

Solar Water Heaters

Solar water heaters, sometimes called solar domestic hot water systems, use the sun to heat either water or a heat-transfer fluid in collectors. A typical system will reduce the need for conventional energy source for water heating by about two-thirds. Solar water heaters are cost competitive in many applications when you account for the total energy costs over the life of the system. Although the initial cost of solar water heaters is higher than that of conventional water heaters, the fuel (sunshine) is free. And when the environmental benefits are factored in, they are clearly a worthwhile investment.

After being heated in the collector, the water or fluid is stored in a tank similar to a conventional gas or electric water tank. Some systems are active, using an electric pump to circulate the fluid through the collectors, while others are passive, using natural convection to circulate the fluid. Systems come in a variety of technologies such as flat plate collectors, evacuated tube collectors, concentration collectors, breadbox (combined tank and collector), and batch heaters.



Before investing in any solar energy system, you should invest in making your home more energy efficient. Taking steps to use less hot water and to lower the temperature of your hot water reduces the size and cost of your solar hot water system.

Good first steps:

- 1) Reduce the total amount of hot water needed to complete your tasks by installing low-flow showerheads and faucet aerators.
- 2) Reduce standby heat losses by insulating your current water heater and any accessible hot water pipes.
- 3) Reduce additional standby heat losses: if you have no dishwasher, or your dishwasher is equipped with its own automatic water heater, lower the thermostat on your water heater to 120°. When buying a new dishwasher, select one that has the option of running a longer cycle at lower temperature, which saves energy overall.

For more information on ways to use less energy for water heating, visit the Energy Efficiency and Renewable Energy Network at www.eere.energy.gov/EE/buildings_water_heating.html. The Home Energy Saver can also be a useful tool in assessing energy efficiency priorities in your



house. It is an excellent on-line calculator developed by Lawrence Berkeley National Laboratory that takes data input by users and reports on what measures will likely be most effective in lowering utility bills and reducing your home's environmental impact. Use it at <http://hes.lbl.gov>.

Also ensure that your site has enough available sunshine to meet your needs efficiently and economically. Your local solar equipment dealer can perform a solar site analysis for you or show you how to do one on your own. To find a local service provider, refer to the California Solar Energy Industries Association website at www.calseia.org or the Northern California Solar Energy Association website at www.noricalsolar.org.

Remember: Local zoning laws or covenants may restrict where you can place your collectors. Check with your city, county, and homeowners association to find out about any restrictions.

PRODUCT COMPARISONS

Solar Water Heating

Uses renewable energy
Higher first cost, lower lifecycle costs

Electric/Gas Water Heating

Uses non-renewable energy
Lower first cost, higher lifecycle costs

LEED CREDITS

Using this material potentially contributes to obtaining these credits in the US Green Building Council's LEED rating system:

Energy & Atmosphere

EA Prerequisite 2 Minimum Energy Performance

EA Credit 1 Optimize Energy Performance

LEED stands for Leadership in Energy and Environmental Design. To find out more about it, visit www.leedbuilding.org

ENVIRONMENTAL ATTRIBUTES

Energy Performance

The operation of solar water heaters uses a pollution-free form of renewable energy. By investing in one, you will be significantly reducing the carbon dioxide, nitrogen oxides, sulfur dioxide, and the other air pollution and wastes created when your utility generates power or you burn fuel to heat your household water. When a solar water heater replaces an electric water heater, the electricity displaced over 20 years represents more than 50 tons of avoided carbon dioxide emissions alone. Carbon dioxide traps heat in the upper atmosphere, thus contributing to global warming.

Resource Impacts

Solar water heaters use renewable energy and hence reduce our dependence on limited natural resources. The upstream environmental benefits from reduced energy use are numerous: reduced habitat destruction caused by the extraction and transport of fossil and nuclear fuels, reduced air pollution and acid rain, and avoided radioactive waste. Clearly, there are resource impacts involved in extracting and processing the minerals for the copper and glass in a panel. However, this "embodied energy" is generally offset within a few months of active use of the



system. If your domestic hot water heater is currently electric, using a solar hot water system is approximately the equivalent of offsetting the CO₂ of a fuel-efficient car.

Health Considerations

Solar water heaters have no effect on indoor air quality but do promote healthier air quality outdoors.

FUNCTIONAL CONSIDERATIONS

Cost

Research shows that an average household with an electric water heater spends about 25% of its home energy costs on heating water. Solar water heater economics can compare quite favorably with those of electric or gas water heaters depending on the local fuel costs. Heating water with the sun also means long-term benefits, such as being cushioned from future fuel shortages and price increases and reducing your home's environmental impact.

Paybacks vary widely, but a simple payback of 4 to 8 years on a well-designed and properly installed solar water heater can typically be expected. After the payback period, savings are accrued over the life of the system, which ranges from 15 to 40 years, depending on the system and how well it is maintained. If building a new home or refinancing a present home to do a major renovation, the economics are even more attractive. The cost of including the price of a solar water heater in a new 30-year mortgage is usually between \$13 and \$20 per month.

The **California Energy Commission's** Consumer Energy Center maintains information on all energy efficiency technologies and federal, state, local, and utility available rebates, grants and loans for solar hot water heaters and other energy technologies:

www.consumerenergycenter.org/rebate/index.html

Installation

Take the same care in choosing a solar water heater that you would in the purchase of any major appliance. Your best protection is to consider only certified and labeled systems. Check with the Solar Rating Certification Corporation (SRCC) at www.solar-rating.org to select the best systems for your needs. Find out if the manufacturer offers a warranty, what the warranty covers, and for how long. Typically, rebates require certain warranty periods, which might require an extra-cost extension of the normal warranty. Ask: If the dealer you are buying the equipment from goes out of business, can you get support and parts from the manufacturer or from a local plumbing contractor?

Make sure that the workers who are actually installing the system are qualified to do the work. Ask the installation contractor how many years of experience they have in solar hot water installation and for at least three references, and check them! When the job is finished, have the contractor walk you through the system so you are familiar with the installation. And be sure that an owner's manual with maintenance instructions is included as part of the package.

Maintenance

Solar water heater systems typically require an annual checkup and some minor attention to maintain the system in good working order. This can be done by the homeowner or by a certified solar equipment installer. Systems with anti-freeze require periodic replacement of the anti-freeze, perhaps every 5 years.



RESOURCES

American Solar Energy Society (ASES) <http://www.ases.org>

ASES is a nonprofit educational organization founded in 1954 to encourage the use of solar energy technologies. ASES publishes a bimonthly magazine, Solar Today, and offers a variety of solar publications through its catalogue.

Northern California Solar Energy Association (NCSEA) <http://www.norcal solar.org>

NCSEA is the local chapter of ASES and lists contractors and rebates.

California Energy Commission <http://www.energy.ca.gov>

CEC provides further background information on solar systems and current state rebate programs.

Energy Efficiency and Renewable Energy Network (EREN) <http://www.eere.energy.gov/>

EREN provides free general and technical information to the public on the many topics and technologies pertaining to energy efficiency and renewable energy.

California Solar Energy Industries Association (CalSEIA) <http://www.calseia.org>

CalSEIA provides lists of solar-equipment manufacturers, dealers, and installers in California.

Suppliers and Installers

For up-to-date installer listings, search the Green Materials Database, www.builditgreen.org/guide.

Cooperative Community Energy

(Buyer's co-op, membership required)
534 Fourth Street, Suite C
San Rafael, CA 94901-3360
(877) 228-8700
www.ccenergy.com

Cooperative Community Energy

(Buyer's co-op, membership required)
130 Petaluma Avenue, Suite A
Sebastopol, CA 95472
(707) 829-1999
www.ccenergy.com

Declination Solar

2245 Quesada Ave
San Francisco, CA 94124
(415) 826-3985
www.declinationsolar.com

Heliodyne, Inc.

4910 Seaport Ave.
Richmond, CA 94804
(510) 237-9614

Poco Solar

(Solahart systems)
3345 Kellet Street
Santa Clara, CA 95054
(408) 970-0680

Solahart USA, Inc.

25206 Flanders Drive
Carmel, CA 93923
(831) 622-9584
www.solahart.com

Solahart San Martin

(Solahart systems)
16890 Church Street Building 21C
Morgan Hill, CA 95037
(408) 776-2751

Solahart Services

(Solahart systems)
7720 Lorraine Ave Suite 111
Stockton, CA 95210
(209) 957-0833



www.heliodyne.com

Land & Sea Solar

PO Box 1507
Soquel, CA 95073
(831) 477-7169

www.landandseasolar.com

Light Energy Systems

(Solahart systems)
965-D Detroit Avenue
Concord, CA 94518
(925) 680-4343

www.lightenergysystems.com

MC Solar Engineering

2362 Walsh Avenue
Santa Clara, CA 95051
(408) 496-6226

www.mcsolar.com

Solar Depot

1240 Holm Road
Petaluma, CA 94904
(707) 766-7727

www.solardepot.com

Solar Living Institute

13771 S. Hwy 101
Hopland, CA 95449
(707) 744-2017

www.realgoods.com

Sun Light and Power

1035 Folger Ave.
Berkeley, CA 94710
(510) 845-2997

www.sunlightandpower.com

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