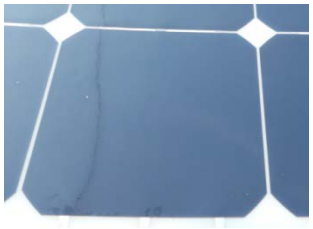
Estimating Daily Power Output From Solar Panels

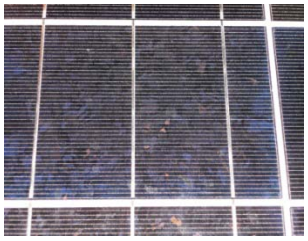
First it is necessary to differentiate between the three most common types of silicon cells in general use.

- SunPower® Cells - These are very high efficiency cells, at 22.5%, and so solar panels utilizing these cells will be considerably smaller than similarly rated panels using other types of cells. These are monocrystalline "Back-Contact" cells, where the cell surface is completely free of any grids or metal strips and collectors, and are distinctively completely black in appearance. They are thinner and have better low-light performance and higher heat tolerance than standard cells, and the absence of any metal collectors, bus strips, etc. on the exposed surface means that the entire cell surface is used for collecting solar energy. An added bonus of the lack of metal strips on the cell is that there is nothing elevated above the cell surface to generate shadows at low angles of incidence, i.e. early and late in the day, as is the case with regular cells.



- Regular Monocrystalline (Mono) Cells - Regular cells will have the familiar grid pattern of metal strips on the surface that collect the electrical energy. As well as not performing as well as SunPower® cells in low light and high heat conditions, the presence of the grid strips sitting proud of the cell surface inevitably throw shadows on the exposed cell surface when the sun is low, leading to reduced output in the morning and afternoon.

- Polycrystalline (Poly) Cells - Unlike mono cells that are sliced from a pure silicon crystal, poly cells are made up of silicon off-cuts and remnants recycled from the semiconductor, photovoltaic, and other industries. These pieces are melted down into ingots that are then sliced into cells that are used in lower cost solar panels. As well as having the same disadvantages as the regular mono cells compared to the SunPower® cells, the existence of the individual silicon flakes in poly cells results in even lower output at low angles of incidence of the sun. This is due to the edges and corners of the individual silicon flakes interfering with power generation as the sun's rays strike the cell surface at an angle.



From the above, it can be seen that although solar panels with different types of cells may have the same wattage rating, their potential daily power yield over the course of a solar day will vary considerably. As a general rule for estimation, the following daily yields can be assumed on a good solar day with a constant load, using a MPPT controller.

For solar panels with SunPower® cells: divide the wattage rating by **3** for potential daily amp/hour yield at 12v.
For solar panels with Regular Mono cells: divide the wattage rating by **4** for potential daily amp/hour yield at 12v.
For solar panels with Poly cells; divide the wattage rating by **5** for potential daily amp/hour yield at 12v.

So if we compare three panels of 100 watt rating, each with different types of cells, then the potential daily amp/hour yields will be:

100 watt panel with SunPower® Cells - **33** amp/hrs a day
100 watt panel with Regular Mono cells - **25** amp/hours a day
100 watt panel with Poly cells - **20** amp/hours a day

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