

Half Cut Solar Panels: Higher Efficiency & Better Shade Tolerance

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In this article, we look into the technical features, advantages and possible disadvantages of solar PV modules with half cut solar cells, which are currently produced by many of the larger manufacturers

Why cut solar cells in half?

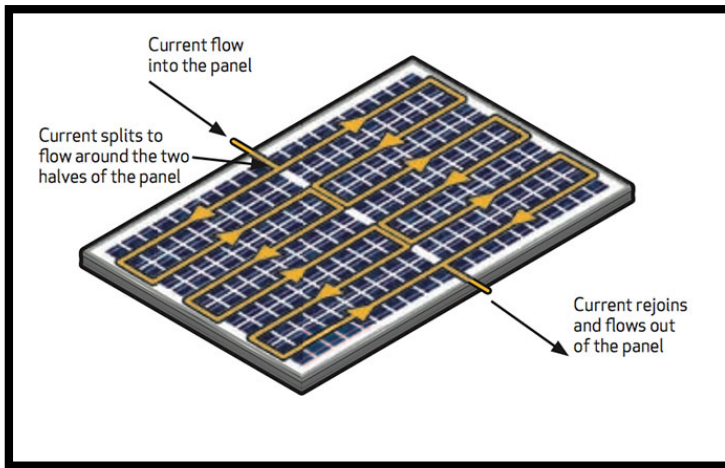
Solar cells are cut in half to reduce the **cell-to-module losses** during assembly. Power loss is generally proportional to the square of the current times resistance. Therefore, when cutting a solar cell in half, the power losses are reduced by a factor of four. As there is currently no specialized third party supply chain of half cut solar cells, the producers of such modules with half cut solar cells have to take care of the cutting step themselves. During production, it involves the additional step of cutting the solar cells with a laser and breaking them in two.

Half cut solar cells and higher efficiency

When the area of a solar cell is cut in half, the amount of electrical current that is carried by each **busbar** is reduced by half as well. This decrease in electrical resistance within the busbars results in an overall **increase in efficiency**, especially during times of **high irradiance**, driven by significantly **higher short-circuit current (Isc)** and **Fill Factor (FF)**. The actual increase in efficiency per manufacturer varies in the range of **1.5-3% efficiency increase**, which is significant.

Half cut cell module design

Cutting solar cells results in half the current, and... double the voltage. Solar modules with double the voltage would be a disadvantage, as the higher string voltage would result in half the amount of modules that can be connected per string to the inverter. Therefore, most manufacturers adopt the following string layout to produce voltages similar to standard solar modules:



Besides half cut solar cells, one trend we clearly see is the increase in the number of busbars.

Similar to the use of half cut solar cells, using more busbars **reduces the inner electrical resistance**.

This decrease in inner resistance is achieved because the distances between the busbars are shorter and less current flows through each smaller electrode where resistance is the highest. Using multiple busbars certainly leads to higher efficiency, and can reduce the effects of cell inherent defects.

After reading about half cut solar cells, you may ask yourself:

why aren't more manufacturers using half cut solar cells?

