



SUSTAINABLE ARCHITECTURE FOR A BETTER FUTURE



BENEFITS AS BRIGHT AS THE SUN



Optimal time of
manufacturing



High quality control over
the production process



Customized product
assortment



Renewable energy
produced by transparent
and non-transparent
façade panels

18 YRS

Experience in BIPV
industry

Photovoltaic
carports

Photovoltaic
sunshades

Photovoltaic
lamps

Photovoltaic
glass

Photovoltaic
facades

Photovoltaic
bus shelters

Photovoltaic
benches



Today buildings are the leading global consumer of energy, and this trend will only continue in the future, mainly due to economic and population growth. This trend is increasingly recognized by many countries around the world.

Federal, state and local governments see investing in green energy technologies in new and existing buildings as an opportunity to achieve greenhouse gas reduction goals. Therefore, energy efficiency in buildings has become a major factor in the environmental movement in recent years, and these factors are increasing the importance of energy efficiency in buildings.

REVOLUTION IN ARCHITECTURE

BUILDING MATERIALS THAT PRODUCE ELECTRICITY FROM THE SUN

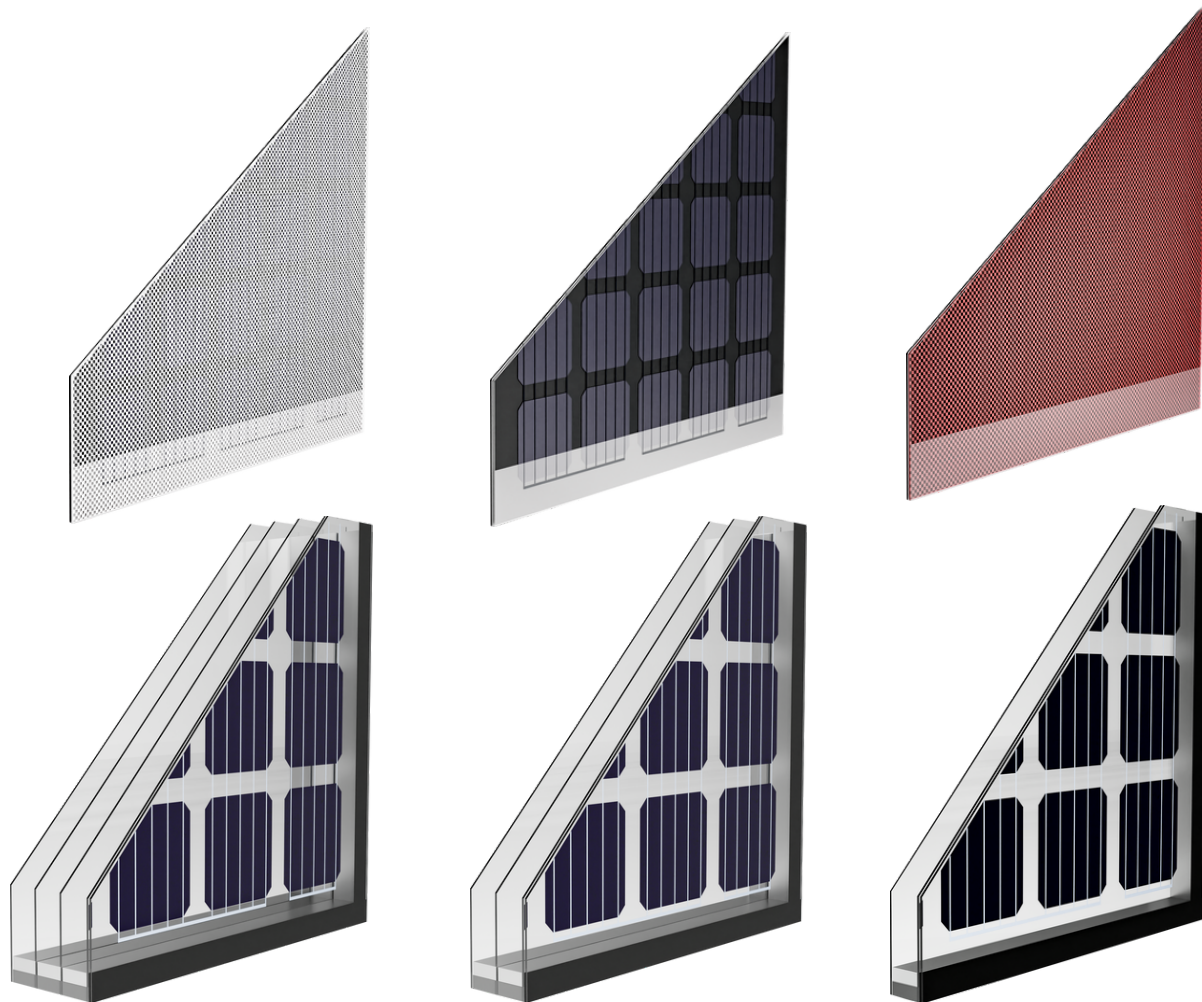
BIPV (BUILDING INTEGRATION PHOTOVOLTAIC) is a comprehensive photovoltaic solution integrated with buildings, which is a substitute for traditional building materials used in roofing, building facades, balustrades and sun protection. BIPV elements produced by ML System can be used not only as a construction element, but primarily as a source of electricity obtained from the sun.

BIPV products, being part of ecological, modern and sustainable construction, are an ideal complement to the architecture of newly constructed buildings and a great solution dedicated to the modernization of existing, energy-inefficient public and private buildings.

BIPV ONE & ONLY ANSWER FOR SUSTAINABLE ARCHITECTURE AND BUILDINGS

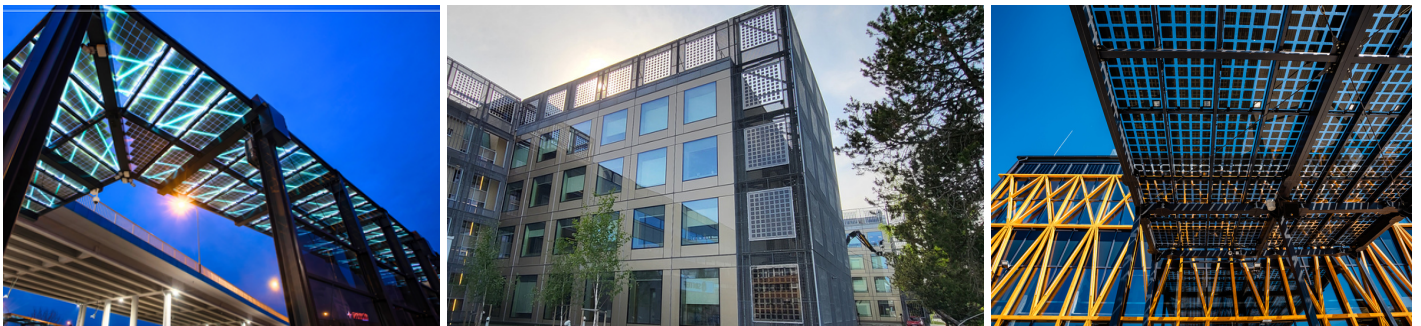


BIPV MODULES



The essential component of BIPV is the system of glass-to-glass modules. Bonding two glass panes with plastic films produces safety glass, a product that is very popular in civil engineering and architecture. Safety glass applications span partitions, balustrades, canopies, etc. Plastic films used in bonding safety and standard glass panes encapsulate the PV cells to protect them from external factors.

All BIPV module types are available in various thicknesses and forms, depending on the vision of the architects (to adapt to the installation method and building form).



GLASS WITH QUANTUM DOTS LAYER

The first solution in the world where a seemingly ordinary glass, in addition to the basic function of insulation from external factors, such as temperature or noise, while providing lighting for the interior of buildings, is an active element generating free ecological energy from the sun. The solution is all the more attractive as it looks no different from traditional insulating glass units commonly used in the construction industry, where the invisible metal oxide coating has been replaced with a quantum dot coating. Quantum dot layer acts as a filter, transmitting light radiation in the visible length, and the unfavorable UV and infrared rays are converted into electricity. As a result, the panes have very good light transmission parameters with additional benefits in the form of generating free energy from the sun, and a significant reduction in unfavorable phenomena in the form of room heating and UV radiation penetration.

IGU's with quantum dot layer limits the overheating of interiors, as well as the effect of so- called urban heat Island (UHI), is a breakthrough in the energy balance of cities. Implementation of this technology not only produces energy from sun but also contributes to the reduction of the HVAC costs.



SYSTEM TECHNICAL SPECIFITCATION:

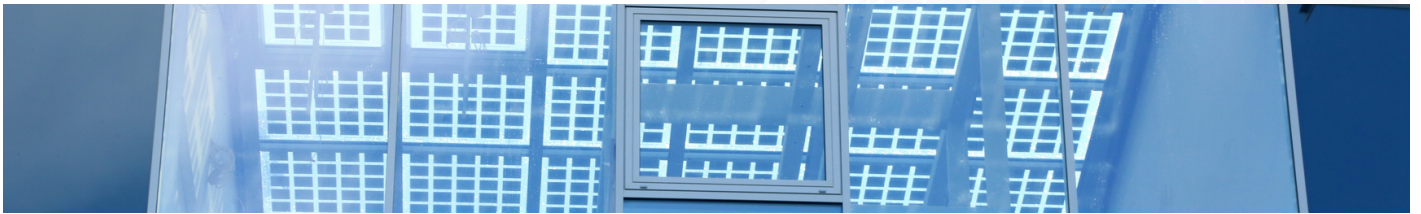
Max dimensions	6.4 ft x 13.1 ft
Efficiency	from 2.7 Wp/ft ²
QDSC	active coating
Thermal insulation	Ug from 0.07 Btu/(h · ft ² · °F)
Energy insulation	g from 0.22
Light transmission	LT up to 85% (for coated VSG)
Additional functions	weather resistance
	resistance to degradation
	resistance to mechanical damage
	safety of use
	tested with fire resistant glass in IGU for EI30 (according to EN 13501)

SINGLE AND TWO CHAMBER INSULATED **GLASS UNITS**

Insulated Glass Unit (IGU) based glazing units are installed as curtain walls and infills in skylights due to the required thermal insulating performance. These designs can also be deployed with PV cells installed within the laminated pane to form the first coating on the IGU outer side.

These solutions are usually applied with various types of low-emission coatings that improve the overall IGU thermal insulation performance. A single-chamber IGU is a standard solution boasting $U = \sim 0.18 \text{ Btu}/(\text{h} \cdot \text{ft}^2 \cdot ^\circ\text{F})$, which means sufficient protection from heat loss to the outside.

Two-chamber IGUs are intended for buildings which require very high thermal insulation performance, as is the case in passive housing. The two-chamber IGUs boast ca. $U = 0.09 \text{ Btu}/(\text{h} \cdot \text{ft}^2 \cdot ^\circ\text{F})$.



Single - and two-chamber PV IGUs are available in different configurations, determined by their functionalities:

- **SUNBLOCK INSULATED GLASS UNIT**

This IGU features a sunblock layer which reduces the exposure to heat from sunlight.

- **SOUNDPROOF INSULATED GLASS UNIT**

This IGU insulates from outdoor noise and its performance is designed according to the nature of the noise.

- **SAFETY INSULATED GLASS UNIT**

This IGU has an improved impact and crash resistance, so that, if cracked, the glass splinters are not propelled out of the panes.

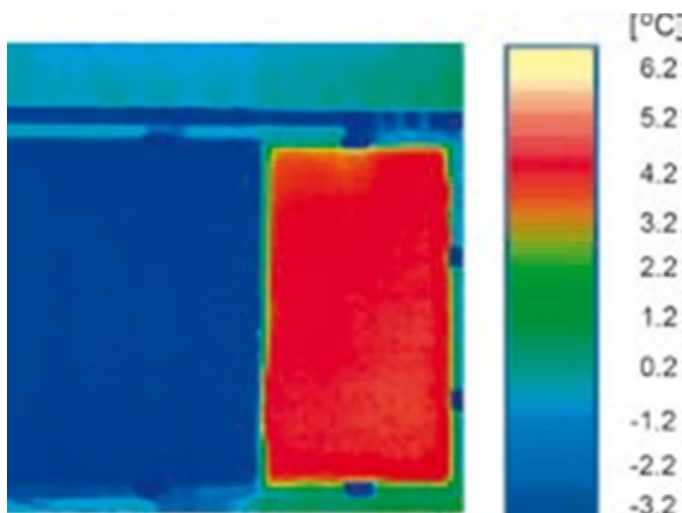
- **ANTI-BURGLARY INSULATED GLASS UNIT**

This laminated glass pane design is adjusted to suit the required anti-burglary class.



NO-FROST MODULES

NoFrost modules can be installed on roofs, skylights and similar structural solutions. One of the panes in the glass-to-glass panel has an additional deposited coat which heats up when connected to an electrical voltage. The generated heat penetrates the module front and the layer of frost, ice or snow. The frost/ice/snow layer melts and uncovers the PV cell underneath.

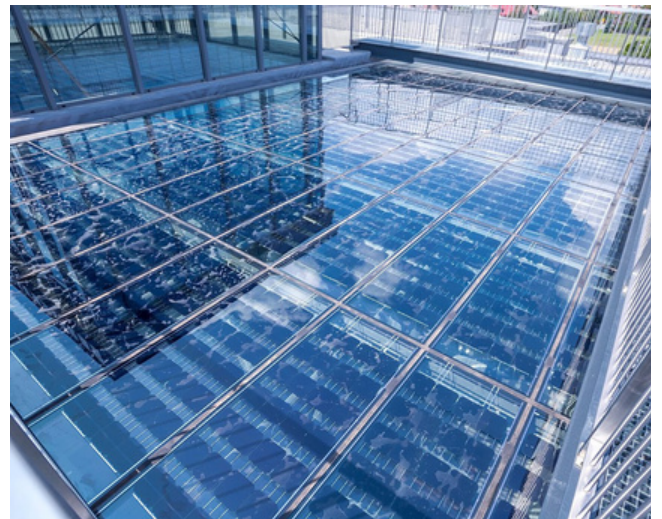


BENEFITS:

- Removes the problem of snow loads on roof structures. The NoFrost modules can clear snow from roof slopes (e.g. carports, halls, airport buildings, border crossing units, warehousing units, train or bus stations, or stadiums)
- An (extra) heat source for indoor rooms; also helps removing steam from glass fronts (e.g. for swimming pools)
- Short time to reach the operating temperature, which is uniformly distributed across the PV panel
- 3 times less power consumed than by resistive wire mats

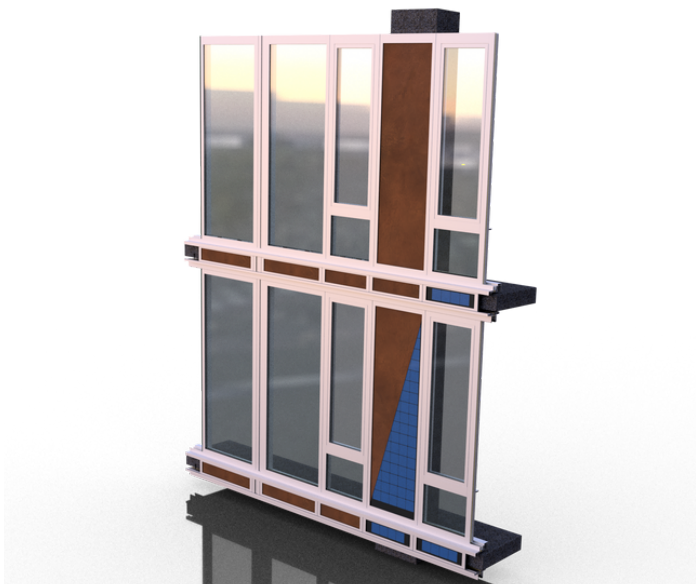
FEATURES:

- NoFrost modules can clear snow from roof slopes (e.g. carports, halls, airport buildings, border crossing units, warehousing units, train or bus stations, or stadiums)
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PHOTOVOLTAIC UNITIZED **FACADE** SYSTEMS

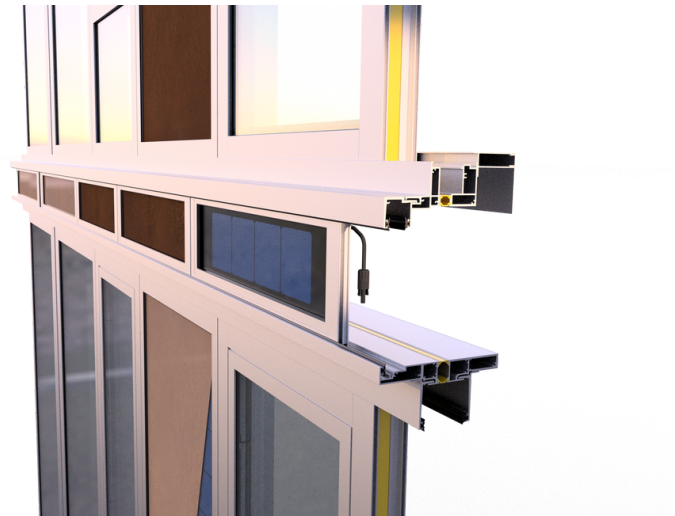
Unitized curtain wall systems integrate the aesthetic appeal of glass, aluminum, and other materials with the efficiency of design and production, aiding the on-site installation construction process of contemporary structures globally. These systems utilize recyclable materials, like glass and aluminum, in addition to natural resources such as wood or wood-aluminum composites, thereby advancing the development of facades into increasingly eco-friendly building products.



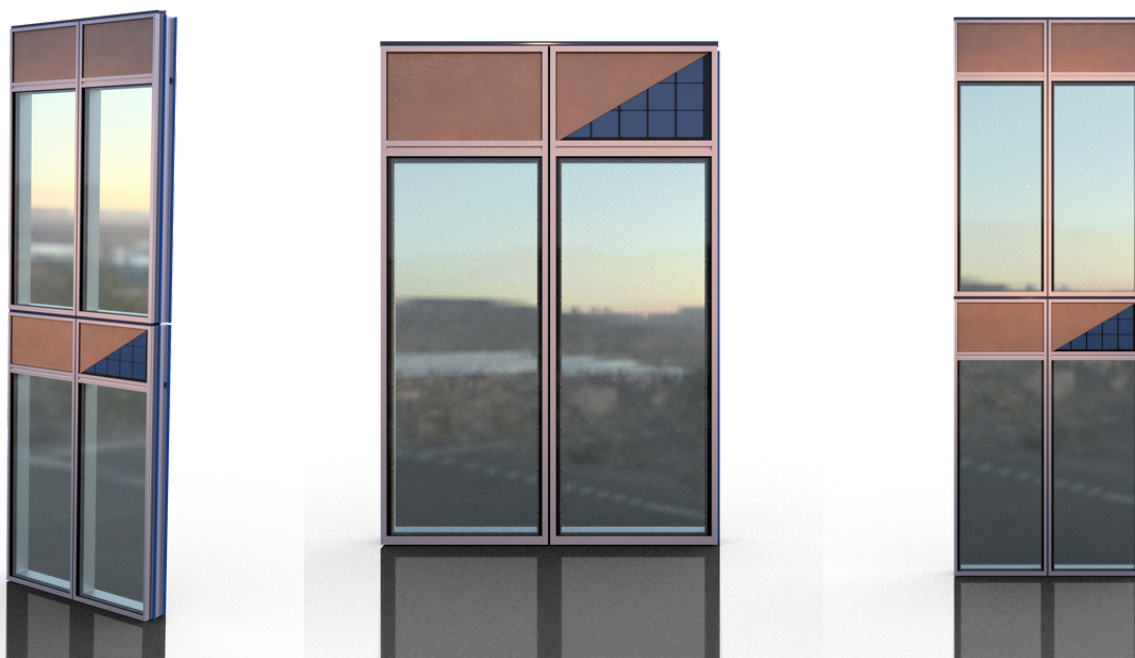
Considering the benefits resulting from the implementation of element facades, ML System, in cooperation with leading system providers of facade technologies (aluminum and wood), has developed its dedicated solutions enabling the use of active product solutions (BIPV panels, active IGU transparent and limited translucency glass) in facade systems. Making them not only eco – friendly but a real pro-ecological product reducing the carbon footprint factor of the buildings.

ML System active unitized façade solution contribute to, contributing highly to the BREAM and LEED certifications allowing to achieve its highest levels.

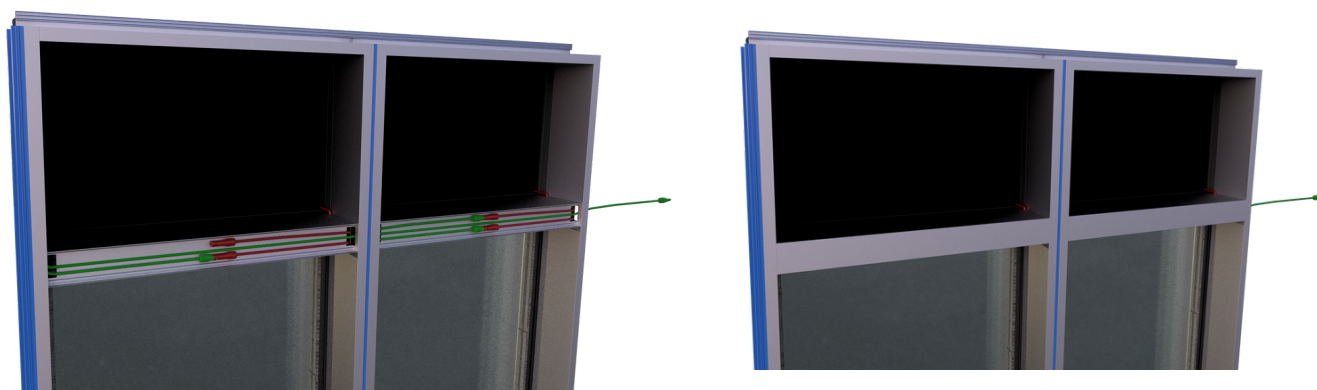
ML System unitized solar facade solutions, encompassing curtain walls, window walls, and punch window facades, are designed for prefabrication (including the pre-wiring of photovoltaic systems) in production facilities. This approach facilitates streamlined prefabrication processes and enhances quality control measures, thereby significantly reducing the erection time on construction sites to the optimum level. Each system is developed to ensure that the active components of the facade can be effortlessly replaced, enhancing both functionality and longevity.



PHOTOVOLTAIC UNITIZED **FACADE** SYSTEMS

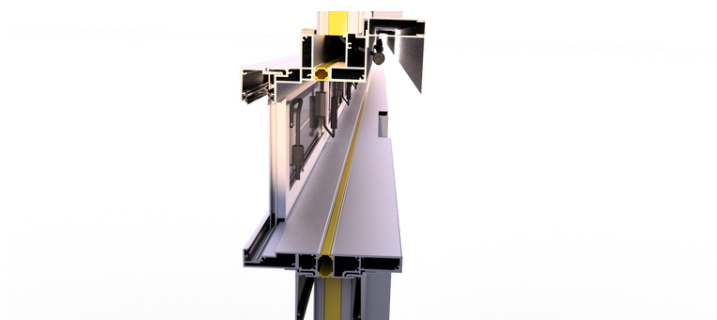
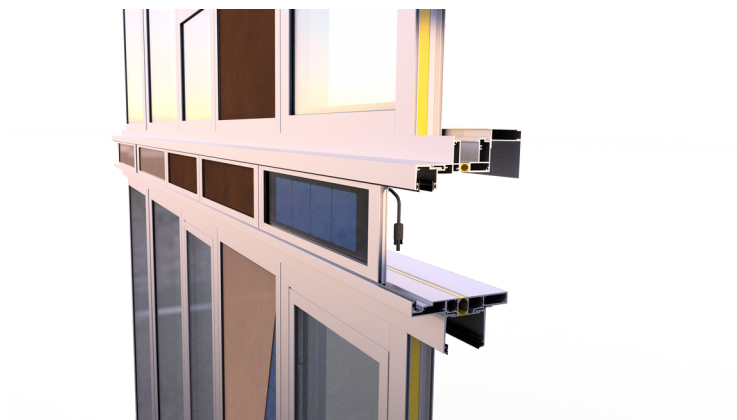
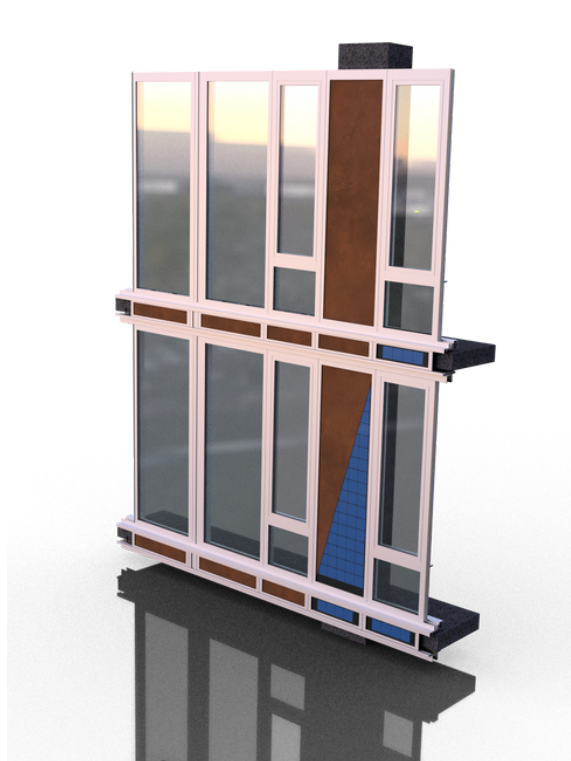


Assembly system - visualization



Assembly system - detail





SYSTEM TECHNICAL SPECIFICATION:

Unit power	max. 20,5 Wp/ft ²
Max operating voltage	1000 V DC
Module types	monocrystalline incl. Black-contact
Optional	monocrystalline incl. Black-contact
	w/heating/glass heater
	printed PV cells
Substructure material	ref. system manufacturer
Maximum module size	ref. system manufacturer
Structure colour	see RAL palette
PV module IGU thickness	ref. system manufacturer
PV module IGU type	single IGU - transparent
	single IGU - enamel coated
	1 - chamber IGU
	2 - chamber IGU
Substructure material	0,14 -0.19 Btu/(h · ft ² · °F)
Maximum module size	as required

PHOTOVOLTAIC SUNSHADES – ML LAMELA

FIXED/MOBILE

Sunshades are important architectural details that have the incredible potential to create the outer appearance of buildings as well as the interior design aesthetics. They are also key to climate comfort and the energy efficiency of buildings. The photovoltaic cells available are applied in the sunshade. ML LAMELA systems are 1st generation cells (poly- and mono-crystalline, including back-contact cells) and 2nd generation cells (thin layer) of various levels of architectonic concepts.



BENEFITS:

- Reducing overheating of rooms
- A wide range of transparency and colours of lamellas
- Any adjustment of the tilt angle of lamellas
- By using of the ultralight materials, the load of the building facade is lower
- Generation of electricity
- Stable construction, modern design
- No need for snow removal
- Easy maintenance, generating savings
- Custom application

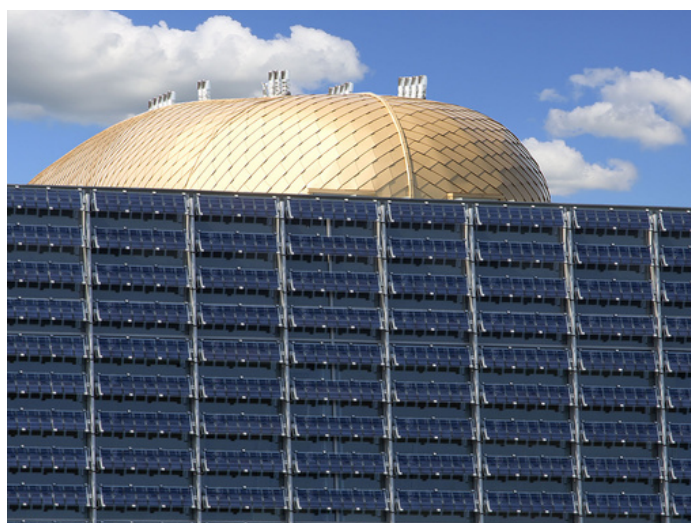
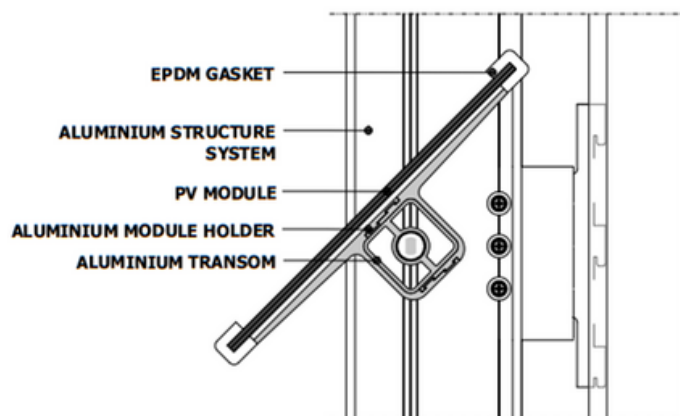
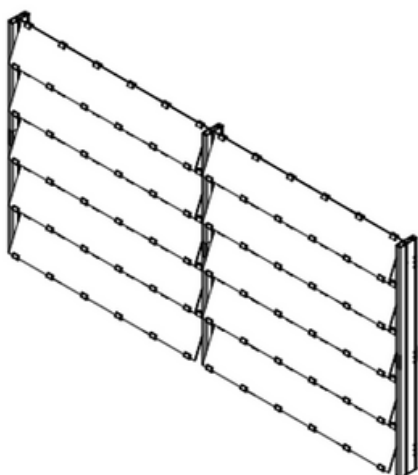
SYSTEM TECHNICAL SPECIFICATION:

Unit power	max. 15,8 Wp/ ft ²
PV cell efficiency	max. 22,5 %
Module types	monocrystalline incl. Black-contact
Optional	bifacial
	transparent
	NoFrost
	printed
Substructure material	aluminium AW 6063/AW 6060 alloy
Support post width	1.97 in
Max. support post spacing	157.5 in
Structure colour	see RAL palette
	14.96 in
	0.12 in to 0.78 in
	10 deg. Pitch – Manual/smooth power actuators

PHOTOVOLTAIC SUNSHADES – ML LAMELA

FIXED/MOBILE

PHOTOVOLTAIC SUNSHADES ML LAMELA FIXED/MOBILE



PHOTOVOLTAIC VENTILATED FACADE SYSTEM

This facade system solution is flexible and can accommodate various PV module sizes in one installation plane, as well as differentiated performance parameters or appearance. The PV modules can be created with regular glass panes in a single facade plane (i.e. without any PV cells; the regular glass panes can be tinted or laminated with color film) to produce a uniform glass surface finish without any inner structural components being visible (in opaque projects), or even highly expose the substructure (in transparent projects).



BENEFITS:

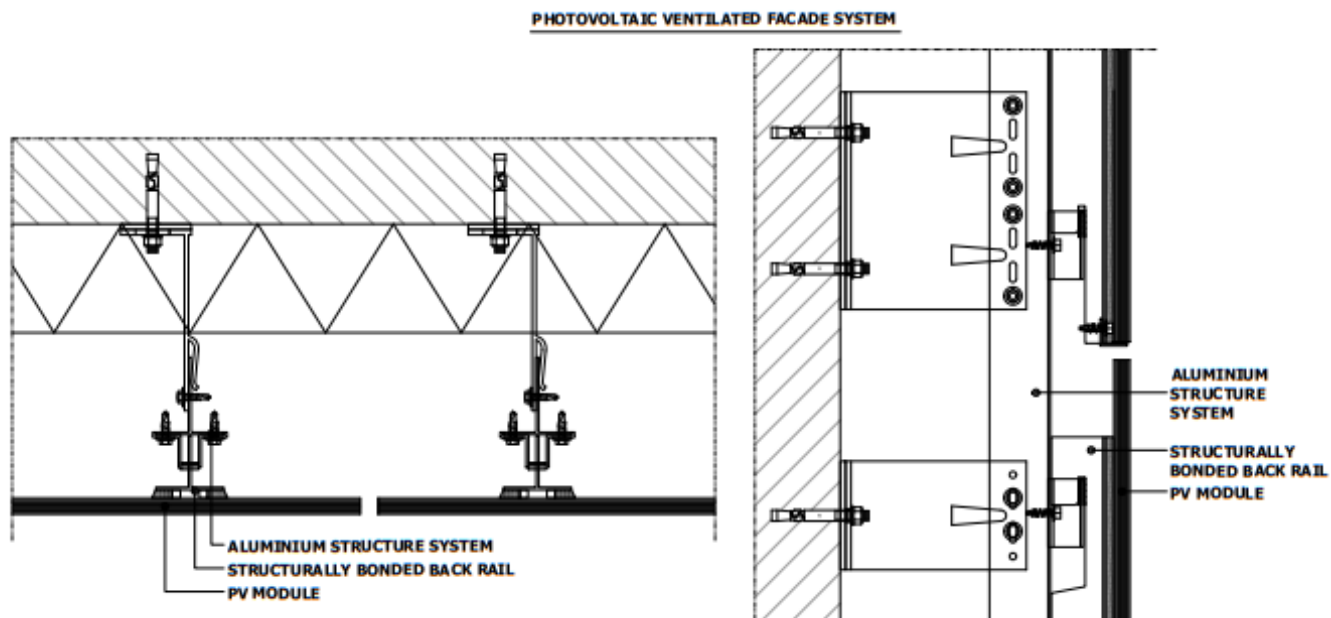
- By using of the ultralight materials, the load of the building facade is lower
- Generation of electricity
- Stable construction, modern design
- No need for snow removal
- Possibility of remote access to the generated yields and generated savings

SYSTEM TECHNICAL SPECIFICATION:

Unit power	max. 20 Wp/ ft²
Max operating voltage	1000 V DC
Module types	monocrystalline incl. Black-contact
Optional	printed
	transparent
Substructure material	aluminium AW 6063/AW 6060 alloy
Maximum module size	20 ft x 9.8 ft
Module thickness	0.11 to 0.86 inch



PHOTOVOLTAIC VENTILATED FACADE SYSTEM



PHOTOVOLTAIC TRANSOM-MULLION FACADE/STANDARD

Curtain walls are multifunctional outer covering of buildings. Thanks to their lightweight structures, good thermal insulating performance and optical transparency, these systems have found widespread use as outer claddings on commercial office buildings, schools, and official government facilities. These facades first protect the building from the elements and then add value to the architectural form of the structure.

However, these functions are no longer enough. This is why we propose novel functionalities that façade systems can, and should, feature, both on new and refurbished buildings to achieve unique styling and a prestigious appearance. What we propose for the standard curtain walls are photovoltaic modules for collecting free solar power.



BENEFITS:

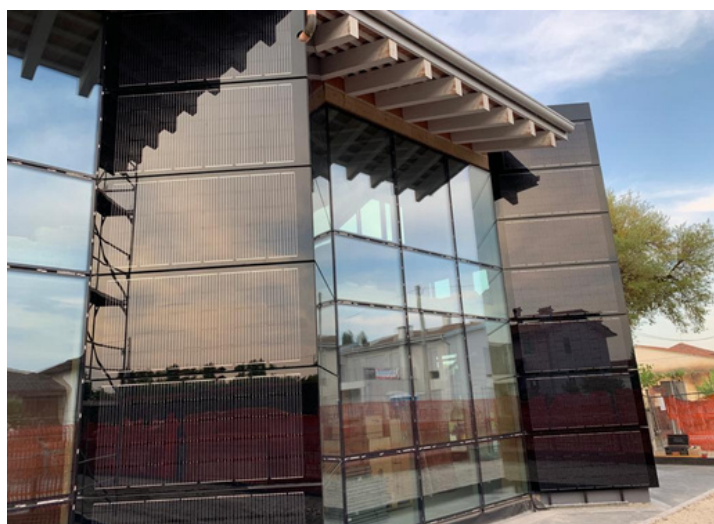
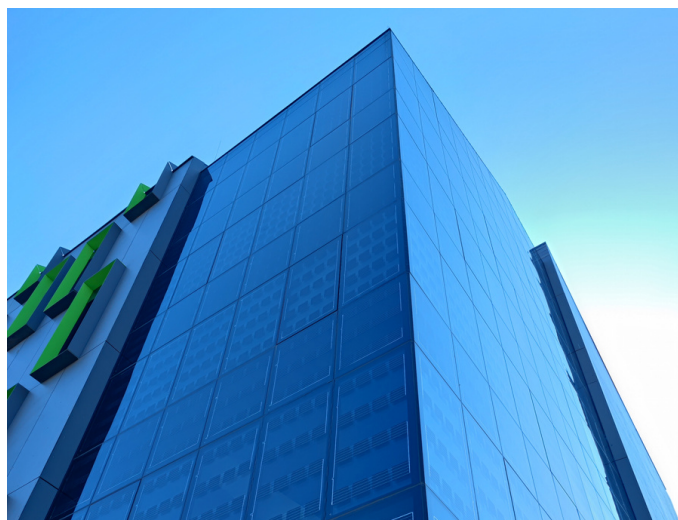
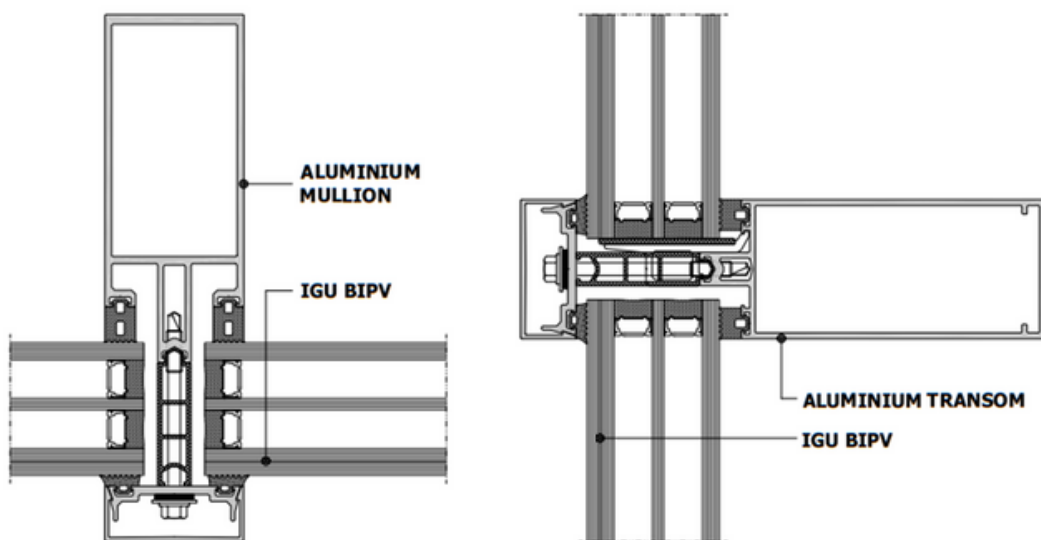
- By using of the ultralight materials, the load of the building facade is lower
- Generation of electricity
- Stable construction, modern design
- No need for snow removal
- Possibility of remote access to the generated yields and generated savings

SYSTEM TECHNICAL SPECIFICATION:

Unit power	max. 20 Wp/ ft ²
Max operating voltage	1000 V DC
Module types	monocrystalline incl. Black-contact
Optional	bifacial
	w/heating/glass heater
	printed PV cells
Substructure material	ref. system manufacturer
Maximum module size	ref. system manufacturer
Structure colour	see RAL palette
PV module IGU type	single IGU - transparent
	single IGU - enamel coated
	1 - chamber IGU
	2 - chamber IGU
PV module IGU thickness	ref. system manufacturer
PV module IGU heat transfer coefficient	from 0,09 Btu/(h · ft ² · °F)
Module transparency	as required

PHOTOVOLTAIC TRANSOM-MULLION FACADE/STANDARD

PHOTOVOLTAIC CURTAIN WALL - STANDARD



PHOTOVOLTAIC OUTER SKIN

The point fastening system has the immense potential to create bold architectural solutions with uniquely elegant appearances and long service lives. The solutions based on the point fastening system are perfect for large buildings, small (street) architecture or custom projects. The range is complemented by dedicated fastening systems for outer louvers, ventilated facades, or roof structures.

BIPV inextricably binds PV modules to the fastening systems. The point fastening is excellent for entrance canopies, especially when combined with the NoFrost PV modules to prevent snow from settling on the shelter top. ML System carries an entire range of fastening solutions for even the most unique design requirements.



BENEFITS:

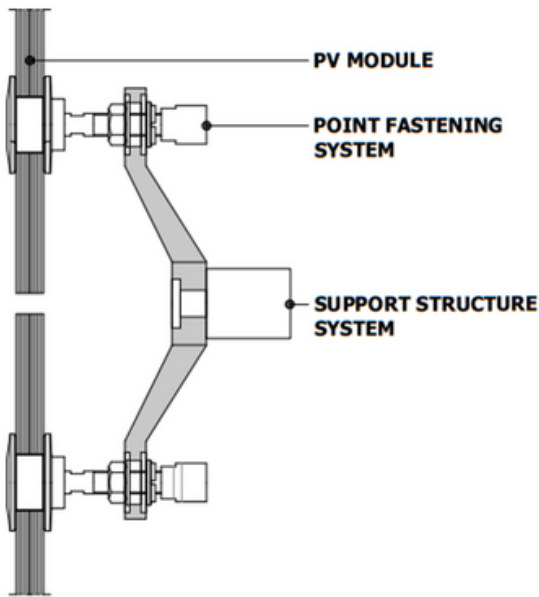
- By using the ultralight glass, the facades become lighter and more resistant to dirt
- Generation of electricity
- Stable construction, modern design
- Simple maintenance and upkeep
- No need for snow removal, protection against weather conditions
- Custom application

SYSTEM TECHNICAL SPECIFICATION:

Unit power	max. 20 Wp/ ft ²
Max operating voltage	1000 V DC
Module types	monocrystalline incl. Black-contact
Optional	transparent
	printed
Substructure material	aluminium/stainless steel
Module to module gap V/H	min. 10 mm
Maximum module size	20 ft x 9.8 ft
Structure color	see RAL palette
Module thickness	3 to 22 mm

PHOTOVOLTAIC **OUTER SKIN**

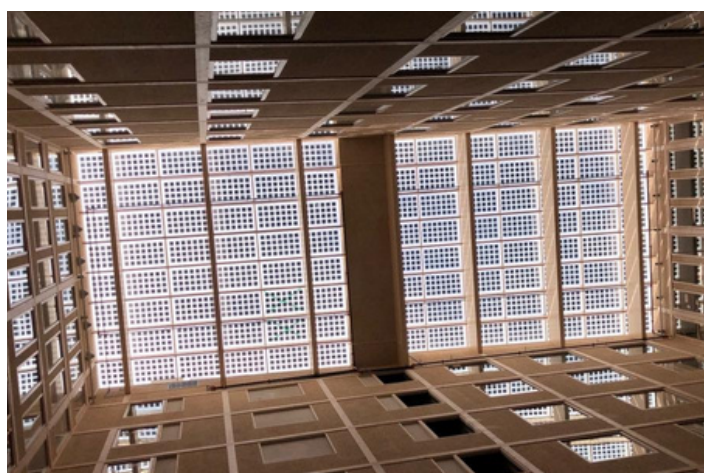
PHOTOVOLTAIC OUTER SKIN - POINT-FASTENED



PHOTOVOLTAIC SKYLIGHT

Skylights are architectural details which provide extra illumination indoors, and this has been their primary function until now. The development of innovative PV cells lets us expand skylight functionality to turn them into small power plants. The PV skylights can be delivered in both standard and structural versions.

Skylights are structures that are usually based on a framework of rafters and purlins and usually infilled with single or two-chamber IGUs (Insulated glass units, or poly-carbonate panes. This is not enough. To provide skylights with the added value of power generation, the outer IGU pane is replaced with a PV module. ML System is planning to introduce its quantum dot layer glass allowing full transparency and energy production of its skylights.



BENEFITS:

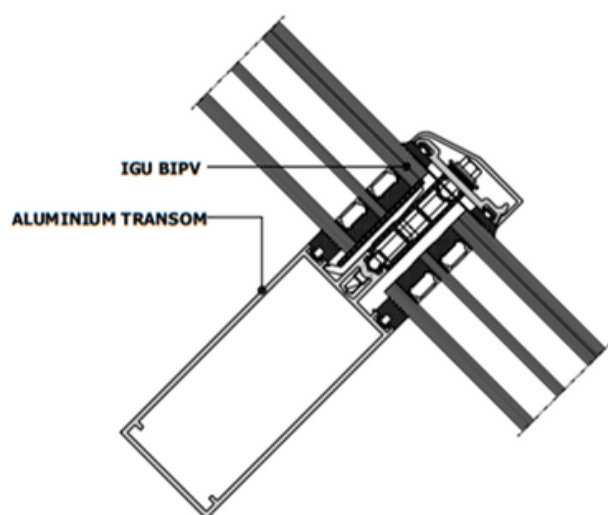
- By using ultra light materials, the implementation of the structures on the roofs is possible because of their low carrying capacity
- Generation of electricity
- Stable construction, modern design
- Simple maintenance and upkeep
- No need for snow removal, protection against weather conditions
- Choice of transparency level

SYSTEM TECHNICAL SPECIFICATION:

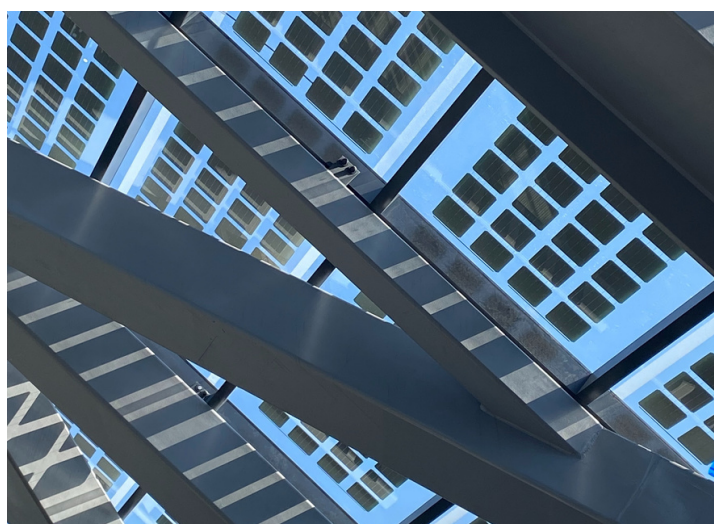
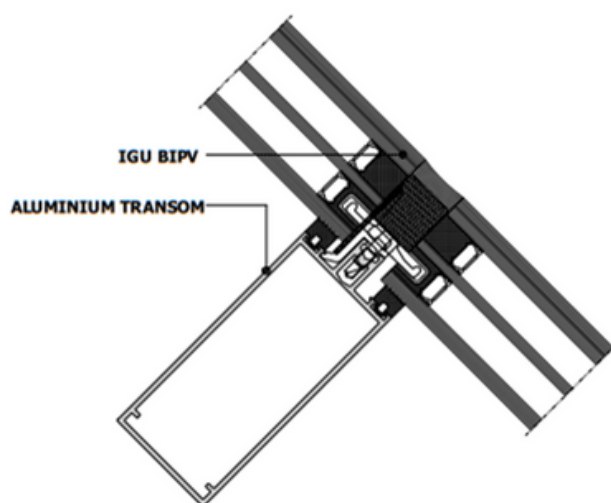
Unit power	max. 20 Wp/ ft ²
Max operating voltage	1000 V DC
Module types	monocrystalline incl. Black-contact
Optional	bifacial
	NoFrost
	printed
Substructure material	ref. system manufacturer
Maximum module size	ref. system manufacturer
Structure colour	see RAL palette
PV module IGU type	single IGU - transparent
	single IGU - enamel coated
	1 - chamber IGU
	2 - chamber IGU
PV module IGU thickness	ref. system manufacturer
PV module IGU heat transfer coefficient	from 0,09 Btu/(h · ft ² · °F)
Module transparency	as required

PHOTOVOLTAIC SKYLIGHT

PHOTOVOLTAIC SKYLIGHT - STANDARD



PHOTOVOLTAIC SKYLIGHT - STRUCTURAL



PHOTOVOLTAIC BALUSTRADES

Glass balustrades are details featured in many architectural designs. The sophisticated elegance of these solutions match both modern and traditional building styles. They are most often used to protect from falls. The outer balustrades from ML System come with a very functional addition: they generate power.

The PV balustrades are manufactured in different sizes, up to 11.5 ft in length, and customized to suit various fastening types and handrail styles. The flexible size range, the wide selection of optional fasteners and handrails, the rich color palette, the large transparency scale, and the novel utility feature of power generation make the ML System PV balustrades extremely attractive in terms of aesthetics and cost efficiency.



BENEFITS:

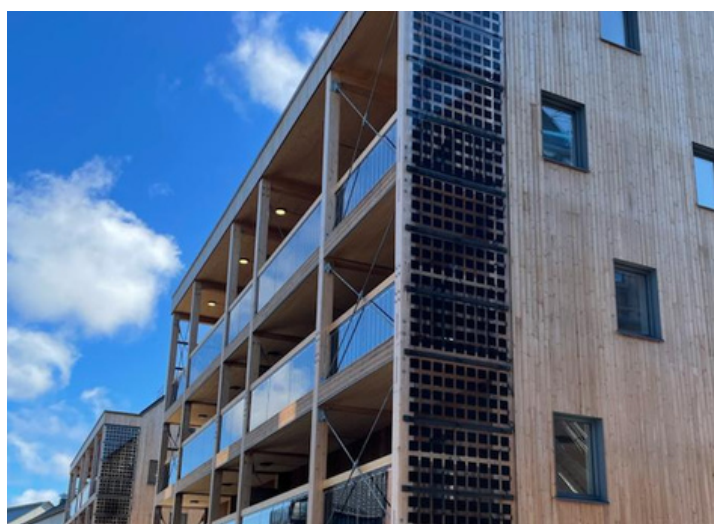
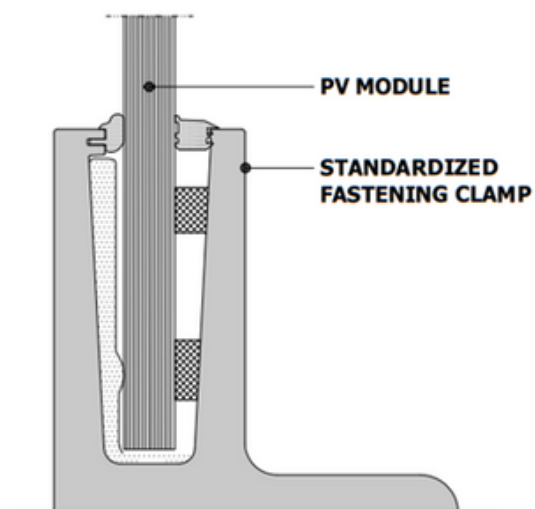
- By using of the ultralight glass, the structure becomes lighter and more resistant to scratches and dirt
- Generation of electricity
- Stable construction, modern design
- Simple maintenance and upkeep

SYSTEM TECHNICAL SPECIFICATION:

Unit power	max. 20 Wp/ ft ²
Max operating voltage	1000 V DC
Module types	monocrystalline incl. Black-contact
Optional	bifacial PV cells
	printed PV cells
Substructure material	ref. system manufacturer
Maximum module size	ref. system manufacturer
Structure colour	see RAL palette
PV module IGU thickness	ref. system manufacturer
Module transparency	as required

PHOTOVOLTAIC BALUSTRADES

PHOTOVOLTAIC BALUSTRADES





ML System S. A.


ML System S.A. – Polish highly specialized technology company with its own production plant and strong R&D Center equipped with world-class laboratory equipment. The company, which has been operating on the market for 18 years (registration date in 2006), specializes in traditional and innovative photovoltaic solutions, of which it is both a producer and a distributor. It has been listed on the Warsaw Stock Exchange since 2018.

ML System's products are a real alternative to many construction products, such as composite or sandwich panels, glass, ceramics, stone, roofing materials, heating mats or even entire heating systems. They provide the basic function of generating electricity from sunlight, and more features that are typical of other construction materials, including: high thermal and sound insulation performance, rain sealing and increased mechanical strength.

ML System is a manufacturer and supplier of complete technologies for use in the building, including assembly, control and building management systems.

BIPV modules manufactured by ML System has Environmental Product Declaration (EPD) to comply with the requirements and environmental standards required in sustainable construction

**BIPV ONE & ONLY ANSWER FOR SUSTAINABLE
ARCHITECTURE AND BUILDINGS**

 **Powering** a safer future

WE ARE CHANGING THE WORLD FOR FUTURE GENERATIONS

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