

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 Air Heating in Industrial Facilities

Most large industrial and warehouse facilities in Canada need fresh ventilation air in order to remove the exhaust fumes caused by their process, to maintain required indoor conditions and to provide a healthy indoor working environment for their workers.

In recent years, standards have been revised to recognize this need as a result of indoor air quality problems such as the 'sick building syndrome.' Since this fresh air needs to be heated during our cold winter seasons, this additional heating requirement results in increased financial costs for companies in all regions of the country.

There is a proven solar air heating technology that can efficiently and cost-effectively preheat fresh ventilation air to reduce heating costs and to meet this increased demand for indoor air quality. Known generically as the perforated-plate solar collector, this absorber is a metal siding that can be installed with ease by any metal siding contractor. The absorber is perforated with many evenly-spaced small holes, and the solar collector is created by mounting the absorber plate away from a wall to create a plenum or air gap of a pre-determined depth. The plenum is either tied into the building's make-up air system or it can have its own independent distribution process.

Like any wall cladding, the absorber is heated when the sun shines on it. As outdoor air naturally moves over the absorber, it is heated and then drawn through the absorber's many holes, and then collected for distribution within the building. Annual

solar collection efficiencies of more than 70% have been documented with the installation of this solar system in buildings located in various sites across Canada.

The perforated-plate solar collector saves even more energy by recapturing much of the heat that otherwise flows out of the leaks in a building's wall. This additional benefit is equivalent to doubling the RSI-value of a standard wall.

It is common for industrial and warehouse facilities to have a high degree of air stratification within, due to the large size of the building. This means that air at floor level can be quite cool, while air at ceiling level can be quite warm. This valuable heat is often wasted by the ceiling exhaust and by the heat loss through the building's roof.

A solar air heating system mixes this existing warm air with fresh air entering via the solar collectors, and reducing the temperatures at the ceiling and causing the mixed heated air to come down to floor level. While this method does not provide perfect destratification, it does save a substantial amount of energy in many facilities. Whenever possible, the fresh air from a perforated-plate solar collector system is distributed in this manner.

Financial impact

For industrial and warehouse facilities with new construction and retrofit projects, perforated-plate solar collectors commonly have internal rates of return (IRR) of 20 to 30%, exceeding 40% in some

locations. For other projects, the IRR is usually 15 to 25%, a return that is superior to good bank rates and higher than the discount rate used by most organizations. New and retrofit projects are quoted with a higher rate of return because the cost for installing standard siding and some of the HVAC equipment can be discounted if the design is planned with a solar air heating system.

Because of their size, industrial and warehouse facilities cost between \$150 and \$200/m² to install. There is little or no maintenance for a perforated-plate solar collector, so there is minimal ongoing O&M costs.

Due to a wide variance of climate and energy prices among Canadian cities, as well as differences in system operating conditions, it is difficult to calculate the capital and operating savings that can accrue from the installation of a perforated-plate solar collector system.

A solar energy company can provide an estimate or undertake a feasibility study, while a pre-feasibility assessment is possible by downloading the RETScreen software (developed by NRCan and available for free download from the internet at retscreen.gc.ca; it runs on Microsoft Excel).

Financial Incentives for Commercial Sites

NRCan also provides the Renewable Energy Deployment Initiative (REDI), which offers a rebate equal to 25% of the total cost for installing a perforated-plate solar collector system in a commercial, institutional or industrial application. The REDI incentive is intended for installations that are primarily heating ventilation air, and the incentive is capped at \$50,000. For locations that are not on the national energy grid, the rebate is equal to 40% of total cost.

Several Canadian utilities offer an incentive for investing in energy saving technologies, including the perforated-plate solar collector. This incentive is usually based upon estimated annual displaced energy consumption and is usually equal to 5% of the total cost for a perforated-plate solar collector.

If your building or application requires heated air, consider saving energy and money with a perforated plate solar collector system. Internal rates of return are almost always superior than the best bank rate, and there are numerous environmental reasons to consider this option.

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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:

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