

# SOLAR HOT WATER HEATERS

Active-Closed Loop Glycol system info sheet

Summary offered by Solar Assist, Eugene, OR since 1994; (541-338-4957)

Solar water heaters capture the sun's radiant energy with 'solar thermal' collectors and circulate 'solar fluid' (non-toxic antifreeze) through insulated copper pipes from the roof top collectors to the solar storage tank inside the house. The sun's energy is transferred to your domestic water in the solar tank by conduction through the use of a heat exchanger.

Solar thermal collectors have 'absorbers' (usually copper) in an insulated aluminum box with glass on the sunward surface. These absorbers have small copper pipes with attached plates that allow the solar fluid to gather the heat. Like most materials on our planet they absorb radiation from the sun and transfer it into heat. The collector design traps this heat very efficiently and stores it in the solar water heater tank for use throughout the day and night. The copper piping, or solar loop, connecting the collectors to the solar tank is sheathed with a high temperature pipe insulation to ensure protection through temperature swings of up to 300 degrees (0 F to 300 F). These durable materials last for well over 20 years in direct exposure to the elements in hot, cold, wet or dry conditions.

In active systems, a pump circulates the solar fluid through the loop. A differential temperature controller wired to sensors on both the collector and the solar tank determines that "if there is heat in the collector worth gathering, then spend some pumping energy to gather it." When the proper temperature differential is reached the controller activates the pump. The energy returned can be 4 to 30 times the energy invested in running the pump. See the diagram on the back for a clear picture of this functional description.

The solar tank uses a heat exchanger, (a coiled copper pipe wrapped around the outside of the inner 'steel pressure tank') which transfers the heat by direct conduction. The copper coil heats the steel wall of the solar tank which, in turn, heats the incoming cold city water within the tank before it is routed to your back up gas or electric water heater.

By preheating the city water from 50 degrees up to 70-100 degrees in winter or 120-160 degrees in summer your back-up water heater works less, saving you energy and money. The amount you save depends on your 'load' of hot water usage and the size of the solar system. Solar water heaters are 'load dependent' so they can't save you money if you're not consuming hot water; such as when you are on vacation or live in a 1-2 person household. Usually, the more people in the house, the bigger the load and therefore, bigger families save more. A well-sized solar water heater can save you approximately 2/3 on the hot water heating portion of your bill. Whole house energy efficiency, including insulation levels, windows, and efficient appliances should be considered along with solar equipment as options for saving energy and money within the house.

Since savings are dependent upon how much hot water you use, ODOE (Oregon Department of Energy) calculates smaller annual energy savings (or 'yield') for the water heating loads of 1 or 2 people compared to 3-5 person households. The range of savings for households of 3-5 people is approximately \$150/yr with a single 40 ft<sup>2</sup> collector "SolaRay" system or \$220/yr for the 64 ft<sup>2</sup>, two collector "SolaRay" system. Additionally, since your adding value to your home this can help to offset some of the system cost.

INCENTIVES are available through State (up to \$1,500) and Federal Tax Credits (up to \$2,000) and some Utilities have incentives (\$400-1,100). These incentives can cover approximately half the cost. Prices for these high performance systems range from \$7,000-\$10,000.