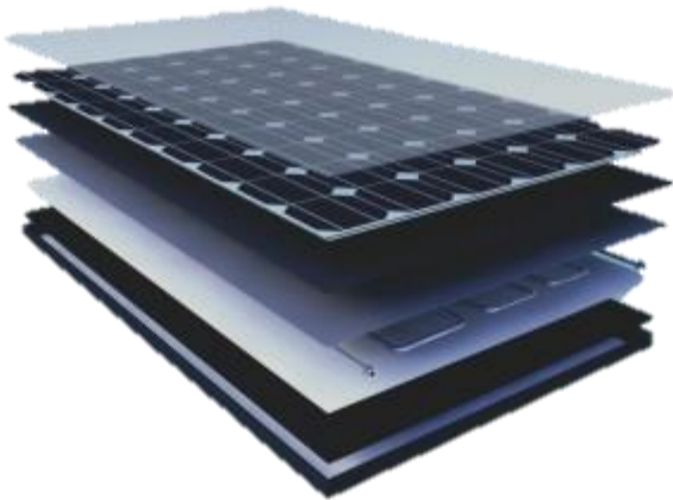




HYBRID SOLAR PANEL

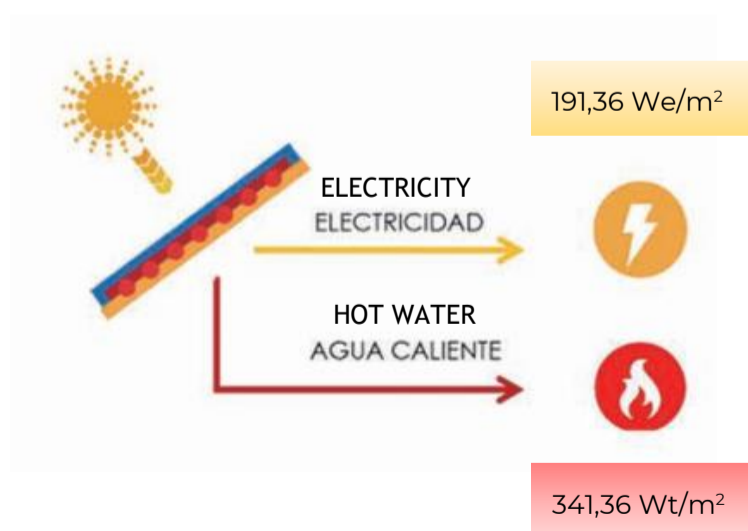


- ~ Hybrid technology that combines a monocrystalline photovoltaic module and a high-efficiency solar thermal collector.
- ~ Simple low-cost and low-maintenance energy solution, capable of facilitating the 0 Carbon strategy.
- ~ 60 high power cells.
- ~ PVT-1: first generation hybrid solar panel.
- ~ The cooling produced by the water circuit improve photovoltaic performance, improving its efficiency by up to 17% compared to a traditional photovoltaic panel.

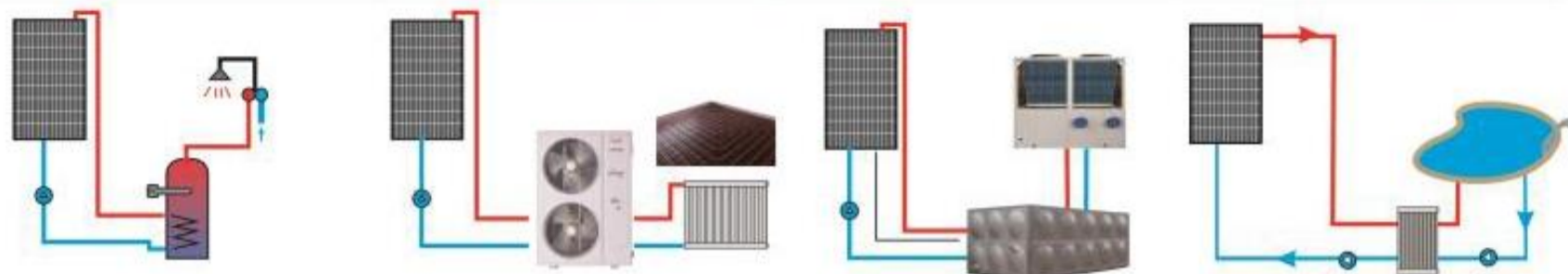
*According to standards:

- ~ IEC/EN 61215 Photovoltaic (PV) modules for terrestrial use. Design qualification and approval.
- ~ IEC/EN 61730 Safety qualification of photovoltaic (PV) modules.

* Warranty: 5 years. Shel life: 15 years.



Different applications:



Domestic and/or comercial hot water

Heat pump and/ or heating

Swimming pools

TECHNICAL SPECIFICATIONS

- Maximum working pressure: 10 bars
- Maximum system voltaje: DC 1000 V
- Maximum series fuse: 15 A
- Application class: Class A
- Conexions: 2x1/2" M stainless Steel 304
- Volumetric Flow: 0,078 l/s
- Hot water (with an increase of temperatura of 35°C): 60 L – 80 L / D
- Shelf life: 15 years
- Board components (from outside to inside):
 - 1- Tempered glass.
 - 2- Monocrystalline photovoltaic module.
 - 3- EVE
 - 4- Heat conduction alloy plate.
 - 5- 304 stainless Steel heat Exchange tube.
 - 6- High temperatura insulation layer.
 - 7- Insolation.
 - 8- Aluminum frame.



CHARACTERISTICS

Maximum electrical power	Maximum thermal power*	Cell type	Weight	Dimensions	Current at Pmax (Imp)	Voltage at Pmax (Vmp)	Short circuit current (Isc)	Open circuit voltaje (Voc)
310 W (0/+3%)	553 W	Monocrystalline	22,5 kg	1640 x 992 x 35 mm	9,36 A	33,1 V	10,02 A	40,5 V

*Output power under the following conditions: Gb = 850 W/m². Gd = 150 W/m². u = 1,3 m/s. θm – θa = 0K.

Gb: Direct solar irradiance

Gd: Diffuse solar irradiance

u: Circulating air speed

θm: Average temperatura of the heat transfer fluid.

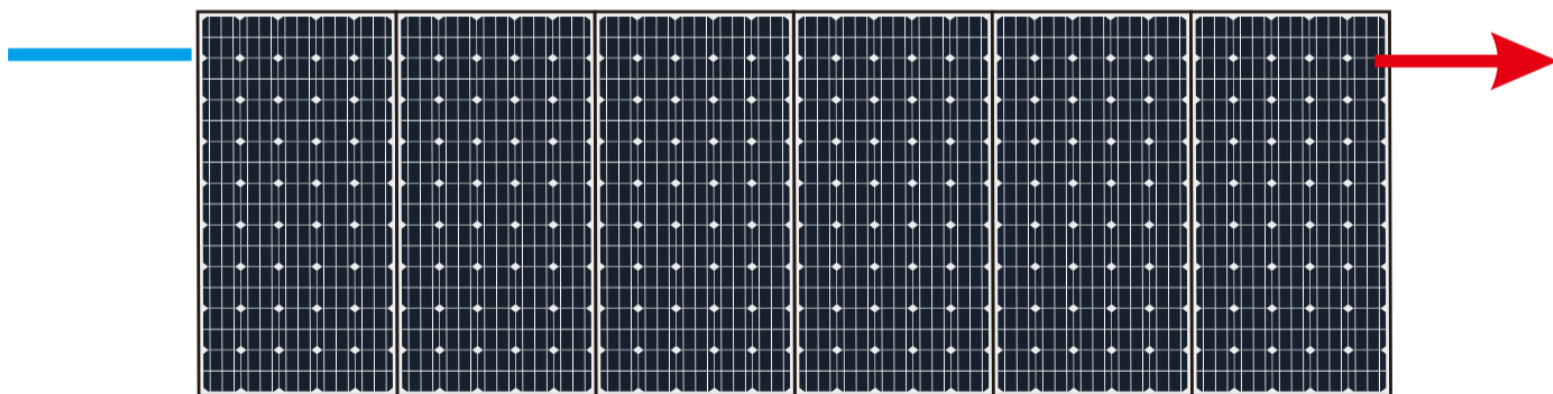
θa: Ambient or circulating air temperatura

ADDITIONAL INFORMATION

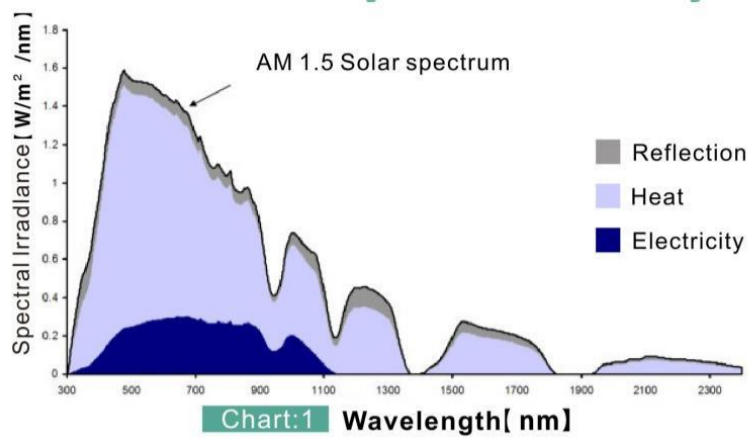
- ✓ Higher output efficiency at lower temperatures than equivalent monocrystalline photovoltaic system.
- ✓ Space saving on the roof, as only this plate is required to produce heat and electricity.



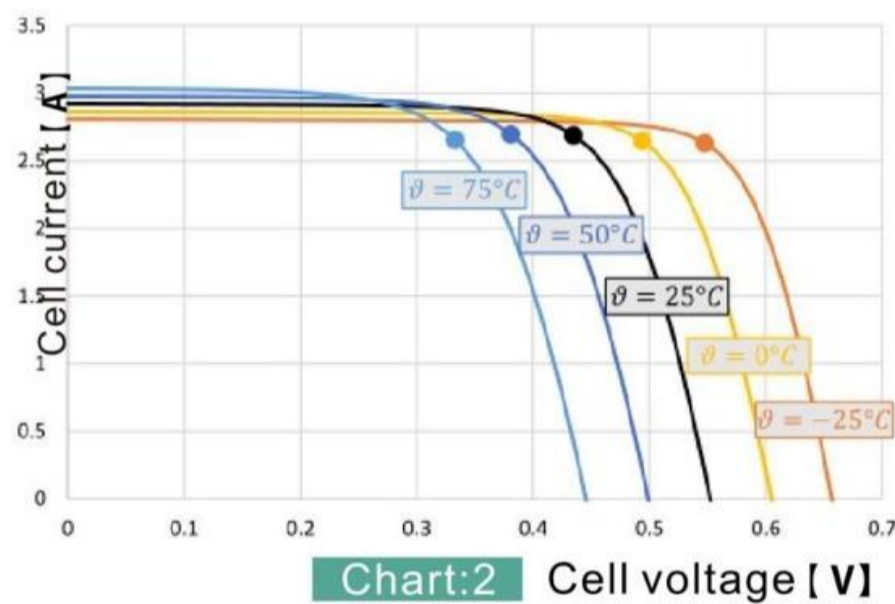
- ✓ A rear cover is incorporated into the unión of the photovoltaic laminate and the thermal collector whose function is to conserve heat, thus preventing it from being lost through the rear of the panel. This means that the photovoltaic laminate is not so hot, thus enhancing the electrical part of the panel.
- ✓ The maximum recommended number of modules in line to guarantee the correct filling of the panels during start-up is 6 vertically or horizontally.



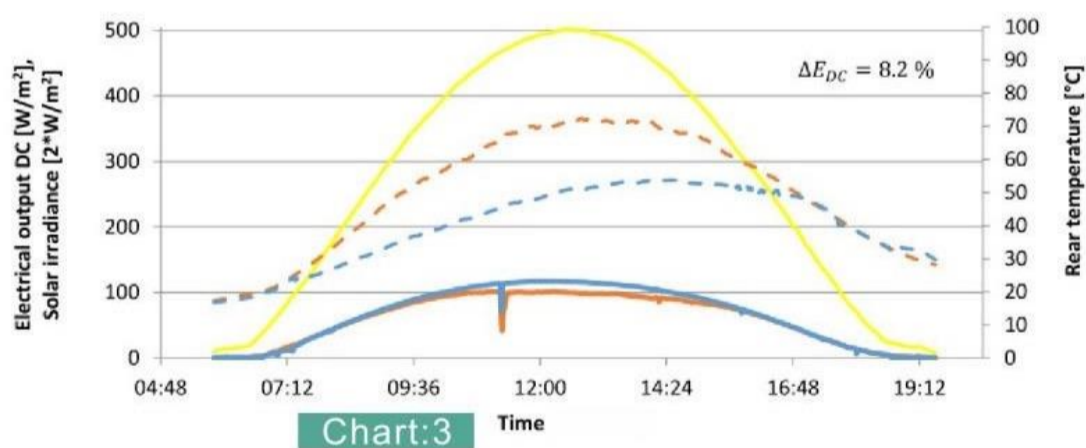
PERFORMANCE CURVES



In a photovoltaic cell, 10% of the solar irradiation is reflected and can not be used. The remaining 17% of the 90% of the irradiation is absorbed by the photovoltaic cell and can be converted into electricity. 73% is converted into thermal energy.



In a photovoltaic module, the thermal output is not used. It increases the cell temperature, so it has a negative effect on the electrical efficiency of the photovoltaic module. In standard silicon photovoltaic cells, an increase in cell temperature results in a reduction in open-circuit voltage and a less pronounced increase in short-circuit current. This results in a reduction in electrical efficiency at the point of maximum power.



Hybrid solar panel solves the weakness of conventional photovoltaic module, extracts heat and increases electrical efficiency of photovoltaic cells, produces solar electricity and hot water together. The temperature difference between the hybrid solar panel and the photovoltaic modules reaches a maximum of 22°C. At that time, the hybrid solar panel achieves 17% more electricity production for m2 than the standard photovoltaic system. Integrated throughout the entire day, the difference between the electrical performance of this and the conventional module amounts to 8.2%.

Solar irradiation	DC photovoltaic module	DC hybrid solar panel	Tª photovoltaic module	Tª hybrid solar panel
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PERFORMANCE ANALYSIS WITH 100 HYBRID SOLAR PANEL

- ~ 12 Tn/ domestic hot water day.
- ~ Capacity: 27,5 kW/hour.
- ~ Annual electricity generation: 32.400 kwh (according to the anual effective sunlight in the area where the project was carried out).
- ~ Annual heat generation: 90.700 kWh.
- ~ Amortization: aproximately in 3 years the full initial investment is recovered.

