



Solar Thermal Hot Water & Heat

Illinois Solar Energy Association

www.IllinoisSolar.org

A chapter of the American Solar Energy Society and a 501(c)3 organization



Solar water heating systems

There are over 60 million solar water heating systems in the world, with hundreds of thousands of systems in the United States and thousands in Illinois. Easily integrated with conventional gas, electric, forced air, radiant floor and pool heating systems, solar water heaters have utilized reliable, proven materials and technologies for over 30 years. A solar thermal system can collect up to three therms of natural gas' worth of heating per square foot of collector area per year in Illinois.

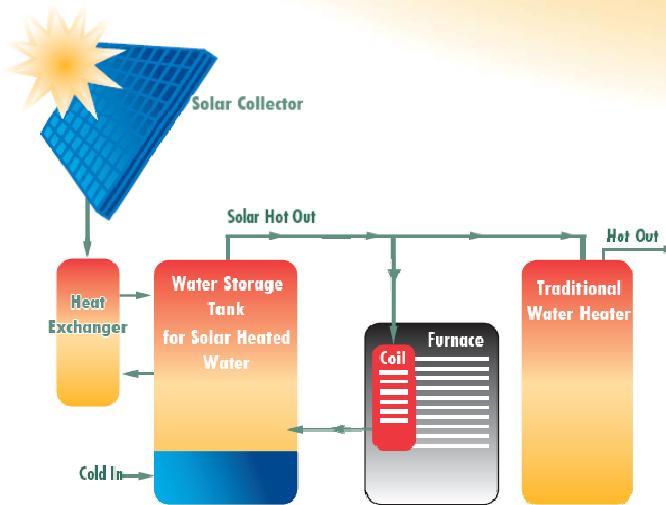
The value of solar water heating

A solar water heater connects to the home's existing gas or electric water heating appliance, and can provide most of the annual domestic hot water needs in Illinois. A solar heating system for a residence can save hundreds of dollars per year in utility costs, a valuable hedge against volatile and rising natural gas and other energy prices.



Evacuated tube system in Roselle

State and federal incentives, when available, can reduce installation costs considerably. Businesses may also be able to take advantage of accelerated depreciation. High-volume hot water users like restaurants, car washes and commercial laundries can realize energy savings worth several times the investment over the life of the solar heating system. Solar collectors may have warranties up to 20 years and storage tanks up to 10 years. Installers may also provide system warranties as well.



How solar water heating works

Usually covered by tempered glass, solar collectors trap solar heat in the same way as a car's interior when it sits in the sun. Water or anti-freeze is heated as it is pumped through the collector. A heat exchanger transfers this heat to a water storage tank. Solar heated water in the storage tank can be used immediately or later for daily hot water needs. The water passes through the gas/electric heater, which now acts as a back-up, boosting temperature when needed. The traditional water heater's useful life may be extended because of the solar system's work.

Space heating A solar water heating system can reduce a building's space heating load depending on the building's energy-efficiency. The solar heated water can warm a hot-water radiant floor system, or pass through a special furnace fan coil. The furnace fan blows air across the coil, reducing the need for natural gas or other fuel in a traditional forced-air heating system.

Can have both – solar hot water and photovoltaic systems on Stelle house



Why solar thermal?

Space and water heating are two large energy expenses for an Illinois home or business. Solar thermal offers an ideal solution to minimize rising and volatile utility costs while reducing pollution and reliance on natural gas, an increasingly imported source of energy. Systems cost little to run and can last decades with minimal maintenance. Illinois solar hot water systems can offset tons of carbon dioxide plus other pollutants per year. In addition to energy savings, a large portion of the system's cost may be recovered as increased equity in the property, often with no increase in tax rates. Based on a study by the Appraisal Institute, a home's value increases \$20 for every \$1 reduction in annual energy bills.

Examples of commercial solar systems



Solar water-heated restaurant in Niles.



The City of Chicago has installed solar water heating systems on many fire and police stations.



Solar is the primary supplier of domestic hot water for this 12-unit apartment building in Oak Park, saving hundreds of therms of natural gas per year.



Solar saves thousands of dollars worth of natural gas each year for this Berwyn laundromat.

Types of collectors

Flat plate collectors are efficient at heating a high volume of water to a medium temperature (generally up to 180 degrees). They are insulated, aluminum framed boxes covered by tempered glass. Inside, heat is collected by absorber fins, reflectors or concentrators. Flat plate collectors are the most common collector type.



Evacuated tube collectors heat a lower volume of water but to higher temperatures. The collectors are usually made of parallel rows of transparent glass tubes. Air is removed, or evacuated, from the space between the inner pipe and the outer glass tube to form a vacuum, which eliminates conductive and convective heat loss.



Outdoor swimming pools make use of relatively inexpensive unglazed collectors made of UV resistant plastic. Pool collectors hook right up to the pool's existing filter pump. They can deliver up to 100% of a pool's heat from Memorial Day to Labor Day in Illinois and are one of the most cost-effective applications of solar energy.



Thermosiphon systems place the storage tank above the collector to rely on natural convection to move the heated water from the collector to the storage tank. This is a passive system since there are no pumps. Thermosiphon collectors are popular in climates that do not experience freezing temperatures, such as Hawaii and South Florida (or used in summer only applications, such as vacation cottages).



JOIN the ISEA in the common goal of promoting solar/renewable technologies, providing energy education and establishing a sustainable energy network. Your support today can help provide a cleaner environment tomorrow. Become a member today.

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