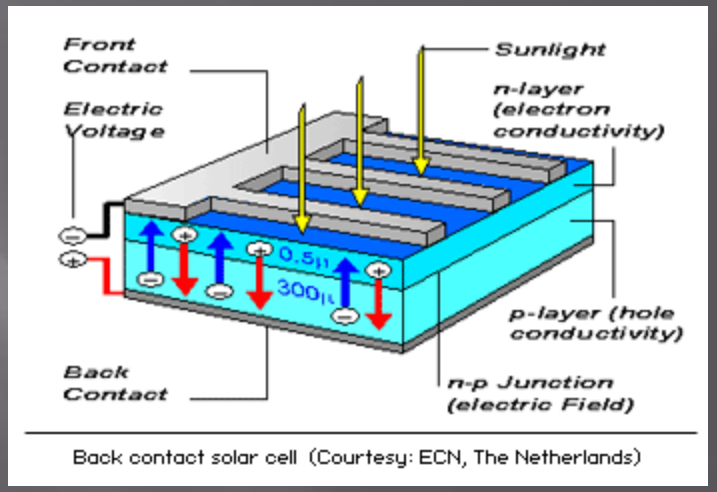
SOLAR PANELS AND HOW THEY WORK

Presented by the

Tyler County Amateur Radio Association

Photovoltaic Cells

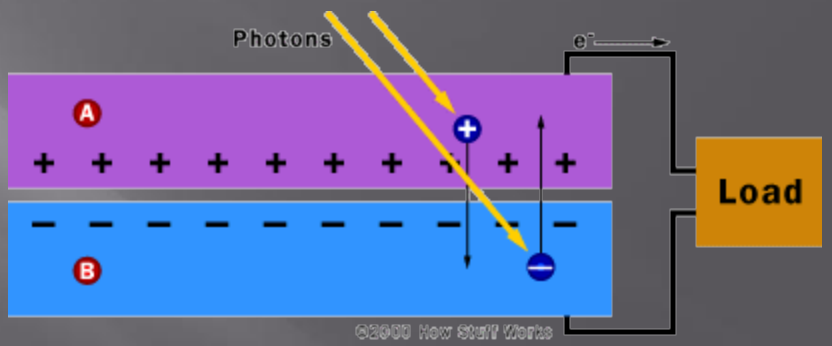
- Photovoltaic (PV) cells are made up of at least 2 semi-conductor layers. One layer containing a positive charge, the other a negative charge. Sunlight consists of little particles of solar energy called photons. As a PV cell is exposed to this sunlight, many of the photons are reflected, pass right through, or absorbed by the solar cell. When enough photons are absorbed by the negative layer of the photovoltaic cell, electrons are freed from the negative semiconductor material.



Back contact solar cell (Courtesy: ECN, The Netherlands)

Photovoltaic Cells (cont)

- Due to the manufacturing process of the positive layer, these freed electrons naturally migrate to the positive layer creating a voltage differential, similar to a household battery. When the 2 layers are connected to an external load, the electrons flow through the circuit creating electricity.

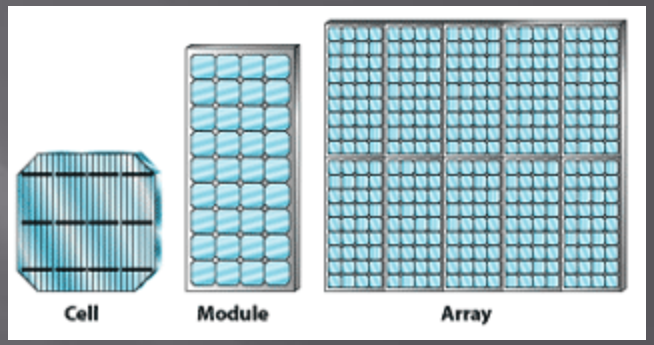


Photovoltaic Cells (cont)

- Most Photovoltaic panels have a directional diode that prevents reverse current flow through the panel by discharging your batteries. This is only in the absence of light. Not all panels have this important feature.

Photovoltaic Cells (cont)

- Each individual solar energy cell produces only 1-2 watts. To increase power output, cells are combined in a weather-tight package called a solar module. These modules (from one to several thousand) are then wired up in serial and/or parallel with one another, into what's called a solar array, to create the desired voltage and amperage output required by the given project.



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