

Solar Collectors

A **solar collector** is one way to capture sunlight and transform it into heat energy, or **thermal energy**. The amount of solar energy an area receives depends on the time of day, the season of the year, the cloudiness of the sky, and how far one is from the Earth's Equator. A closed car on a sunny day is a solar collector. As sunlight passes through the car's windows, the seat covers, side panels, and floor of the car absorb it. The absorbed energy transforms into thermal energy that is trapped inside the car. A greenhouse also makes a great example of a solar collector.

Solar Space Heating

Space heating means heating the space inside a building. Today, many homes use solar energy for space heating. There are two basic types of solar space heating systems: passive and active. **Hybrid solar systems** are a combination of passive and active systems.

Passive Solar Design

A **passive solar home** is designed to let in as much sunlight as possible. It is a big solar collector. Sunlight passes through the windows and heats the walls and floor inside the house. The light can get in, but the thermal energy is trapped inside. A passive solar home does not depend on mechanical equipment to move heat throughout the house. For example, awnings may be designed to let in light in the winter when the sun is lower in the horizon, yet shade the windows in the summer when the sun is higher in the sky. Passive solar buildings are quiet, peaceful places to live or work. They do not rely on machinery and heat the walls or floors rather than the air inside. Passive homes can get 30 to 80 percent of the heat they need from the sun. They store their heat energy by using thick walls and building materials that retain heat well like masonry, concrete, stone, and even water. If a passive home incorporates blowers or fans, it is then called a hybrid solar system.

Active Solar Design

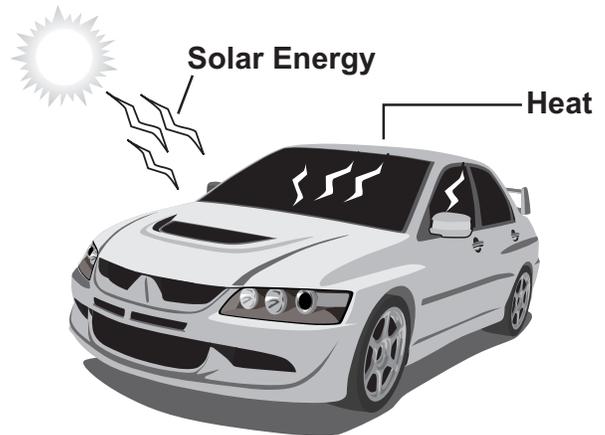
An **active solar home** uses mechanical equipment and other sources of energy to collect and move thermal energy.

One example of an active solar system consists of dark-colored metal plates inside frames with glass tops. These systems are often mounted on the roof or in a location with good solar exposure. The metal plates absorb sunlight and transform it into thermal energy, which heats up a fluid inside the collector. The warmed fluid is moved into the house via a pump and the thermal energy of the fluid is transferred to the air or water inside the home. These solar collectors are stored high on a roof where they can collect the most sunlight. They need to be placed in an area where they will not be shaded by trees or other buildings. Heat can be stored in a large tank filled with liquid, or even in rock bins underneath the house. Both active and passive designs usually include some sort of back-up system like a furnace or wood stove, in case of extreme cold or cloudy weather.

Solar Water Heating

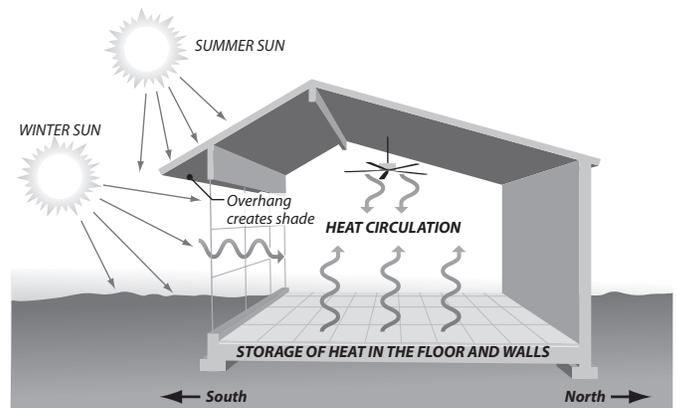
Solar energy can also be used to heat water for household use. Heating water for bathing and washing is the second largest home energy cost. Installing a solar water heater can cut that cost in half. A solar water heater works a lot like solar space heating. In our hemisphere, a solar collector is often mounted on the south side of a roof where it can capture sunlight. The sunlight heats water and stores it in a tank. The hot water is piped to faucets throughout a house, just as it would be with an ordinary water heater.

Solar Collector



On a sunny day, a closed car is a solar collector. Solar energy passes through the glass, hits the inside of the car and changes into thermal energy, which gets trapped inside.

Passive Solar Home Design



SOLAR WATER HEATER

