How to operate solar panels

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Solar panels can power an incredible range of applications -- from a remote cabin to keeping the lights on in the International Space Station. But we all know solar isn"t just for providing remote power needs.

There"s virtually unlimited reasons why people choose to go solar. From energy independence, to reducing energy bills, to climate concerns, there"s really no "wrong" reason to install panels. And as solar panels continue to drop in price, they"ve become a competitive energy option for more and more homes and businesses.

Understanding the basics about solar panels is key to comprehending how they harness the Sun"s energy and how they are changing the world. Here are just a few of our favorite solar installs:

This guide has all the basics you need to know about solar, including how solar energy is produced and how solar panels are made. We"ll also explore the ins and outs of a solar photovoltaic (PV) system, how to design a top-notch solar system, and all of the essentials of going solar.

Solar energy for electrical production relies on subatomic particles called photons. These particles start their journey in the center of the Sun, traveling through the various layers before careening into space. A journey from the center of the Sun to the surface can take anywhere between 100,000 to 50 million years to complete.

A solar panel’s secret sauce lies in its ability to convert photons into electrons. In a nutshell, a solar panel converts photons into direct current, which is then converted to alternate current for use in home and business applications.

Solar cells are typically constructed of silicon, a semiconductor capable of producing electricity. When sunlight strikes the panel, photons interact with silicon atoms, releasing electrons in a phenomenon called the photovoltaic effect.

A solar cell is manufactured with a positive and negative silicon sheet sandwiched together. An upper silicon layer is infused with phosphorus for a negative charge, and a boron-infused bottom layer maintains a positive charge. The resulting field funnels electrons towards conductive metal and out of the panel.

Once the photovoltaic process produces a current, the electricity has to flow somewhere. Since the current produced by a solar panel is DC, it needs to be converted into AC before it can be used in most situations. Once converted to AC, energy from solar can be used in multiple ways.

The most common method is entry into a grid-tied system. A grid-tied system draws a significant portion of its energy needs from solar panels during the day. Depending on the size of the system, more energy may be produced than the site needs, so surplus electricity is sent back to the grid. When the Sun goes down, the consumer draws supplemental energy from the utility.

A major advantage of a grid-tied system is the ability to sell surplus solar energy back to the utility through a process called net metering (NEM). On cloudy days and during the night, a solar system may not produce enough energy to meet demand. The opposite is true for very sunny days: When energy use is low but production is high, panels will collect surplus energy, usually more than enough for a customer’s energy needs.

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