

Solar Energy in Canada

Solar energy can meet three distinct applications: **heating water, heating air, and generation of electricity** in any residential or commercial setting. In most cases, solar energy provides the lowest lifecycle cost, and the lowest environmental impact from the release of greenhouse gases (GHG).

Solar Energy for your Swimming Pool

Solar thermal water heating systems are compatible with swimming pool heating for a number of reasons.

Swimming pools require water temperatures in the range that most solar systems are capable of supplying: from 29 to 37°C. Secondly, the solar system provides the maximum output of hot water during the summer months, which is when seasonal swimming pools are in use.

The use of a solar system to heat a swimming system is environmentally-friendly due to the direct replacement of a portion of the fuel required to heat the water.

Solar heating systems for swimming pools are divided into two main types. The most common type is a system designed to heat a pool in use for the spring-to-fall season. The solar collectors used in these seasonal systems are generally flexible plastic panels, typically 4 x 10' or 4 x 12' in dimension, although they also can be manufactured in custom length if required. Some collectors consist of rubber tubing that is cut to length and then attached to a plastic header.

The second type is designed to provide year-round use for indoor or enclosed pools. The collectors used in these systems generally consist of flat plate copper tube absorbers enclosed in an insulated box with a glass cover. These collectors usually have dimensions of 4 x 8' or 4 x 6'. Because this type is exposed to freezing temperatures during winter, a glycol antifreeze mixture is circulated from the

panels to a heat exchanger. The water from the pool is circulated through the other side of the heat exchanger to transfer the heat to the pool, so there is no transfer of the glycol into the pool.

The major components in a solar pool heating system are as follows:

- 1) Solar collectors, either flat plate copper tube or flexible plastic panels. While a typical flat plate collector is 4 x 8' or 4 x 6', the plastic panels come in 4' widths and various lengths from 5 to 12 feet.
- 2) Storage tanks for year-round use, typically with multiple internal heat exchangers that allow the solar system to store heat in the tank, and others that allow the swimming pool to extract that absorbed heat. The main body of water in the tank is often used as a preheat tank for the domestic water supply. In a seasonal system, the pool water is circulated directly through the panels using the filter pump.
- 3) A control package, which includes sensors to monitor the temperature at the collectors and in the pool, to ensure the system transfers the maximum amount of heat from the collectors to the swimming pool. An alternative would be a manually operated ball valve used to direct the water to the collectors during the daylight hours.
- 4) A backup heat source, which will heat the pool when the sun is not available.

Solar pool heating systems can be retrofitted to

existing buildings, but the year-round systems are more easily installed during new construction.

In both new and retrofit installations, the solar system requires a south, west or east facing roof for the solar collectors. A north facing roof does not provide sufficient solar exposure. The number of panels required will depend on the direction of the roof and the size of the pool.

A seasonal system requires solar collectors that are 50 percent of the pool surface area if oriented toward the south, which increases to 80 percent of pool surface area if the orientation is eastward. Most year-round systems require two 4'x8' panels, with more required as the size of the pool is increased.

The panels cannot be shaded by trees or other buildings.

The storage tank for a year-round system also requires space in the mechanical room to accommodate the storage tank (a 80 US gallon tank has a diameter of 24" and a height of 6').

The collectors must be connected to the solar storage tank or heat exchanger by copper supply and return lines. Finding a route for these lines in an existing home with a finished basement can be difficult.

During summer, a solar system can provide approximately 50 to 90 percent of the heating of the pool. The amount depends on the number of sunny days and the space available for panels.

The cost of a typical solar system with two flat-plate collectors, storage tank and control package would be approximately \$5,800. Installation costs will vary depending on type of construction in the building, and whether the system is installed in new construction or retrofitted. The range is generally \$1,200 to \$2,000.

A typical seasonal solar system includes five 4 x 10' panels and control system. This package usually costs \$2,000 to \$2,600. Installation costs vary depending on the type of home, the number of stories, and whether the project is new or retrofit.

Some portion of both a seasonal and a year-round solar system can be installed by the homeowner. Both systems require basic plumbing skills and some work on the building roof. The balance of the connections for the year-round system requires more advanced plumbing skills. The installation of the back-up heat source typically requires a licenced tradesperson to connect the heating unit to the gas, oil, or propane fuel source.

Author: Lyle Jory

The **Canadian Solar Industries Association (CanSIA)**, with assistance from **Natural Resources Canada**, has produced this series of bulletins to explain the feasible applications of solar energy in Canada. To demonstrate how you can put the sun to work for you, CanSIA has posted these bulletins on its internet homepage, with additional information on solar energy and a comprehensive directory of companies that are involved in the design, sale and installation of solar energy across Canada. Members of CanSIA comply with a Code of Ethics. Please go to www.CanSIA.ca, or contact our office:

2415 Holly Lane, Suite 250, Ottawa, ON K1V 7P2
(613) 736-9077 (fax) 736-8938 (email) info@CanSIA.ca