Geo-Exchange Delivers High Efficiency in a Range of Applications Operational Longevity Supports Capital Planning and Stability

Geo-exchange technology - also known as ground-source, geothermal heat pump, earth energy, etc - offers an opportunity to capture and deliver quality thermal energy to consumers, while more efficiently using existing electricity infrastructure and well-known technology. It represents a significant opportunity for Canadian policymakers to promote and expand renewable energy.

All geo-exchange systems involve a heat-transfer fluid moving within a loop to transfer thermal energy, which heats and/or cools spaces or processes. Rather than use combustion, geo-exchange systems capitalize on the transfer of existing energy from earth, processes or buildings to deliver ultra-high efficiencies and renewable heating and cooling.

Under national design and installation standard CSA C-448, geo-exchange systems operate at approximately a 300% minimum efficiency. This means that for every unit of electricity invested in to a system, at least two units of 'free' heat or cool are transferred from the earth.

When geo-exchange meets 100% of heating needs, it provides up to 70% savings compared to electric resistance heating. When cooling a space, given the naturally low temperature of the earth, geo-exchange usually operates about 35% more efficiently than even EnergyStar-rated air-conditioning technology.

In some applications, efficiencies as high as 1000% can be achieved when parts of a building require cooling at the same time that others require heat. Well-designed geo-exchange systems can often achieve higher technical and economic efficiencies with integrated low-temperature hydronic systems or thermal storage tools such as hot water or ice tanks.

LIFECYCLE AND PAYBACK CALCULATIONS

Operational life for geo-exchange systems can be set at 50 years - the common warranty on loop fields, which are the largest cost driver - with distribution system replacement in year twenty-five. Interior distribution systems usually make up approximately 30-35% of initial installation costs for residential systems.

Commonly quoted estimates and figures assuming a 20-year lifecycle are exceedingly conservative. They can almost be effectively doubled.

The federal government and some other governments such as the government of Manitoba estimate that geo-exchange provides the lowest lifecycle cost of any heating and cooling method. This 50-year time period provides long-term predictability for capital and infrastructure planning, and therefore may be viewed as a risk management tool.

Consumers often first look at simple project paybacks. Simple payback numbers, however, usually ignore a number of decision factors such as capital depreciation and tax effects, opportunity costs, risk, fluctuations over time, and income in the years after the payback.

Simple payback counter-intuitively tells very little about the financial value of a project, and it is almost never used in investment finance for exactly that reason. Project Net Present Value (NPV) is the tool of choice and on this basis geo-exchange often makes the most financial sense of any technology.

ADDRESSING BARRIERS TO MARKET PENETRATION

Historically, industry has identified the following barriers as its most pressing constraints:
((Lack of training
(Lack of certifications and quality assurance for customers
(Upfront costs of geo-exchange systems, especially for residential installations
(Lack of government incentives for geo-exchange
(Lack of policies supporting geo-exchange market growth.

The Canadian Geo-Exchange Coalition (CGC) has taken the following steps to address these barriers:

1. CGC has worked with a broad array of industry specialists to develop Canada's first national training program for drillers, installers and designers of geo-exchange systems. The training - developed by industry-leading practitioners, in cooperation with the Canadian Standards Association and Natural Resources Canada - is fully revised and updated annually and delivered across Canada since February 2007.

2. CGC developed the Global Quality Geoexchange Program(r) during 2005-2007. This first Canadian quality program underwent extensive consultation, including a Canada-wide, 12-city tour of public consultations, and is the world's most extensive geo-exchange quality initiative.

3. CGC first looks to the private financial sector to develop financing program with lower-risk premiums, using the Global Quality Geoexchange Program(r) as quality assurance. Having one unified national quality assurance tool is a critical step in risk management for all investors and insurers. A number of utilities and governments,

including the federal government under the ecoENERGY Retrofit - Homes Program, are now referring to the CGC Global Quality Geoexchange Program(r) for their grants and subsidies. Requiring CGC's quality assurance program in incentive programs and regulatory frameworks is a low-cost way for governments to help renewable technology forward in Canada.

TAX TREATMENT

Geo-exchange technology has been listed in the Canadian government's Class 43.1 Technical Guide since 1994 under the category of 'active solar equipment'. Class 43.1 allows taxpayers an accelerated write-off of the capital cost of certain equipment that is designed to produce energy in a more efficient way or to produce energy from alternative renewable sources.

Class 43.2 has been created to provide additional incentive for systems in Class 43.1 that use fossil fuels more efficiently, specified waste-fuelled electrical generation systems, and renewable energy systems. Class 43.1 allows taxpayers to deduct the cost of eligible equipment from taxable income at up to 30% per year on a declining balance basis, while Class 43.2 provides further acceleration of the capital cost allowance rate to 50% for certain energy systems.

In the 2007 federal budget, eligibility under Class 43.2 was extended to wave and tidal energy and a broader range of applications involving active solar heating, photovoltaics, stationary fuel cells, production of biogas from organic waste, and pulp and paper waste fuels. The CGC urges the federal government to include geo-exchange equipment, particularly ground loops and heat pumps, with the other renewable technologies under Class 43.2.

"We believe that Canada's tax regime should treat every energy source or technology equally. Favoured tax treatment for either geo-exchange or any other particular energy system - whether oil or solar - would be inappropriate market interference," says Denis Tanguay, President and CEO of the Canadian Geo-Exchange Coalition.

The CGC has also asked that geo-exchange technology be distinguished in a separate category under Class 43.1 allowing accelerated capital cost allowance for clean energy generation. This would raise awareness among institutional and other investors.

DISTINCT FROM SOLAR

Arguments for a status distinct from "active solar equipment" include:
(Geo-exchange technology is not sold or represented by the solar industry practitioners currently at work in the field
(There is a distinct training, accreditation, and quality assurance program for the technology's generally more technically complex design and installation requirements
(Geo-exchange technology is used in thermal transfer and storage applications much

more frequently than any form of solar energy, especially in applications such as ice rinks and integrated-hydronic processes
(It does not directly capture only solar energies, but also uses the radiant heat of the earth in applications ranging from residential systems to orphaned mines and waste heat capture
(It is the only heating and cooling technology that qualifies both as a renewable and as highly energy efficient
(Geo-exchange technology may otherwise be less visible to and/or targeted by the private investment community than other technologies
(It may be considered an energy generation technology as it uses a small quantity of electricity or natural gas to provide a much larger quantity of renewable heat and cool
(Natural Resources Canada has consistently supported geo-exchange as a distinct technology, which is now represented by a professional and credible industry association.

The preceding article was drawn from the Canadian GeoExchange Coalition's pre-budget submission to the Canadian government. For more information, see the web site at **www.geo-exchange.ca.**