

■ GEO-EXCHANGE SYSTEMS

Geo-exchange systems, also referred to as earth energy systems, or geothermal heat pump systems take advantage of the ground's heating and cooling properties. Geo-exchange technology uses the relatively constant temperature (between 4°C and 10°C year-round) beneath the surface of the earth to heat and cool buildingsⁱ. This energy from beneath the earth's surface can be captured using proven geo-exchange technologies, and harnessed to provide space heating and/or cooling.

Geo-exchange systems work by burying a ground loop system, consisting of subsurface pipes underground filled with a heat-conducting, environmentally friendly liquid. The loops may be closed, so that the same fluid circulates through the system continuously, or open, so they take in water from a pond or aquifer and release it into another water source. Loops may be oriented horizontally or vertically, depending on land area available as well as cost and ease of drilling into subsurface soil or rockⁱⁱ. When the warm fluid returns to the compressor system, heat is removed from the fluid and transferred to the heat pump, where it warms the air in passing pipes prior to its circulation throughout the buildingⁱⁱⁱ. Electricity is required to operate the heat-pumps however the geo-exchange systems are still able to produce three to four units of free thermal energy from the earth for every one unit of electrical energy used. Geo-exchange systems can be installed in new buildings during construction or retrofitted to most existing heating and cooling systems.



- Provides space heating/cooling and hot water generation.
- Three to four units of energy produced for every one unit used.
- Lower maintenance and operating costs than conventional systems.
- Quieter than conventional heating and cooling systems.
- No onsite emissions or indoor air pollutants.
- The potential to power the system using low-impact renewable electricity.
- Reduced space requirements where one system can be used for both heating and cooling

i The Pembina Institute. <http://www.cleanenergydevelopments.com>

ii BC Government: Ministry of Agriculture. <https://www.bcac.bc.ca>

iii Canadian Geothermal Coalition. <http://www.geo-exchange.ca>