

# Solar Water Heating

**Introduction** Solar energy or heat is collected on absorber plates within a panel. This heat is transferred to the water within the storage tank via a liquid medium in closed circuit piping, which performs as a very effective heat exchange element, similar to that in an electric kettle or geyser.

This storage tank then feeds pre-heated water to the geyser, thereby greatly reducing the amount of electric power necessary to bring this water to the thermostatically controlled temperature required. Solar water heating systems can also be used to directly heat swimming pool water.

In addition to the energy cost savings on water heating, there are other benefits derived from using the sun's energy to heat water; for example where sufficient sunlight is available certain systems would not consume any electricity, ensuring hot water supply during from power outages.

**A Description of Solar Water Heating Systems** Solar water heating systems use solar collectors and a liquid handling unit to transfer heat to the load, generally via a storage tank. The liquid handling unit includes the pump(s) (used to circulate the working fluid from the collectors to the storage tank) plus control and safety equipment.

SWH perform three basic operations:-

**Collection:** Solar radiation is "captured" by a solar collector;

**Transfer:** Circulating fluids transfer this energy to a storage tank; circulation can be natural (thermo siphon systems) or forced, using a circulator (low-head pump); **Storage:** Hot water is stored until it is needed at a later time in a mechanical room, or on the roof in the case of a thermo siphon system.

Selective coatings are often applied to the absorber plates to improve the overall collection efficiency. A thermal fluid absorbs the energy collected. The most common solar collector types are: Evacuated tube solar collectors and Glazed liquid flat-plate collectors:

**Evacuated tube solar collectors:** have an absorber with a selective coating enclosed in a sealed glass vacuum tube. They are good at capturing the energy from the sun; their thermal losses to the environment are extremely low.

Systems presently on the market use a sealed heat-pipe on each tube to extract heat from the absorber (a liquid is vaporised while in contact with the heated absorber, heat is recovered at the top of the tube while the vapour condenses, and condensate returns by gravity to the absorber). **Glazed liquid flat-plate collectors:** a flat-plate absorber (which often has a selective coating) is fixed in a frame between a single or double layer of glass and an insulation panel at the back. Much of the sunlight (solar energy) is prevented from escaping due to the glazing (the "greenhouse effect").