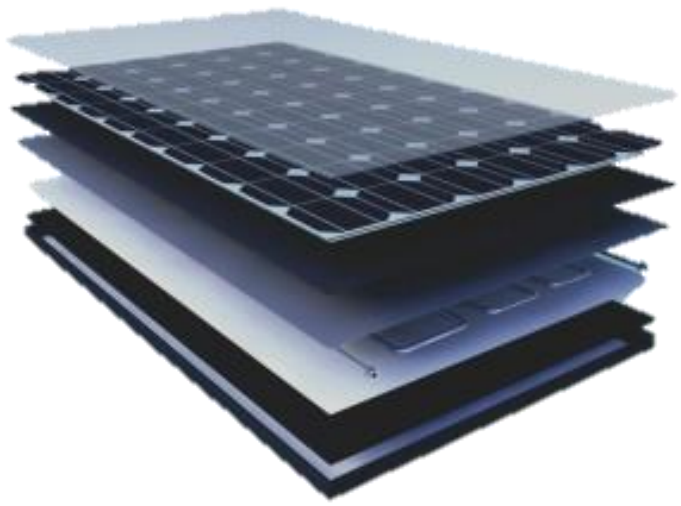
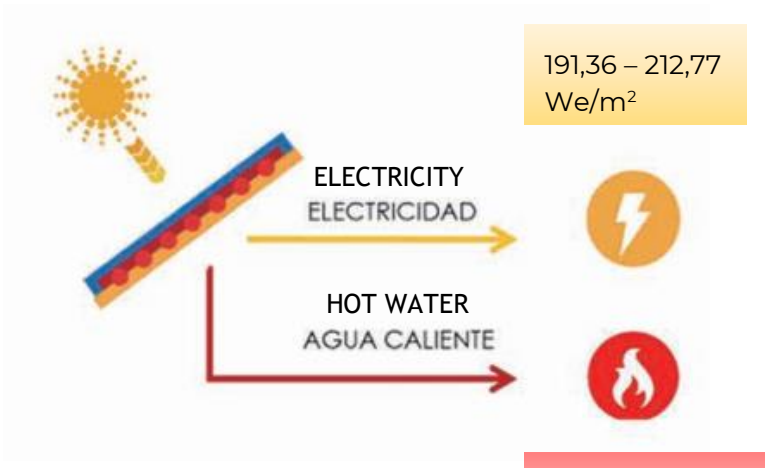
HYBRID SOLAR PANEL HB





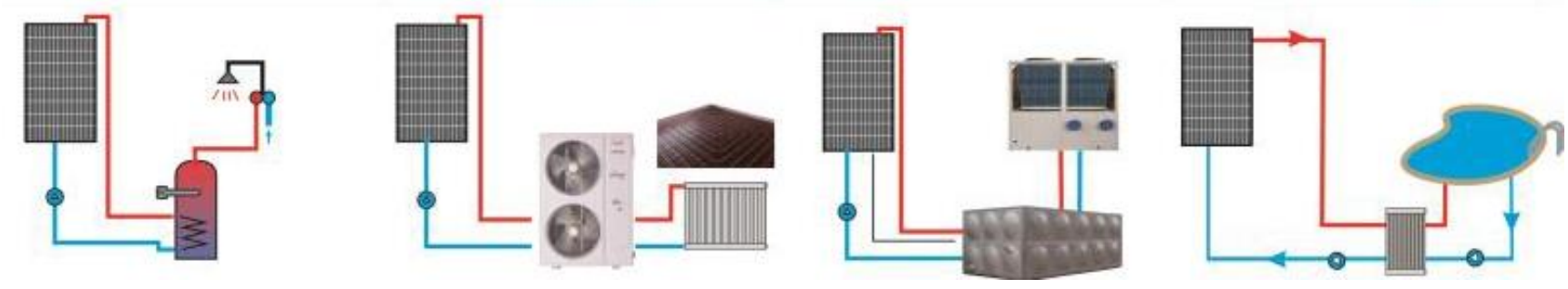
- Hybrid technology that combines a monocrystalline photovoltaic module and a high-efficiency solar thermal collector.
- Simple low-cost and low-manintenance energy solution, capable of facilitating the 0 Carbon strategy.
- 60-120 high power cells Mono-PERC.
- PVT-1 & PVT-2: first and second generation 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: 12 years. Shel life: 25 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 (HB310) and 30 A (HB600)
- Application class: Class A
- Conections: 2x1/2" M (HB310) and 12 mm (HB600) stainless Steel 304
- Volumetric Flow: 0,078 l/s (HB310) and 0,18 l/s (HB600)
- Hot water (with an increase of temperatura of 35ºC): 60 L – 80 L / D
- Shelf life: 25 years

✓	**PID Resistance** Excellent Anti-PID performance.
✓	**Durability againdt extreme environmental conditions and resilience to adverse weather conditions** Certified to withstand a wind load of 2400 Pascal and a snow load of 5400 Pascal.
✓	**High efficiency** Module conversión efficiency of up to 21,2%.
✓	**Low light performance** The advanced textured designo f the glass Surface and cells ensures excellent performance in low light environments.

- 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

Model	Maximum electrical power	Maximum thermal power*	Number of cells	Cell type	Weight	Dimensions	Current at Pmax (Imp)	Voltage at Pmax (Vmp)	Short circuit current (Isc)	Open circuit voltaje (Voc)
HB 310	310 W (0/+3%)	553 W	60	Monocrystalline	22,5 kg	1640 x 992 x 35 mm	9,36 A	33,1 V	10,02 A	40,5 V
HB 600	600 W (0/+3%)	963 W**	120	Monocrystalline	38,0 kg	2172 x 1303 x 35 mm	16,93 A	35,44 V	17,83 A	43,77 V

*Output power under the following conditions: Gb = 850 W/m^2. Gd = 150 W/m^2. u = 1,3 m/s. θm – θa = 0K. Solar Keymark certificate in progress.

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

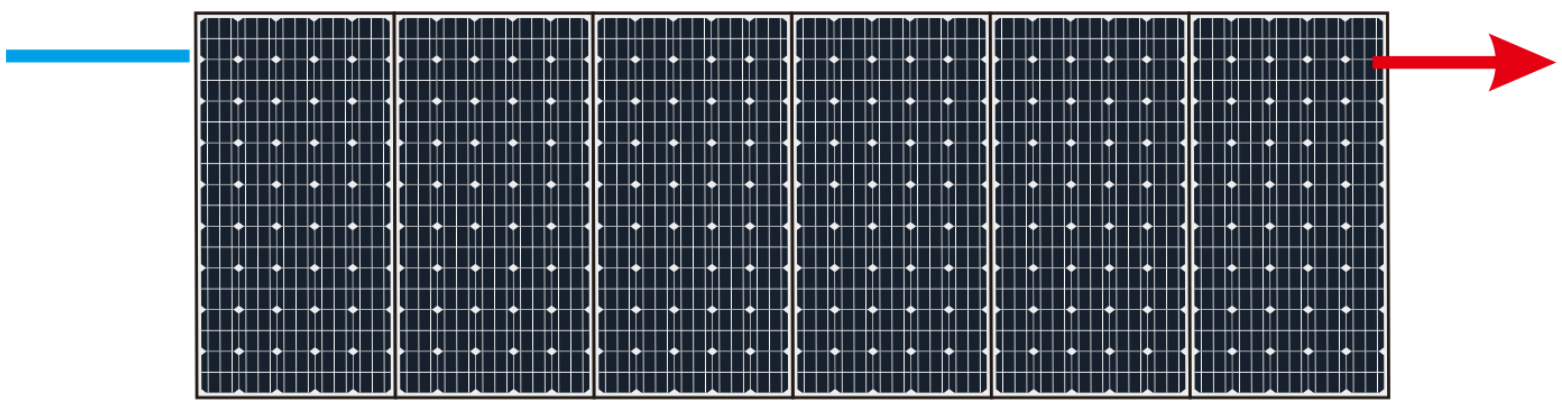
ADDITIONAL INFORMATION

- Higher output efficiency at lower temperatures than equivalent monocrystalline photovoltaic system.

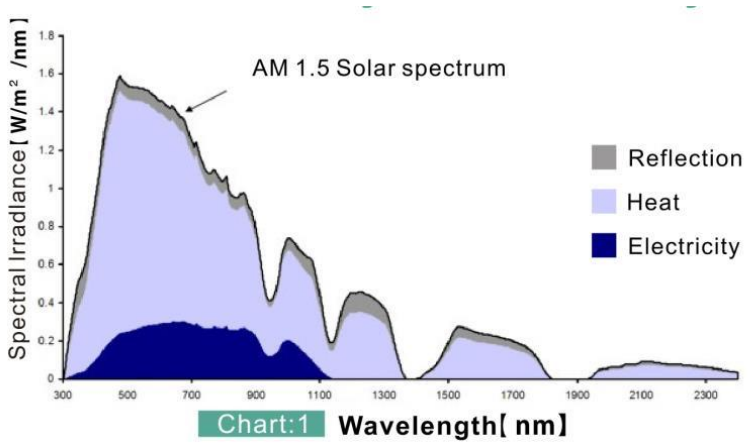
- Space saving on the roof, as only this plate is required to produce heat and electricity.

- A rear cover is incorporated into the unión of the photovoltaic laminate and the termal collector whose function is to conserve heat, thus preventing it from being lost through the rear of the panel. This mean that the photovoltaic laminate is not so hot, thus enhancing the electrical part of the panel.

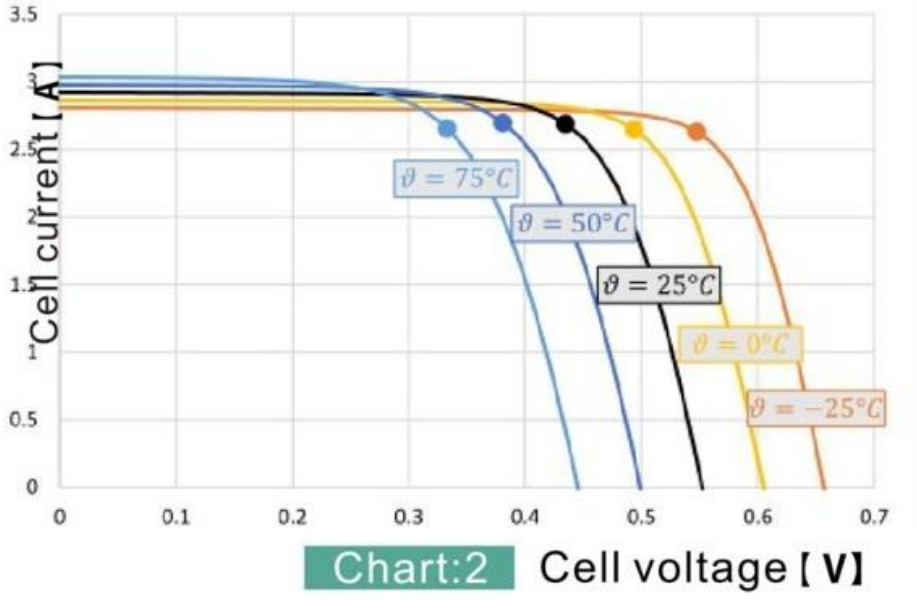
- The máximum recommended number of modules in line to guarantee the correct filling of the panels during start-up is 6 vertically or horizontally.



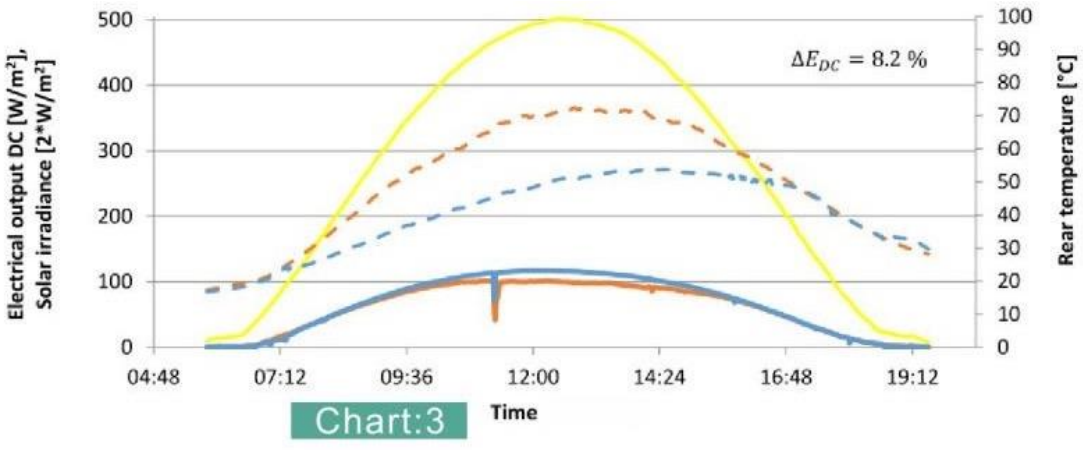
PERFORMANCE CURVES



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 termal energy.



In a phtovoltaic module, the termal 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 voltaje annd a les pronounced increases in short-circuit current. This results in a reduction in electrical efficiency at the point of máximum power.



	Solar irradiation		DC photovoltaic module		DC hybrid solar panel	-	Tª photovoltaic module	-	Tª hybrid solar panel

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 máximum of 22ºC. 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 differece between the electrical performance of this and the conventional module amounts to 8.2%.

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.