

**IN A LAND OF CHEAP ENERGY CAN SMALL SCALE
SOLAR THERMAL BE COST COMPETITIVE?
A CANADIAN CASE STUDY**

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Murdoch University. The work is original except where indicated by reference in the text and no part of the dissertation has been submitted for any other degree. Any views expressed in the dissertation are those of the author and in no way represent those of Murdoch University. The dissertation has not been presented to any other University for examination either in Australia or overseas.

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ABSTRACT

With rising energy prices and an increased focus on environmental issues, this paper attempts to answer the question of whether solar domestic hot water (SDHW) technology can be an economically viable investment over a twenty year period for the average residential homeowner in Ottawa, Ontario by modelling different payback levels that occur through fuel savings for natural gas and electricity. Natural gas is the primary energy source for hot water heating but is not available in all jurisdictions, particularly rural areas.

Average and high consumption hot water energy demand was determined by analyzing hourly consumption data from eight sites in Ottawa for a period of between twelve and eighteen months. Three energy price forecasts were used with performance and energy savings from a typical SDHW system completed by RETScreen software. Modelling included: A) a baseline condition; B) a carbon tax; C) an increase in the harmonized sales tax (HST); and D) a combination of both. Scenarios B), C), and D) are assumed to reduce demand assuming a price elasticity of demand for electricity of -0.3 and -0.35 for natural gas.

In the absence of government incentives, all natural gas scenarios resulted in poor economic returns due mainly to the low price of natural gas relative to capital. Based on current and projected electricity prices, only the BAU policy scenario, assuming no adjustment in consumption due to rising prices resulted in the SDHW system being economically viable without incentives. Greenhouse gas (GHG) abatement costs are estimated at between \$15 and \$20 per tonne CO₂, per year and \$27 to \$30 per tonne CO₂ per year for natural gas and electricity, respectively and is comparable to current international prices under emissions trading.

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