

Tapping the Sun's Energy

Solar panels, or photovoltaic cells, harness energy from the sun. The cells are made of a semiconductive material that is specially treated so that the sun's rays help create a flow of electrons, which can be used to power your home.

The sun gives off about 400 trillion trillion watts of power

A lot of the sun's energy is reflected back into space or absorbed by the Earth's atmosphere. An average of 1,000 watts hits each square meter of the Earth's surface during peak times, more energy per hour than the global population uses in a year.

PV cell at a glance

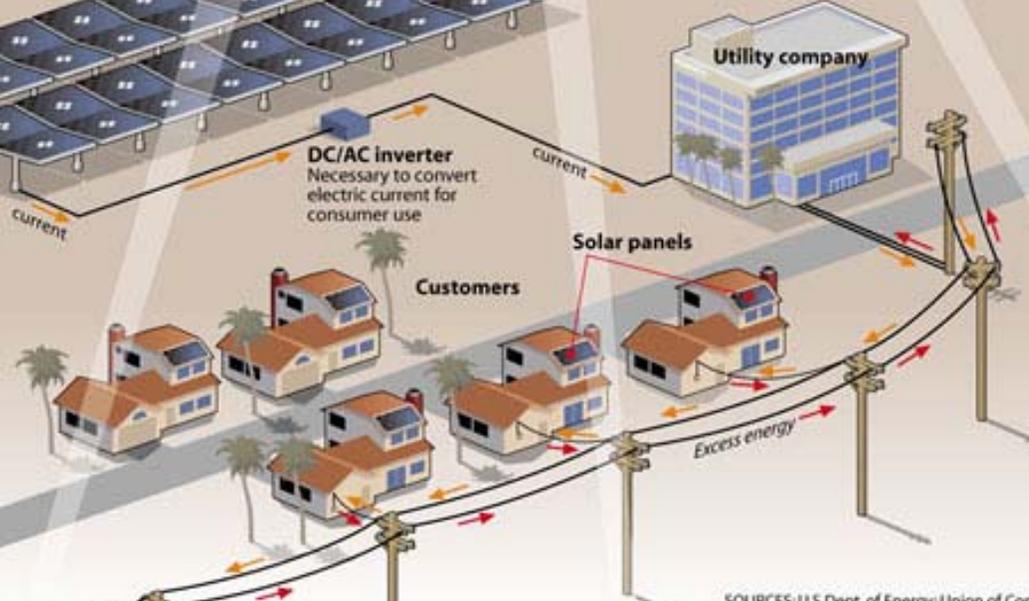
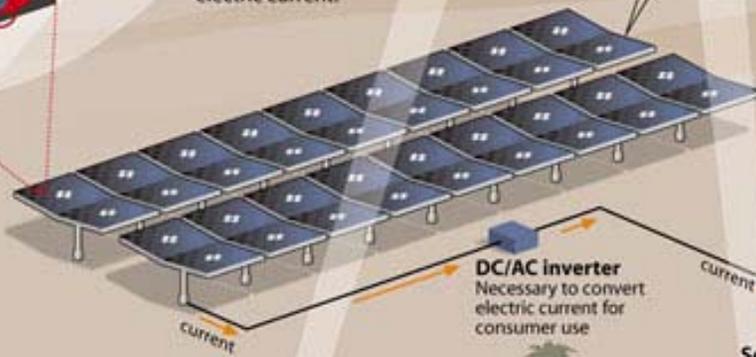
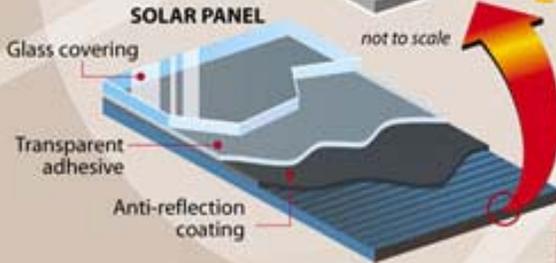
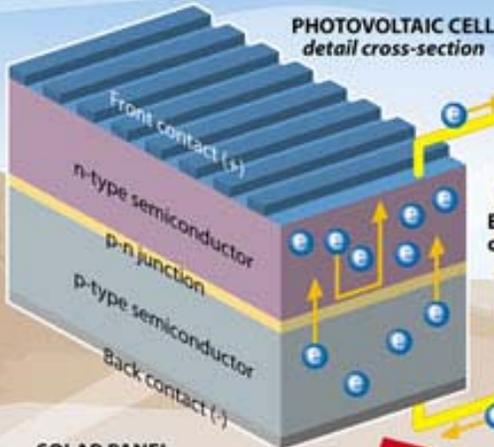
A photovoltaic (or PV) cell is a specially treated wafer of silicon, sandwiched between two thin contact plates. The top contact is positively charged and the back contact is negatively charged, making it a semiconductor.

- ▶ The **n-type semiconductor** has an abundance of electrons, giving it a negative charge, while the **p-type semiconductor** is positively charged.
- ▶ Electron movement at the **p-n junction** produces an electric field that allows only electrons to flow from the p-type layer to the n-type layer.
- ▶ When sunlight hits the solar cell, its energy knocks electrons loose from the atoms in the semiconductor.
- ▶ When the electrons hit the electrical field, they're shuttled to the top contact plate and become a usable electric current.

Solar panel farm
How much energy a solar panel can make depends on how efficiently it converts the sun's energy. An average solar panel around a square meter in size can generate about 100 watts. Commercial panels are up to 17% efficient, and are getting better every day.

Feeding the grid

Excess energy from the solar array is fed into the power grid. It helps provide extra electricity to the community, especially during peak daytime hours. More than 35 U.S. states have laws that require net metering, which means that solar panel owners get to subtract the amount of energy produced by their solar panels from the energy they draw from the grid on their monthly bill.



Solar potential in the U.S.

The amount of energy striking almost any part of the Earth is vast, regardless of region, season, time of day, climate and air pollution. Shown is the average radiation received on a horizontal surface across the continental United States in the month of June.

kWh/day
8.0-8.5
7.5-8.0
7.0-7.5
6.5-7.0
6.0-6.5
5.5-6.0
5.0-5.5

