

### Energy from the Sun



The sun has produced energy for billions of years. Solar energy is the sun's rays (solar radiation) that reach the Earth. This energy can be converted into other forms of energy, such as heat and electricity.

In the 1830s, the British astronomer John Herschel famously used a solar thermal collector box (a device that absorbs sunlight to collect heat) to cook food during an expedition to Africa. Today, people use the sun's energy for lots of things.

### Solar Energy Can Be Used for Heat and Electricity

When converted to **thermal (or heat) energy**, solar energy can be used to:

- Heat water — for use in homes, buildings, or swimming pools
- Heat spaces — inside homes, greenhouses, and other buildings

Solar energy can be converted to electricity in two ways:

- **Photovoltaic (PV devices) or “solar cells”** change sunlight directly into electricity. Individual PV cells are grouped into panels and arrays of panels that can be used in a wide range of applications ranging from single small cells that charge calculator and watch batteries, to systems that power single homes, to large power plants covering many acres.

- **Concentrating Solar Power Plants** generate electricity by using the heat from solar thermal collectors to heat a fluid which produces steam that is used to power the generator. Out of the 11 known concentrating solar power generating units operating in the United States at the end of 2008, 9 of these are in California, 1 in Arizona, and 1 in Nevada.

Two drawbacks of solar energy are:

- The amount of sunlight that arrives at the Earth's surface is not constant. It depends on location, time of day, time of year, and weather conditions.
- Because the sun doesn't deliver that much energy to any one place at any one time, a large surface area is required to collect the energy at a useful rate.