

Solar Water Heating

Solar energy can be used to heat water. Heating water for bathing, dishwashing, and clothes washing is the second largest home energy cost. Installing a solar water heater can reduce your water heating bill by as much as 50 percent.

A solar water heater works a lot like solar space heating. In our hemisphere, a solar collector is mounted on the south side of a roof where it can capture sunlight. The sunlight heats water in a tank. The hot water is piped to faucets throughout a house, just as it would be with an ordinary water heater.

Solar Electricity

Solar energy can also be used to produce electricity. Two ways to make electricity from solar energy are photovoltaics and solar thermal systems.

■ Photovoltaic Electricity

Photovoltaic comes from the words *photo*, meaning light, and *volt*, a measurement of electricity. Sometimes photovoltaic cells are called PV cells or **solar cells** for short. You are probably familiar with photovoltaic cells. Solar-powered toys, calculators, and roadside telephone call boxes all use solar cells to convert sunlight into electricity.

Solar cells are made up of **silicon**, the same substance that makes up sand. Silicon is the second most common substance on Earth. Solar cells can supply energy to anything that is powered by batteries or electric power.

Electricity is produced when radiant energy from the sun strikes the solar cell, causing the electrons to move around. The action of the electrons starts an electric current. The conversion of sunlight into electricity takes place silently and instantly. There are no mechanical parts to wear out.

Compared to other ways of making electricity, photovoltaic systems are expensive and many panels are needed to equal the electricity generated at other types of plants.

It can cost 10 to 30 cents per kilowatt-hour to produce electricity from solar cells. Most people pay their electric companies about 12.6 cents per kilowatt-hour for the electricity they use, and large industrial consumers pay less. Solar systems are often used to generate electricity in remote areas that are a long way from electric power lines.

In 2015, the Desert Sunlight solar project in California opened. It is among the largest photovoltaic plants in the world, generating 550 megawatts of electricity—enough to power over 150,000 homes.

■ Solar Thermal Electricity

Like solar cells, solar thermal systems, also called **concentrated solar power** (CSP), use solar energy to produce electricity, but in a different way. Most solar thermal systems use a solar collector with a mirrored surface to focus sunlight onto a receiver that heats a liquid. The super-heated liquid is used to make steam to produce electricity in the same way that coal plants do. There are CSP plants in California, Arizona, Nevada, Florida, Colorado, and Hawaii. Some of the world's largest CSP facilities are located in California.

Solar energy has great potential for the future. Solar energy is free, and its supplies are unlimited. It does not pollute or otherwise

SOLAR WATER HEATER



SOLAR PANELS (PHOTOVOLTAIC)



SOLAR THERMAL ELECTRICITY



Image courtesy of U.S. Department of Energy

Parabolic troughs concentrate the sun's radiant energy, heating fluid that is used to create steam. The steam turns a generator, which produces electricity.

damage the environment. It cannot be controlled by any one nation or industry. If we can improve the technology to harness the sun's enormous power, we may never face energy shortages again.