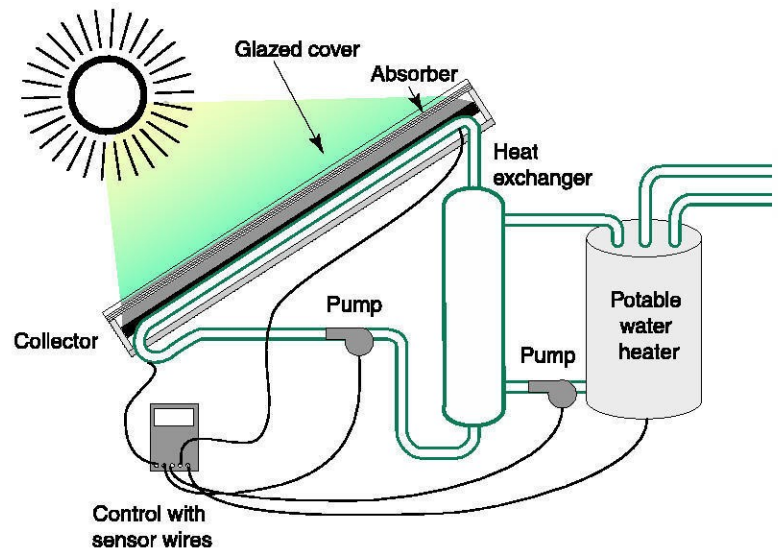


Using the Sun to Heat Water

Solar water heating is a simple, efficient, and affordable technology that provides hot water and saves on energy bills.

If you've ever felt warm water trickle out of a garden hose, you've experienced solar water heating in action. The hose transfers the radiant heat of the sun to the water inside. Solar water heating systems work the same way. Water (or non-toxic antifreeze solution) travels through dark colored pipes that are located in direct sunlight. The sun heats the water in the pipes. Once heated, the water is stored in an insulated tank until needed. In instances where there is no sun for a prolonged period of time, an auxiliary back up water heating system is used. Often the back up water heater is the storage tank itself and therefore does not cost extra.



Basic components of a flat plate collector system

Will Solar Work ?

The average family spends approximately \$300 annually on water heating. By using a solar water heating system, residents can typically cut their water heating needs by 40-80 percent and save between \$120 and \$240 annually.

Why Solar Water Heating?

Besides saving money, solar water heating:

- Increase the amount of hot water available
- Requires little maintenance
- Helps create a sustainable and independent energy future for the United States
- Is used by more than 1 million homes and over 200,000 businesses in the United States
- Reduces the amount of pollution created by burning fossil fuels

Myths on Solar

Though you may have heard rumors about solar water heating systems, many are untrue:

Myth: A solar water system cannot provide hot water at night.

Truth: During peak daylight hours, your solar system is most efficient. However, because the solar heated water is contained in an insulated storage tank, it is available at any time. In fact, a solar water heater can provide a home with more hot water for longer periods of time than traditional gas and electric systems.

Myth: Solar water panels only work on a home's roof.

Truth: Solar water panels can be installed anywhere there is direct sunlight. A southern orientation is optimal, but not required.

Myth: Large amounts of energy are required to manufacture solar water heating systems.

Truth: Solar water heaters produce the amount of energy required to manufacture them within the first 6-18 months they are used and can last more than 20 years.

Costs

The first step in considering solar water heating is to adopt water and energy efficiency measures. For example, low-flow shower heads, aerators, and front-loading washing machines can drastically reduce the amount of hot water used.

Insulating water tanks and pipes decreases the amount of heat loss.

Rather than spreading energy payments over a long period of time, as with natural gas or electricity, a solar system places all the costs upfront. From there the sun serves as a renewable fuel source that costs the homeowner virtually nothing to use.

Upfront costs vary widely and depend on the type of system installed. Typical costs range from \$2,500 to \$4,500 for a standard home installation. Exact price quotes can only be obtained from the installer.

1. Sizing the System

An average family of four uses 80 gallons of hot water each day. Each gallon of water requires roughly one square foot of solar collector area for heating. Using this estimate, a family of four needs two 4' x 10' collector panels connected to a 40-80 gallon storage tank.

2. Choosing the System

Residents in all points north, will want freeze protection. Both drain-back and non-toxic antifreeze systems offer freeze protection. Final system choice depends on the specific application and homeowner needs.

3. Payback Time

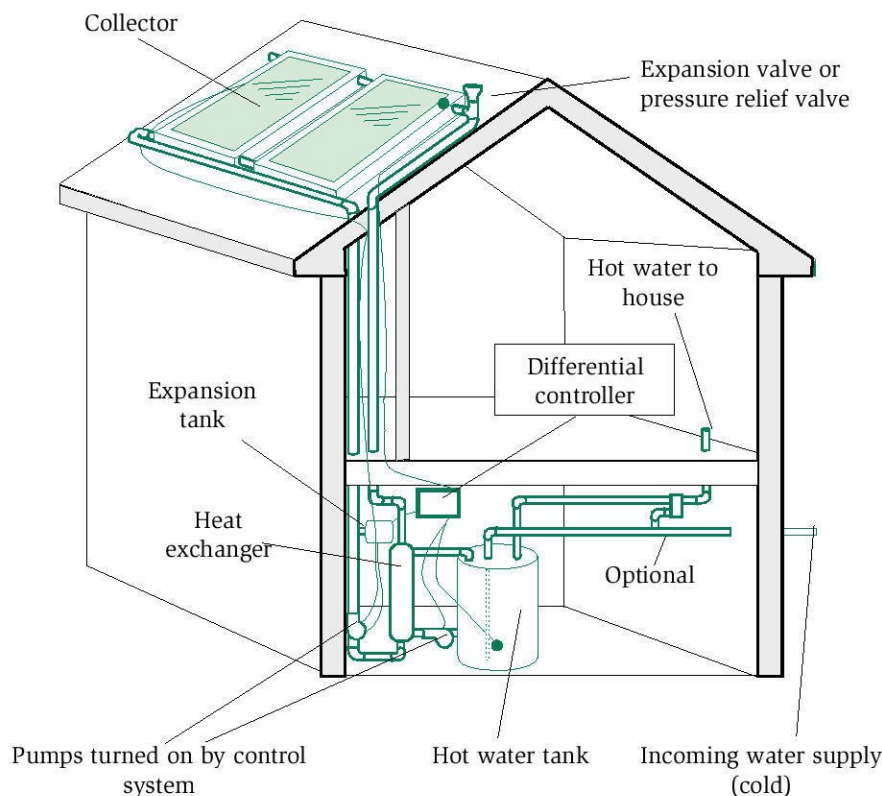
Payback time is a measure of how long it takes for the energy savings to repay the cost of the solar water heater.

For example, a family of four spends \$300 per year for hot water. The family installs a \$3,000 solar water heating system that reduces their annual water heating bills by 50 percent. It will take 20 years for the system to pay for itself.

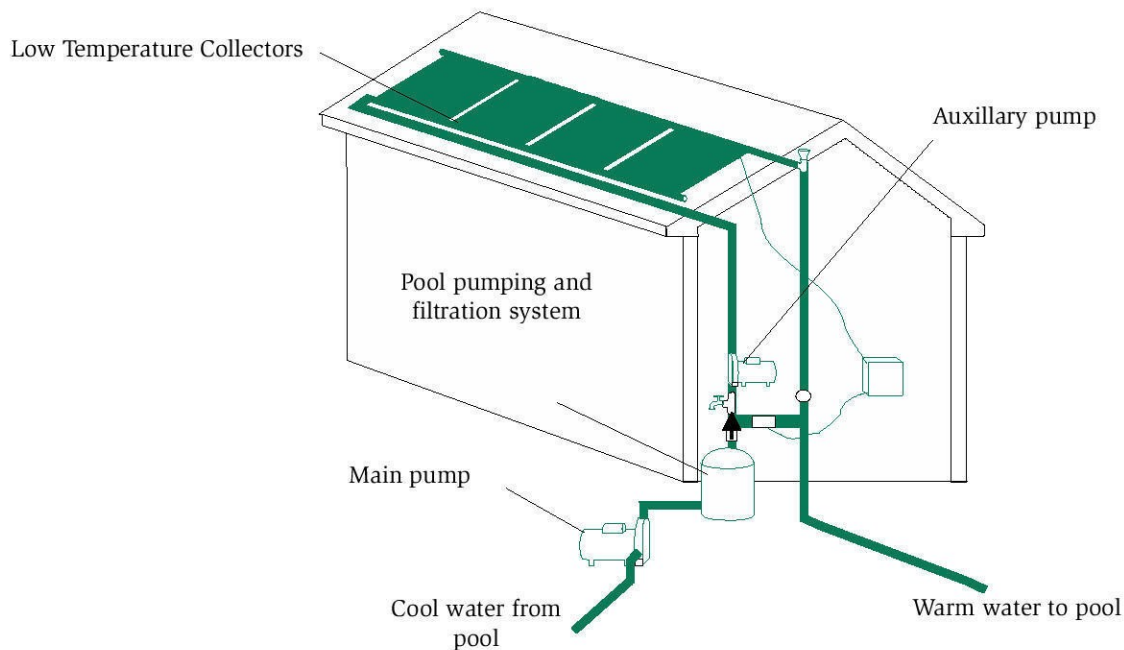
Average annual water heating cost = \$300

$\$300/\text{yr} \times 50\% \text{ solar savings} = \150 savings/yr

$\$3,000 \text{ initial cost} \div \$150 \text{ savings/yr} = 20 \text{ years}$



Active, Pressurized Solar Water Heating System



Solar pool heating system

Swimming with Solar

One of the most cost effective uses of solar technologies available on the market today is solar pool heating. Solar pool heating is the best and least expensive method for heating a pool. Unlike traditional pool heaters, a solar pool heater can also help cool the pool during summer months by pumping the warm pool water through the solar collectors at night where the heat is radiated to the night sky, and the cool water is circulated back into the pool.

A typical solar pool heating system costs \$2,000 to \$4,000 installed, or approximately \$6 per square foot of collector.

Solar pool heaters typically cost less than residential solar water heating systems because:

- ❑ The pool's filter pump is used to pump the water through the solar collector.
- ❑ The collector is usually made out of black plastic or rubber.
- ❑ The storage tank is the pool.

1. Sizing the System

Sizing a solar pool collector is dependent on many variables including climate, length of swimming season, solar availability, and use of a pool cover.

Pool covers save water by preventing evaporation, and retain two-thirds of the collected pool heat. If a pool cover is used, the size of the collector is usually around half the size of the swimming pool surface

area. If a pool cover is not used, the collector area is usually between three-fourths to three times the size of the pool surface area.

For example, a 30'x15', or 450 square foot (ft²) swimming pool that has a pool cover would need about 225 ft² of collector area and cost around \$1,350. The same pool without the pool cover could need up to 675 ft² of collector area and cost \$4,050. Shaded pools require more collector area.

2. Payback for Solar Pool heating

Payback is a measure of how long it takes for the energy savings from the solar pool heater to repay the cost of the solar pool heater.

For example, the 225 ft² collector noted above that cost \$1,350 would save the homeowner \$637 each year it was used in place of a gas powered pool heater. If it was being used in place of an electric pool heater, it would save the homeowner \$897 each year. The simple payback period would be 2.1 years when replacing a natural gas fired pool heater and 1.5 years when replacing an electric pool heater.

Natural Gas: $\$1,350 \div \$637/\text{year} = 2.1 \text{ years}$

Electric: $\$1,350 \div \$897/\text{year} = 1.5 \text{ years}$

As the example above shows, typical payback periods for solar pool heaters are one and a half to three years. Check with your local installer for a more specific payback period based on your system.

Additional Resources

For more information on solar water heating or to find an installer near you, contact:

American Solar Energy Society

Solar Today Magazine
2400 Central Ave., B-1
Boulder, CO 80301
(303) 443-3130
ases@ases.org
www.ases.org/solar

Florida Solar Energy Center,

Public Information Office
1679 Clearlake Rd.
Cocoa, FL 32922
(321) 638-1000
www.fsec.ucs.edu

Georgia Solar Energy Association (GSEA)

PO Box 728
Athens, GA 30603
(912) 596-1780

Home Power Magazine

PO Box 520
Ashland, OR 97520
(541) 512-0201
www.homepower.com

Interstate Renewable Energy Council (IREC)

P.O. Box 1156
Latham, New York 12110-1156
(518) 458-6059 (phone & fax)
www.irecusa.org

National Renewable Energy Laboratory (NREL)

Technical Publications
1617 Cole Boulevard
Golden, CO 80401
(303) 275-4363
www.nrel.gov

North Carolina Solar Center

Box 7401
North Carolina State University
Raleigh, NC 27695-7401
(919) 515-5666
ncsun@ncsu.edu
www.ncsc.ncsu.edu

Solar Energy Industries Association (SEIA)

805 15th St. NW, Suite 510
Washington, DC 20005
(202)682-0556
<http://www.seia.org>

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Atlanta, GA 30308
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U.S. Department of Energy

Energy Efficiency and Renewable Energy (EERE)
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