



STAFF REPORT INFORMATION ONLY

Geo-thermal Energy – Utility Arrangement

Date:	March 31, 2008
To:	Government Management Committee
From:	Chief Corporate Officer
Wards:	All
Reference Number:	P:\2008\Internal Services\F&re\Gm08033F&re – (AFS 6845)

SUMMARY

The purpose of this report is to report back as requested on the feasibility of using a geo-thermal energy utility approach similar to the solar utility approach previously approved by Council.

Financial Impact

Under the geo-thermal energy utility arrangement the City would not own or operate the geo-thermal system. The City would only pay for actual energy produced from the geo-thermal system at a rate equal to or lower than the existing utility rate and therefore there are no negative financial impacts.

The Deputy City Manager and Chief Financial Officer has reviewed this report and agrees with the financial impact statement.

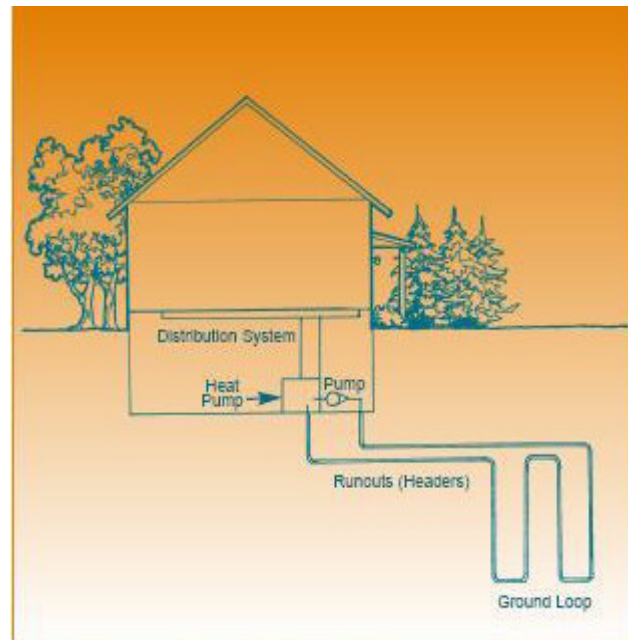
DECISION HISTORY

City Council on November 19 and 20, 2007, adopted Report - Solar Thermal Energy Purchase Strategy.
(<http://www.toronto.ca/legdocs/mmis/2007/gm/bgrd/backgroundfile-7973.pdf>)
Appendix A - Solar Utility
(<http://www.toronto.ca/legdocs/mmis/2007/gm/bgrd/backgroundfile-7974.pdf>)

COMMENTS

Geothermal Technology

Geothermal technology is a renewable energy alternative to traditional heating, and air conditioning systems. Other terms used to describe geothermal technology include earth energy systems, ground-source heat pumps, geothermal heat pump systems or water source heat pumps. Geothermal systems use the relatively constant temperature of the ground to regulate the temperature of a home or building at very high efficiency. The system moves heat from the ground to the home/building for heating — and in the opposite direction for cooling. Geothermal technology has been widely used in Ontario for over 20 years.



▲ *Components of a typical earth energy system.*

Benefits of Geothermal Technology

- Transfers three to four units of energy into a building for every one unit of electricity it uses;
- Produces less carbon dioxide and atmospheric pollutants than conventional heating and cooling systems;
- Runs cleaner than traditional heating and cooling systems;

Cost of Installing a Geothermal System

There are many site-specific variables that influence the cost of installing a geothermal system: loop type and size, site conditions (soil/rock type, water quality, etc.) overall

size/capacity of the system, and local regulations. There are essentially two types of (heat transfer) loops: a vertical loop means that energy is extracted from the ground using vertical pipes and a horizontal loop means that energy is extracted using horizontal pipes. The vertical system is more costly to install but requires less land space and a horizontal system is less costly to install but requires more land space.

Estimated costs to install a complete system, including the ground loop and indoor heat pump, range from \$15,000 to \$30,000 for a typical home (2,000 ft²). The cost for a commercial building will be proportionately larger depending building size. Additional expenses may be incurred for modifications to interior ductwork or lawn/surface restoration costs.

While geothermal systems may be more expensive to install than conventional systems, long-term energy savings can be significant. The payback period for each system will vary depending on the cost of the system and the existing energy expenses but can range, typically, from 5 – 20 years. The payback is usually shorter when the system is installed in a new building.

Utility Model

The utility model allows building owners to purchase renewable energy with no upfront capital. This model is being used by the private sector to build and operate solar thermal installations in Toronto and City Council has authorized this methodology for up to 20 installations on City buildings. The utility model could also work for geo-thermal installations. Interest is growing for geothermal installations using the utility approach and a number of firms are offering this approach. Enwave has also indicated its interest in developing this business.

In the geo-thermal utility approach, an energy specialist firm would supply, install, own, operate and maintain geo-thermal systems and the customer would purchase the actual energy generated for its use. The energy firm would act, in essence, as an energy utility with the energy being extracted from the ground on the building's property.

Financial Model

Under a geo-thermal utility arrangement the customer would only pay for actual energy produced from the geo-thermal system at a rate negotiated between the customer and the energy firm (usually equal to or lower than the existing utility rate for natural gas or electricity).

Benefits of using the geo-thermal utility (for heating purposes) approach include:

- installation of renewable energy systems without using City capital
- using proven technology
- CO₂ emission reductions
- avoiding maintenance of the system
- energy price stability (fixed price contract for the energy generated)

Potential Application for City of Toronto

A geo-thermal system was installed in the Yonge Hearts Child Care Centre in 2003 and this building is showing significant energy savings compared to other similar buildings. The new Police Academy building includes a geo-thermal system and the Press Building at Exhibition Place is also undergoing a retrofit to utilize geo-thermal energy. This installation should be completed by June 2008. The first City building utilizing geo-thermal energy was the office/changeroom facility in Coronation Park and has been successfully using geo-thermal energy since 1993.

The geo-thermal technology is not new but using the utility approach is very new. One of the main reasons there are so few installations is due to the longer payback periods for existing buildings. Payback periods are better when the installation can be done while the building is being constructed.

As natural gas rates continue to increase and as the utility model is further developed the City should be looking to use this approach as an option for heating and cooling its facilities.

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SIGNATURE

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