NORTH CAROLINA SOLAR CENTER

SOLAR CENTER INFORMATION

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Heating Your Swimming Pool with Solar Energy

An unheated swimming pool has a natural yearly temperature cycle that varies with climate and geography, which in most parts of the United States limits outdoor swimming to just the summer months. However, a comfortable three to four month swimming season can be stretched out to five or six months when a pool heater is added (even longer in warm climates).

While heating your pool can enhance and extend your enjoyment of your pool, the cost of keeping all that water warm is very high. However, if you take advantage of the strong summer sun, you can reduce those high heating costs while still obtaining the benefits of a warm pool.

Conservation First

If you already have a heating system, the first thing you should do is to conserve the heat in your pool. The easiest way to save energy is to turn down the thermostat on your pool heater; every one degree reduction on the thermostat will reduce energy consumption by 5 - 10%. Once you have turned the heat down, the next step is to keep the heat from escaping. Since 95% of a pool's heat losses occur at the surface through evaporation, conduction, and radiation to the sky, a pool cover will substantially reduce your pool's heat loss. A cover will also help keep the pool cleaner and help extend the life of the chemicals in your pool. With a transparent plastic cover, you will actually gain some heat as the sun's rays pass through the cover and heat the water. At a cost of $0.40 - $0.80 per square foot, a pool cover can pay for itself in as little as one year, though you should be aware that the covers will deteriorate due to ultraviolet radiation, requiring a replacement every 3 to 5 years. Make sure your cover's warranty specifies its life expectancy. Also check to determine the ease of handling and storing the cover.

Basic Components

If you have taken steps to retain your pool's heat but are still not happy with your heating bills, or if you are planning to install a new pool, a solar swimming pool heater may be a good investment for you. Figure 1 shows the basic components of a solar pool heating system including the pump, filter, collectors, and backup heating system. Solar pool heaters take full advantage of the fact that solar collectors are more efficient when working at low temperatures. Unlike domestic hot water systems which raise a small amount of water to a very high temperature at an efficiency of 30 - 50%, pool heaters raise the temperature of several thousand gallons of water only a few degrees, to around 80 degrees Fahrenheit, but operate at an efficiency of 70 - 80%.

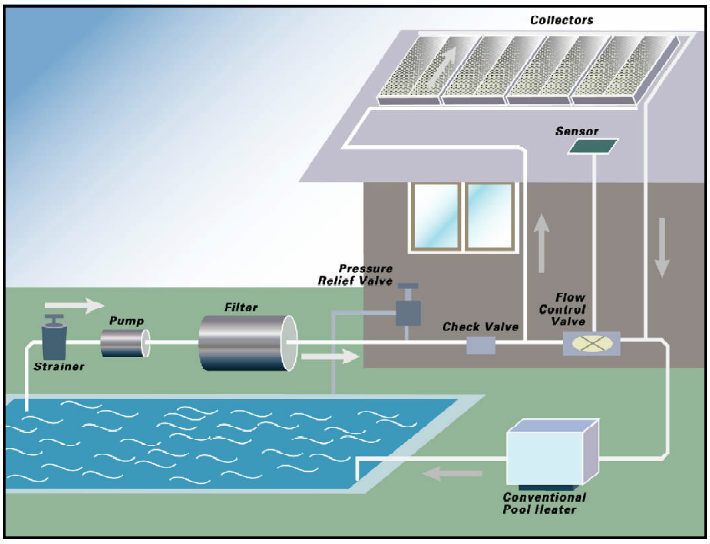

Figure 1. A Solar Pool Heating System

Collectors for pool heating normally do not require glazing or insulation since they are operated during those times of the year when solar radiation and ambient temperatures are relatively high. This allows for a simpler design that is far less expensive than domestic hot water collectors. In fact, many collectors are made of heavy duty plastic which is treated with an ultraviolet light inhibitor to extend the life of the panels. The advantages of plastic collectors are that they weigh less than metal collectors and they are much less expensive.

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Metal collectors are generally made of copper tubing mounted on an aluminum plate. The metal collectors last longer than plastic ones, and they are slightly more efficient in absorbing heat, therefore requiring less roof space than plastic collectors. The disadvantage of metal collectors is that the copper tubes may react with your pool's walls, producing discoloration that can only be removed by draining, cleaning, and repainting the pool. However, this problem can be entirely avoided if the pH level is always maintained above 7.2.

Since all swimming pools require a pump and related plumbing, the addition of a solar pool heater to an existing installation can be relatively simple. However, unless you are experienced with plumbing and electrical wiring, it is advisable to allow a professional to install your system. Often the existing filter pump can be used to circulate the pool water, though you should be sure it is able to maintain a high flow rate in order to keep the panels cool and operating at a high efficiency. It is generally recommended that all the pool water circulate through the collectors every 8 - 12 hours. Your collector should require very little maintenance provided the pool's chemical balance and filtration system are regularly checked.

Collector Sizing and Location

The amount of collector area you need to heat your pool depends on a variety of factors, but a general rule of thumb is that the collector area should be equal to at least one half of the pool surface area in order to extend the swimming season into spring and autumn in a reasonably sunny climate.

Collectors can be mounted on roofs or in any other location near the pool that provides proper exposure, orientation, and tilt towards the sun. The optimum collector orientation is south, but west-facing orientations are satisfactory for pool heating as long as the collector area is increased to a minimum of 75% of the pool surface area. East facing orientations are marginal. The tilt of the collector is just as important as the orientation. To receive maximum solar radiation, collectorsshould be perpendicular to the sun's rays. For primarily summer heating, the tilt should be equal to your latitude minus 10 to 15 degrees. In situations where it is desirable to install the collector horizontally, such as on a flat roof, the collector area should be increased to 75% of the pool surface area.

References

The following publications provide further information on solar swimming pool heating. This list is not exhaustive; inclusion does not imply endorsement by the North Carolina Solar Center, nor does omission of similar materials imply criticism.

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