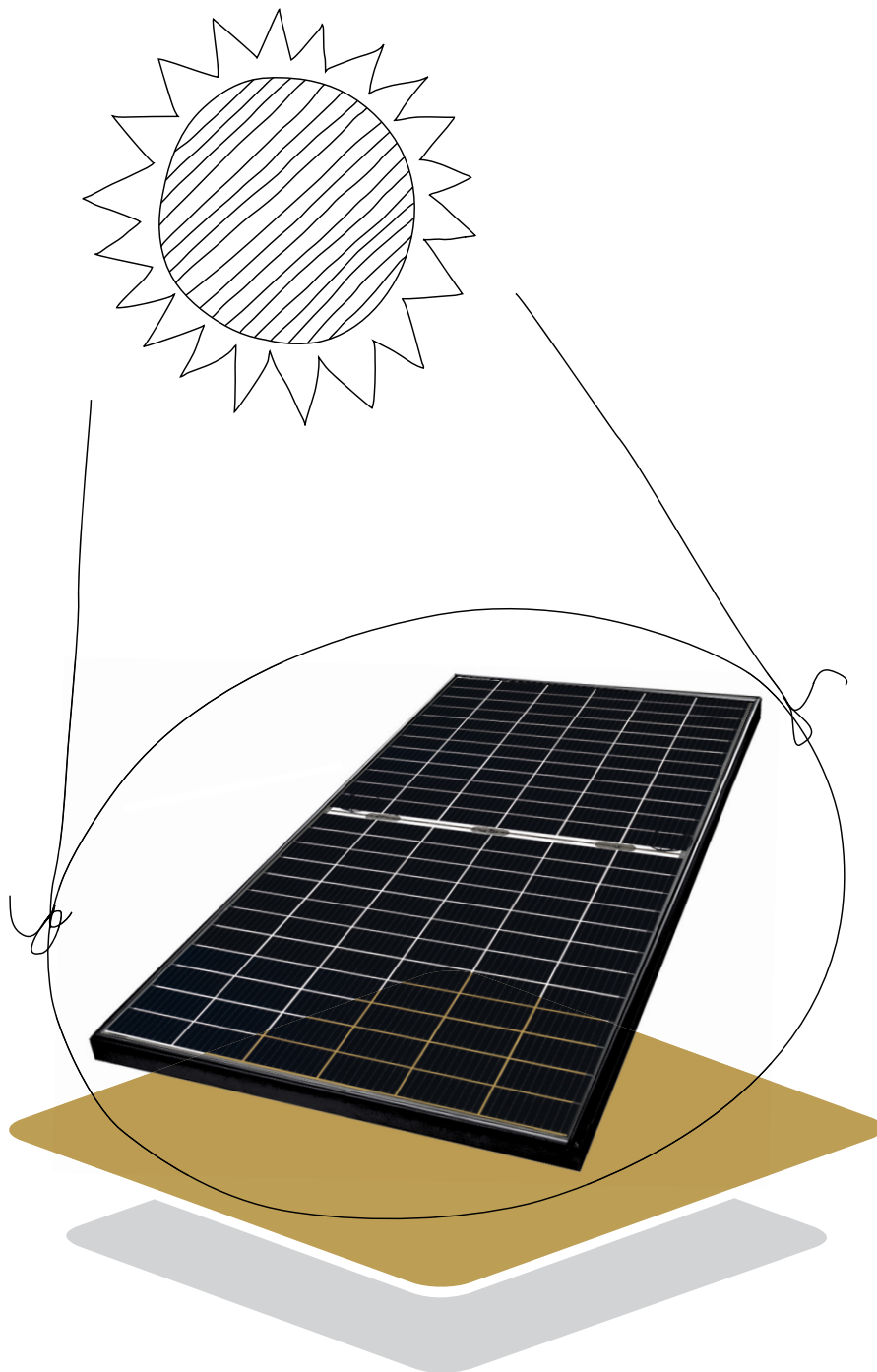


ECO LINE BIFACIAL

Bifacial, Half-Cell, Glass-Glass Module Family
The „additional yield module“



BIFACIAL | HALF-CELL | GLASS-GLASS

THE HIGH-GAINS MODULE



Combining three technologies in terms of modular architecture, Luxor Solar is expanding its portfolio with an additional premium solar module.

By using bifacial cell technology resulting in an increase in performance of the half-cell architecture and the longevity of a glass-glass solar module, Luxor Solar generates significantly more yield.

Bifacial solar modules use both direct radiation on the front and indirect light on the back to generate electricity. A glass pane on the rear side of the module enables both unused light that passes through the module and reflected light from the surroundings to be captured by the cells on the back.

Factors such as the so-called albedo (retroreflective power) comprised with the distance between the module and the surface greatly influence how high the additional generated yield is at the rear end.

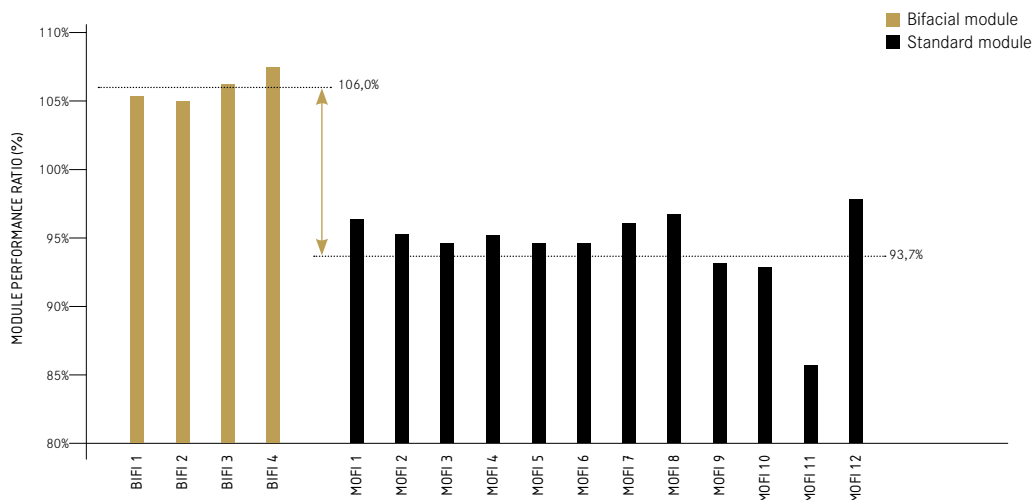
Depending on the nature of the reflective surfaces and

the installation height of the module, the yield can be up to 25% higher.

In general, the higher the albedo and the greater the distance between the module and surface, the higher the additional yield. Especially in the mornings and evenings, the back provides the greatest contribution.

- + Bifacial
- + Half-Cell Architecture
- + Glass-Glass Technology

ENERGY YIELD PERFORMANCE OF BIFACIAL PV MODULES⁽¹⁾



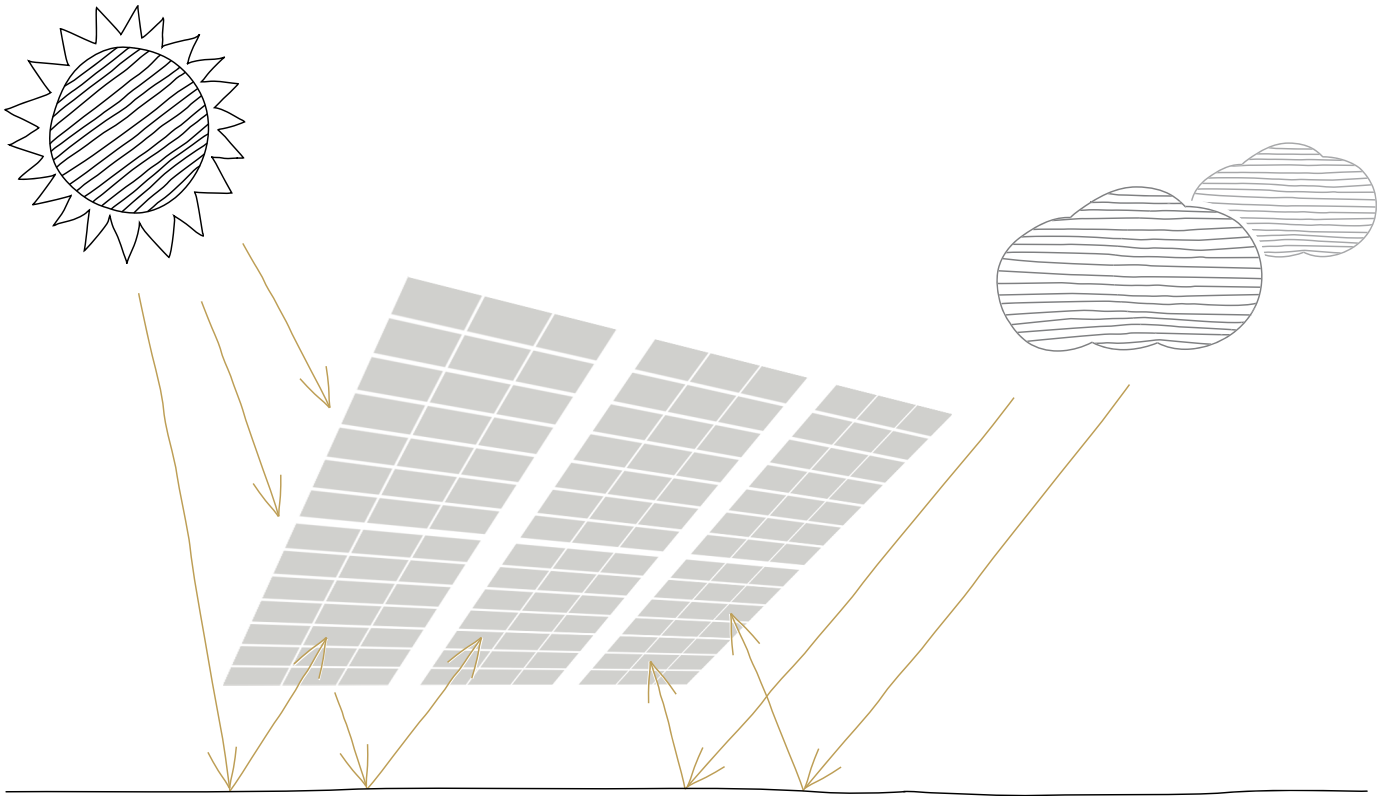
(1) TÜV Rheinland - Dr. Herrmann, bifiPV Workshop, Konstanz, 2017

BIFACIALITY

HIGHER POWER PRODUCTION = SECURE YIELDS

In the case of a bifacial solar cell, the back surface field, which is normally covered entirely with aluminium, is printed with an aluminium grid approximately at the front of the solar cell. The application of this grid enables indirect light from the solar cell to be picked up on the back and converted into electrical current.

The bifacial additional yield is dependent on the area of reflection. The higher the albedo, the greater the reflected radiation. An additional yield of up to 25% can be achieved. With an albedo of 30%, an 11% higher yield was achieved within one year. ⁽¹⁾



ALBEDO* ⁽²⁾

High in [m]**	Concrete	Grass	White gravel	Sand	Bright roof slab	Bright roof film
Max	16.0%	23.0%	27.0%	40.0%	56.0%	80.0%
0	1.2%	1.7%	2.0%	3.0%	4.2%	6.0%
0.1	2.3%	3.3%	3.9%	5.8%	8.1%	11.6%
0.2	3.1%	4.4%	5.2%	7.7%	10.8%	15.5%
0.3	3.6%	5.2%	6.1%	9.1%	12.8%	18.2%
0.4	4.0%	5.8%	6.8%	10.1%	14.1%	20.2%
0.5	4.3%	6.2%	7.3%	10.8%	15.1%	21.5%

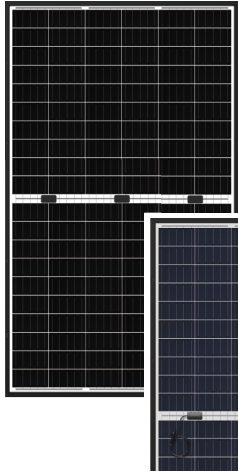
* Albedo is a measure of the retro-reflectivity of diffuse reflection, i.e. non self-illuminating surfaces.

** Solar module installation height above reflection surface

In comparison, the water surface of lakes reflect up to 10%.

(1) TÜV Rheinland - Dr. Herrmann, bifPV Workshop, Konstanz, 2017
 (2) ISES, R. Satpathy, Additional Energy yield using Bifacial Solar PV Modules, Freiburg, 2017

ECO LINE BIFACIAL MODULE FAMILY



120 HALF CELLS
MONOCRYSTALLINE
BLACK FRAME



Longlife tested



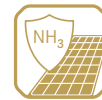
Selection of
components



Back glass



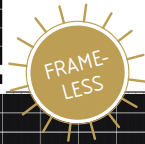
Salt mist
resistant



Ammonia
resistant



120 HALF CELLS
MONOCRYSTALLINE
FRAMELESS



Safety provided



100% PID
free cells



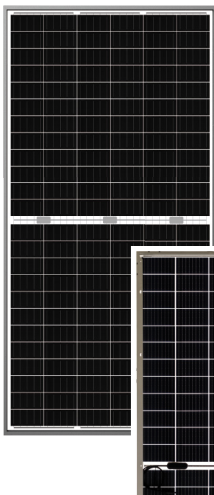
Special packing to
avoid micro cracks
in the cells



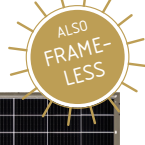
Increased
fire safety



German
warrantor



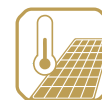
144 HALF CELLS
MONOCRYSTALLINE
SILVER FRAME
OR FRAMELESS



Power proofed



Performance surplus
of 0 Wp to 6.49 Wp



Higher heat
dispensing



Ultra thin front
glass



Longest lifespan

HALF-CELL ARCHITECTURE

PERFORMANCE & GAINS

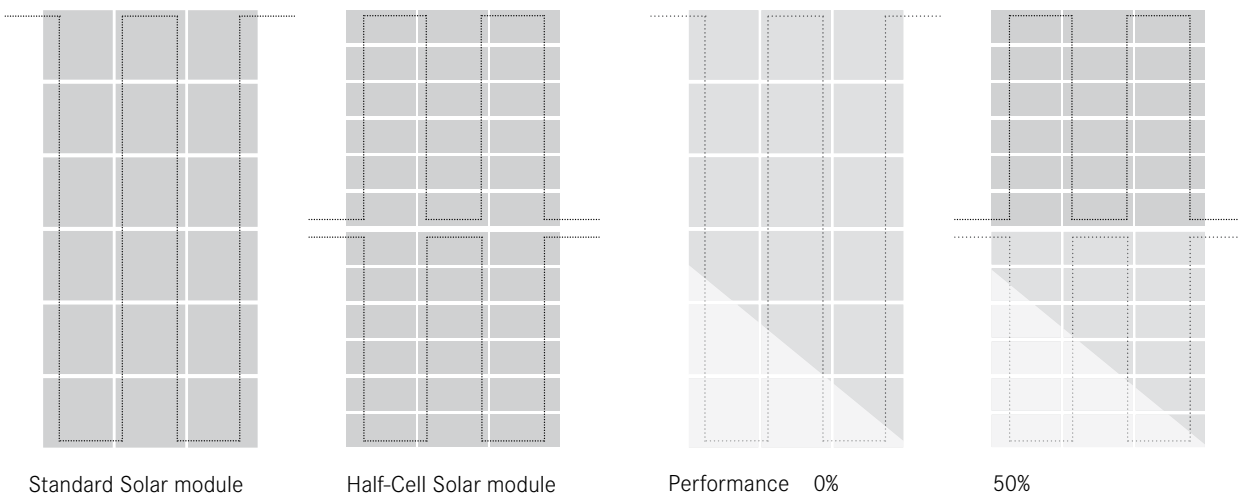
HALF-CELL ARCHITECTURE

Solar modules with half-cell architecture persuade with an increased power yield, a lower internal resistance and better shading behaviour whilst simultaneously increasing the internal total reflection.

High-quality solar cells with the highest efficiency and the best possible low-light behaviour ensure the best yields with plus tolerances of 0 Wp - 6.49 Wp.

ADVANTAGES OF HALF-CELL ARCHITECTURE

- + Reduction of currents and thereby a massive reduction in electrical losses by up to 75%
- + Optimized shading behaviour
- + Lower operating temperature for more yield ⁽³⁾

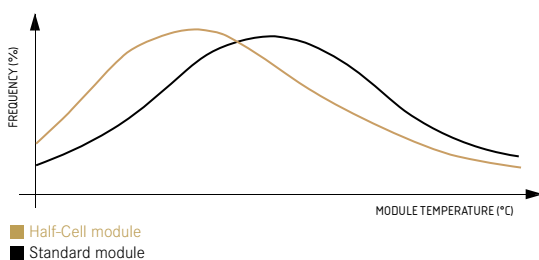


LOWER OPERATING TEMPERATURE

Halving the solar cells, halves the working currents as well, which significantly reduces heat loss. The lower operating temperature increases the reliability of the module and leads to an increase in performance.

ADVANTAGE TO PARTIAL SHADING

Due to the unique parallel connection design, half-cell solar modules can still achieve an output power of 50% with partial shading when installed in portrait format at sunrise or sunset. A standard module with full cells will no longer deliver any power when shaded.



Furthermore, half-cell architecture can improve the performance of bifacial modules with uneven front illumination on the back.

GLASS-GLASS TECHNOLOGY

INCREASED DURABILITY =

LOWER MAINTENANCE COSTS

GLASS-GLASS MODULES ARE PARTICULARLY RESISTANT

The back glass of the module, unlike a foil, cannot cloud over. Clouding of the film can be caused by UV radiation, which means that less light falls on the solar cells. Glass-glass solar modules offer more stability compared to a

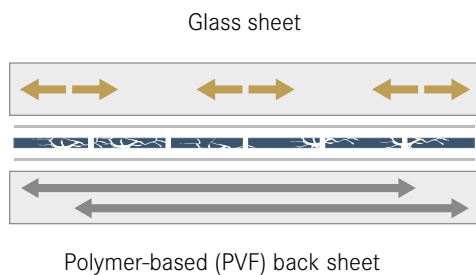
module with a backsheet foil. In addition, glass offers a higher fire safety than plastic and a high resistance to moisture and other environmental influences.

THERMAL EXPANSION

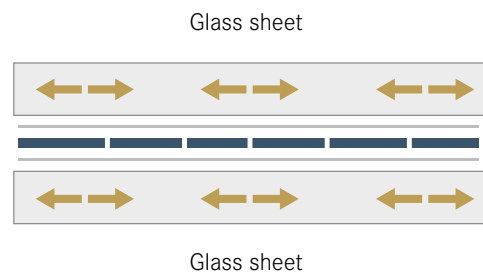
Consistent expansion and contraction

In contrast to standard modules, in glass-glass modules identical materials are used on the front and the back. Thanks to the identical physical conditions, the module

can withstand higher stress caused for example by temperature fluctuations, heavy loads and strong winds. Properties which significantly extend the lifespan of glass-glass modules, especially in hot and humid climates.



CONVENTIONAL PV MODULE.
VARIABLE THERMAL EXPANSION
BETWEEN GLASS AND POLYMER FILM.

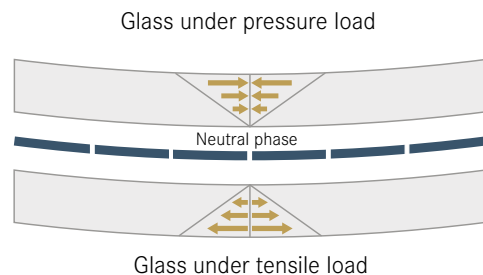


LUXOR GLASS-GLASS PV MODULE
EQUAL THERMAL EXPANSION
ON FRONT AND BACK GLASS.

MECHANICAL EXPANSION

Solar cells in neutral phase

Compressive and tensile loads, caused for example by snow and wind, place mechanical stress on solar modules. The glasses of the glass-glass modules on the front and back have the same material thickness, which means that the cell image is in the neutral phase. In this phase, very low tensile and compressive loads act, this means significantly less stress for the cells and slows down the degradation of performance.



RELIABLE RESISTANT

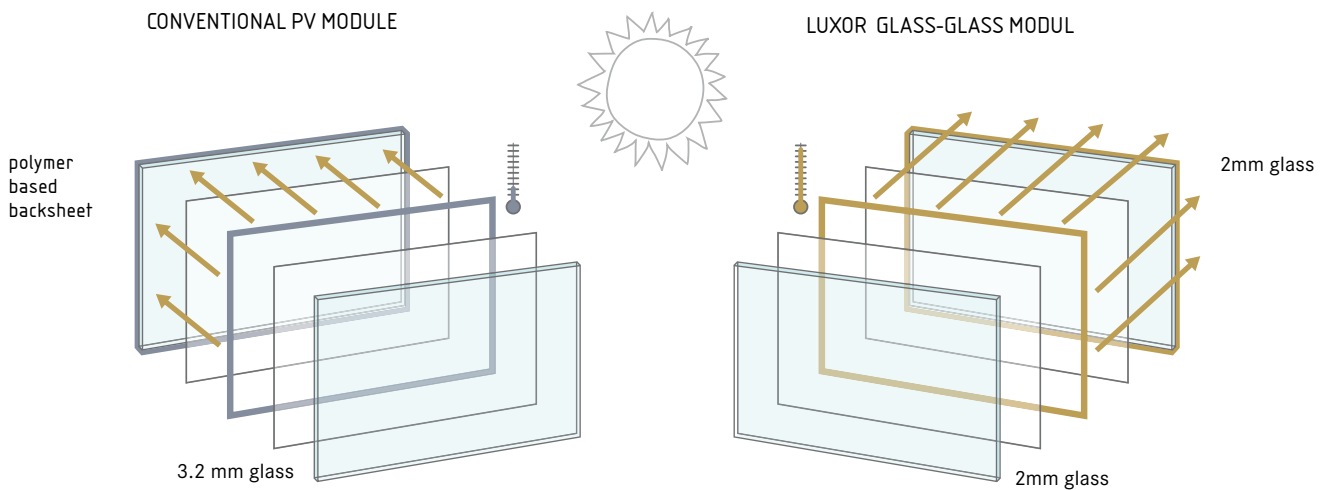
Ultra-thin front glass

The front glass used in the Bifacial line is only 2 mm. thick. The glass is therefore more translucent, which results in up to 2% higher yield compared to conventional solar modules with a front glass of 3.2mm.

Heat dissipation

The double-glass technology leads to a better heat transfer coefficient than with glass-film modules. This means more efficient heat dissipation and, as a result, more yield of up to 2%.⁽⁴⁾

HEAT EXHAUST FROM A LUXOR BIFACIAL LINE MODULE



SECURITY, YIELD & GUARANTEES

The advantages of the Luxor ECO Line Bifacial are many. A premium class solar module for safety and environmentally conscious customers who appreciate excellent quality.

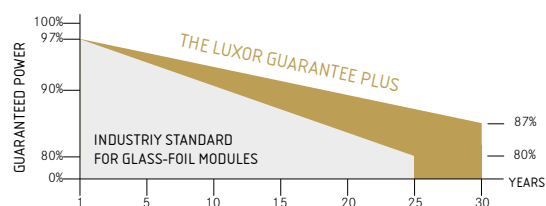
- + Higher yield
- + Maximum longevity
- + Combination of the latest technologies
- + Long guarantees, high security
- + Withstands extreme environmental conditions
- + For translucent applications such as carports or conservatories



product guarantee¹



linear performance guarantee¹



¹: The specific warranty conditions are given under www.luxor-solar.com/de/downloads.html

Luxor, your specialised company



Luxor Solar GmbH

Kornbergstraße 29 | 70176 Stuttgart | Germany
T +49.711.88 888 - 999 | F +49.711.88 888 - 911
info@luxor-solar.com | www.luxor-solar.com

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