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## Solar Water Heating

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We all want to find the solution to the issues of global warming, the energy crisis and international energy wars. Although there is no one solution to cure all energy-related ills, technologies such as solar water heaters (SWH) offer one piece of the puzzle.

Approximately 50% of the earth's carbon emissions come from building energy use—heating, cooling and appliances—and solar water heating systems can help to drastically reduce this energy consumption.

### The Basics of Solar Water Heating



Solar water heating systems use clean, free energy from the sun to heat our domestic hot water, which accounts for about 15 to 20% of a household's energy outlay. Renewable energy systems do have an up-front installation cost, but you'll enjoy instantly increased home equity and reduction of utility bills starting from day one. Your pocketbook won't suffer from rate increases,

and residential investors generally recover the initial expense of installation with within a few years. Experts agree that a SWH system is among the most cost-effective renewable energy investments a homeowner can make.

It is a good idea to have a solar professional assess your site to determine the best location for the system, and to give you an idea of what can be accomplished with solar heating where you live or work. As direct sunlight is needed, SWH collectors should be mounted within 30 degrees of true south and tilted at an angle equal to your latitude. Systems are primarily roof-mounted, but if there is not space up above, ground or wall mounts work as well.

Keep in mind that SWH systems are not designed to provide 100% of a home's domestic water load—there are just too many cloudy days every year! A typical system will provide between 50 and 75% of the annual load. In warmer climates or during the summer, nearly 100% energy provision can be expected. During a year's cloudiest periods, energy output can drop down to 50%, so annual average estimates run in the neighborhood of 75%. This means that you'll always need a backup water heater for use during cloudy weather.

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
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## Selecting a System

Selecting an SWH system appropriate for your climate is the most important consideration. If you are in a climate that never freezes or the system is operated only in the summer, an Integral Collector Storage (ICS) system will work for you. An ICS system is a simple water tank that is exposed to the sun. Collectors can have one or multiple tanks and are usually housed in an insulated box showing glass on one side. This type of SWH system is the most cost-effective and is popular in areas surrounding the equator.

In cooler climates there are two types of systems installed—closed-loop pressurized systems and drainback systems.

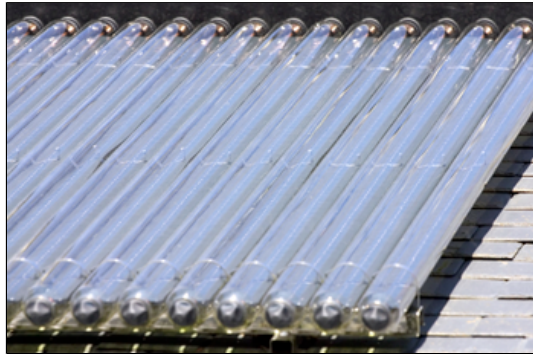
Closed-loop pressurized systems are the most popular worldwide, and these use antifreeze as the solar fluid. The solar fluid stays in the collector and piping at all times and is circulated with a pump. Whenever the sun shines on the collectors, the pump engages and circulates solar fluid from the collectors to a heat exchanger, which transfers heat from the antifreeze to the water that you will be using for domestic purposes.

Drainback systems differ from pressurized systems in the sense that solar fluid is only present in the collectors and piping when the system is operating. When the system is off, the solar fluid drains back to a drainback tank. The pipes and collector are then empty, meaning that the system is free from the risks of freezing or overheating. Water is used as the solar fluid in moderate climates, while weak antifreeze is used in colder climates.

*Solar water heaters can last 40 years or longer if the design is appropriate to the climate and the system incorporates high-quality materials and workmanship.*

## Model Specifications

There are two popular models of solar collectors, flat-plate and evacuated-tube. Flat-plate collectors are the most popular models and work well in all climates. These have been on the market the longest, and are efficient and competitively priced. An absorber plate inside of the collector gathers heat and transfers it to a network of copper tubing, through which the solar fluid flows. The front of the collector is a flat piece of tempered glass.



Evacuated-tube collectors are a newer technology and each manufacturer's product varies significantly with respect to cost, quality, effectiveness, and how the panels work. In these models, a glass tube surrounds the heat-collecting absorber plate. A vacuum is then created inside of each glass tube, which reduces heat loss by restricting air so that there is no transfer medium for the heat. The cost of an evacuated-tube system is usually higher than a flat-plate model, and the collectors tend to be more fragile as well. As compared with flat plate collectors, evacuated-tube models experience less wind loading when mounted—wind loading is the stress exerted on a roof when the panels act as sails and generate a strong energy force by pulling up, on the oppositional end of the spectrum from concerns about the weight of the collector exerting stress by bearing down. The evacuated-tube models work to decrease wind loading by the presence of spaces between the tubes, though these can prevent snow from shedding in the winter.

## Benefits of SWH

A local SWH professional is your best resource for determining how well a system will serve your needs. A professional can advise you on what systems work well in your climate, and inform you about the potential state or local incentives for renewable energy installations. There is currently a federal tax credit for an SWH system that will cover 30% of the residential system cost up to \$2,000, provided that the system meets 50% of the water heating needs in addition to using certified collectors. This tax credit lasts throughout the year of 2008.

Solar water heaters can last 40 years or longer if the design is appropriate to the climate and the system incorporates high-quality materials and workmanship. Investing in a solar energy system is a very green choice, because it keeps our energy dollars local and reduces our



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dependency on others. You will spend a certain amount of money to heat your hot water in any case, so why not boost your eco-impact and go solar?

Article Contributors: *Bob Ramlow*

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