

# 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).

## Designing Solar Energy for your Pool

Solar energy can be used to heat the water in a swimming pool, in order to extend the swimming season from May to September, while reducing the heating costs significantly and reducing the environmental damage from conventional fuel sources.

Without a heating unit, an outdoor pool will reach 21°C (70°F) by June, or by May if you add a solar blanket and a solar heating unit. The pool will retain that temperature until the end of September in a typical summer.

### Automatic control

With a solar heater, water from the pool is circulated by the pump through low-profile, south-facing panels, called solar collectors, that are installed on the roof. Electronic sensors tell a solar control unit that there is enough sunlight available to heat the pool water, and the controller diverts the water into the collectors. Properly oriented collectors will start to heat a pool by 8:30 in the morning, and will capture the solar energy until 6:30 that evening. Once pool temperatures reach the desired point, the controller automatically adjusts the position of the system valve to allow the water to bypass the solar heater and maintain the desired temperature.

Solar pool heating expenses are lower than fuel-burning alternatives. The cost of a solar system will vary with the size of the pool and the type of installation, and require no separate heat exchange unit. A solar system for an 18' diameter pool will cost \$1,200, while a 20 x 40' rectangular pool would cost

\$3,200. All figures are estimates, and will depend on a number of site-specific issues.

A 16 x 32' pool would cost \$2,500 to install, compared with \$1,400 for a system to heat with natural gas or oil, but the latter will require \$800 a year in operating costs to purchase the fuel. After just five years, the total cost for the solar system would be \$2,500, but the oil/gas unit would have cost \$5,400. After ten years, solar would still be at \$2,500, while the more traditional option would be \$9,400 and counting.

As the cost of natural gas and oil continues to rise, the economic benefits of solar energy become obvious.

Solar heating systems include only one moving part, a water diversion valve, and require almost no maintenance. Solar manufacturers offer a 10 to 15 year full replacement warranty, and some offer a limited lifetime warranty, compared with a standard 4 year warranty on gas and oil heaters. Fossil fuel heaters require maintenance of burner nozzles, firing chambers and chimneys, with annual maintenance at \$100.

### Location

Orientation of the solar collectors is crucial to the efficient operation of a solar pool heater. The collectors must face between southeast and southwest, and need to be tilted at 60° angle above horizontal. Any other orientation will lose performance efficiency, but can be considered.

The best spot for collectors depends on several factors specific to the site. They should be installed in a location to minimize the length of plumbing required, and it is important that they not be shaded by nearby trees or buildings. They must also be firmly attached to their moorings to avoid damage from high winds.

There are four location choices for pool collectors:

- Flush-mounted on the roof if the roof's tilt angle (angle above the horizontal) is close to 60°, and the roof's azimuth angle (east-west orientation) is south.
- Rack-mounted on the roof if the roof is flat.
- Rack-mounted on a south-facing wall or fence if the roof does not offer southern exposure. This rack should angle the bottom of the collectors to achieve a tilt angle of 60°.
- Rack-mounted on the ground close to the pool in order to obtain the proper orientation. A rack will cost more, but will increase collector performance if the other options are not optimal.

In most of Canada, the sun traverses the sky at approximately 60° above the horizon in May, and reaches a maximum angle of 70° by summer solstice (June 21) before descending to 60° by late September. In designing a layout for the location of

the collectors, you must remember that the 'magnetic north' of a compass is not the 'true north' path of the sun. Collectors should be oriented as close as possible to 'true north' for maximum efficiency.

Some municipalities in Canada have by-laws which restrict the height of construction or have specific building code regulations which may prohibit certain choices for plumbing and/or electrical work. Be sure to consult local authorities before finalizing any plans to install a solar energy pool heater.

A solar pool heater is compatible with any existing pump and filter in a swimming pool. The solar system is attached to existing plumbing between the filter and the pool, and a valve is installed in the return line to divert the pool water through the solar collectors when the pool requires heating. At night or when the pool is up to the desired temperature, the valve returns the pool water directly to the pool without a detour to the collectors. The pool water is always pumped and filtered in exactly the same way as it was before the solar system was added.

*Author: Jeffrey Knapp*

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](http://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](mailto:info@CanSIA.ca)**

