

GOING SOLAR, Introduction to Solar Water Heating:

A little reading here will answer a lot of questions!

Because of their low cost and high power density, mid-temperature Solar Water Heaters have always been the first thing to do when "going solar" but their great weight made the installation very difficult and expensive.

The Revolutionary Lightweight, Attractive Design of the "Skyline" Solar Water Heater changes that paradigm and makes solar water heating truly practical for everyone. The Federal 30% Tax Credit and Fast Rising Fuel Costs Make Now The Time to Install a Solar Water Heating System!

Solar (domestic) water heaters are a cost-effective way to generate hot water for your home. They can be used in any climate, and the fuel they use, sunshine, is free!

On average, water heaters use as much energy as a medium-sized car uses in a year. Each installed solar water heater is like increasing the fuel mileage on the family car by over 60%. Supplementing millions of existing water heaters with SolarRoofs.com's advanced solar thermal water heaters frees up huge amounts of limited energy resources that can then be used to produce electricity.

How Does a Solar Water Heater Work?

How well an active solar energy system performs depends on effective siting, system design, and installation.

Solar thermal water heating systems, which uses the sun's energy rather than electricity or gas to heat water, can efficiently provide up to 85% of the hot water needs—without fuel cost or pollution and with minimal operation and maintenance expense.

Solar water heating is a reliable and renewable energy technology used to heat water. Sunlight strikes and heats an "absorber" surface within a "solar collector." Either a heat-transfer fluid or potable water flowing through tubes attached to copper fin tube absorbers pick up the heat energy converted from the sun's radiant energy on the absorber.

The solar heated water is stored in a storage tank until needed. If additional heat is needed, it is provided by electricity or fossil fuel energy by the conventional "backup" water-heating system.

Types of Solar Heaters for Domestic Water Heating:

Solar water heating systems can be either active or passive, but the most common are active systems. Active systems rely on pumps to move the liquid between the collector and the storage tank, while passive systems rely on gravity and the tendency for water to naturally circulate as it is heated.

SolarRoofs prefers the active system powered by a small PV (solar electric) panel and 12 volt pump, this way the system is 100% powered by the sun, like a passive system, but has the advantages of much easier installation and attractive appearance by not having a tank on the roof.

Four types of solar collectors are used for residential applications:

Flat-plate collector

Glazed flat-plate collectors are insulated, weatherproofed boxes that contain a dark absorber plate under one or more glass or plastic (polymer) covers. Unglazed flat-plate collectors—typically used for solar pool heating—have a dark absorber plate, made of metal or polymer, without a cover or enclosure.

Thermosyphon systems

Water flows through the system when warm water rises as cooler water sinks. The collector must be installed below the storage tank so that warm water will rise into the tank which is located on the roof above the collectors. These systems are reliable, but contractors must pay careful attention to the roof design because of the heavy storage tank. Because the water storage is in the roof, these systems are less attractive and typically weigh over 800 pounds when filled with water. They are usually more expensive than integral collector-storage passive systems.

Integral collector-storage systems

Also known as ICS or batch systems, they feature one or more black tanks or tubes in an insulated, glazed box. Cold water first passes through the solar collector, which preheats the water. The water then continues on to the conventional backup water heater, providing a reliable source of hot water. They should be installed only in mild-freeze climates because the outdoor pipes could freeze in severe, cold weather. Because the water storage is in the roof, these systems typically weigh over 800 pounds when filled with water.

Evacuated-tube solar collectors

They feature parallel rows of transparent glass tubes. Each tube contains a glass outer tube and metal absorber tube attached to a fin. The fin's coating absorbs solar energy but inhibits radiative heat loss. These high-temperature collectors are used more frequently for commercial applications as their high temperatures are inappropriate for the majority of mid-temp solar water heating applications.

There are two types of active solar water heating systems:

Direct Open Loop Circulation Systems

In these systems a pump circulates household water through the collectors and into the home. They work well in climates where it rarely freezes.

Indirect Closed Loop Circulation Systems

Pumps circulate a heat-transfer fluid through the collectors and a heat exchanger. This heats the water that then flows into the home. They are popular in climates prone to freezing temperatures.

Antifreeze, The heat transfer fluid is usually a glycol-water mixture with the glycol concentration depending on the expected minimum temperature. The glycol is usually food-grade propylene glycol because it is non-toxic. SolarRoofs' systems 4 and 5 are indirect closed loop systems using non-toxic polypropylene antifreeze.

Drainback systems, a type of indirect system, use pumps to circulate water through the collectors. The water in the collector loop drains into a reservoir tank when the pumps stop. Drainback systems must be carefully installed to assure that the piping always slopes downward, so that the water will completely drain from the piping. This can be difficult to achieve in some

circumstances so sometimes glycol is used. They also require larger pumps to pump the water up to the roof.

Storage and "Back-Up"

Solar water heating systems almost always require a backup system for cloudy days and times of increased demand. Conventional storage water heaters usually provide backup and may already be part of the solar system package. A backup system may also be part of the solar collector, such as rooftop tanks with thermosyphon systems. Solar Systems may also use a modulating type demand (tankless or instantaneous) water heater for backup.

Economics and Other Benefits of Active Solar Heating Systems

Active solar heating systems are most cost-effective when they are used for most of the year, that is, in cold climates with good solar resources.

Selecting and Sizing a Solar System

Selecting the appropriate solar energy system depends on factors such as the site, design, and heating needs of your house. The local climate, the type and efficiency of the collector(s), and the collector area determine how much heat a solar heating system can provide. It is usually most economical to design an active system to provide 40%–80% of the home's heating needs.

Building Codes Covenants and Regulations for Solar Heating Systems

Before installing a solar energy system, you should investigate local building codes, zoning ordinances, and subdivision covenants, as well as any special regulations pertaining to the site. You will probably need a building permit to install a solar energy system onto an existing building. Because of the light weight of Skyline systems, structural is not usually an issue.

Installing Your Solar Heating System

Hundreds of handy homeowners have installed Skyline solar water heaters. There is a joke at SolarRoofs where we say "Handy homeowners have much less problem installing a Skyline solar system than plumbers because they actually read the installation manual." With many color pictures and clear directions, the SolarRoofs installation manual may be the best in the industry.

There are generally 4 ways to get your system installed:

- 1) The homeowner 100% installs the system by themselves or with a helper by reading the install manual (available on the site).
- 2) or, if adding a tank, they have a plumber set the tank which requires some soldering and then they did the no solder solar loop installation themselves.
- 3) or they have a plumber set the tank and have a handyman read the manual and install the solar loop (often they help the handyman).
- 4) have a professional solar contractor install it. They usually charge anywhere from \$800.00 to

\$2,600 to install as they have to cover higher workers compensation, labor and insurance costs as well as Warranty their work.

Maintaining Your Solar Heating System

Very little maintenance is needed. When there is no rain for a long period of time it is good to rinse your collectors with water to get the dust off. Please see Operations and Maintenance manuals.

Most solar water heaters are automatically covered under your homeowner's insurance policy. However, damage from freezing is generally not. Contact your insurance provider to find out what its policy is. Even if your provider will cover your system, it is best to inform them in writing that you own a new system.

The "Skyline" solar water heater is designed and Patented by Al Rich. He is a DOE Award Winning Inventor with 28 years of leadership and innovation in the solar water heating industry.

The Skyline series of open and closed loop Solar Water Heating Systems are designed first and foremost to save you money, year after year so quality and value are built in. SolarRoofs prepackaged systems are modular with all materials and easy-to-follow instructions