

Earth Energy

Have you ever wished you could strike it rich? Discover an oil or gas well in your back yard? Unfortunately, oil and gas are found only where plant and organic material has decomposed and been subjected to the right conditions over millions of years.

Maybe you won't find oil in your backyard, but you will find energy. The earth around your home holds a lot of energy. When the sun beats on the ground, or the rain soaks into it, the ground is warmed. And the earth itself continuously radiates heat from its molten core.

A metre or two below the surface, the ground is about the same temperature as the average air temperature in your area. In the prairies, that's about 5-6°C. In southern Ontario it's about 10°C, and on the East or West coast, about 11-12°C.

That's obviously not warm enough to heat your home directly. To use it, a way of concentrating or "upgrading" the temperature is needed. It's done with a heat pump that can take the relatively low temperature of the earth and use it to heat air or water warm enough to heat your home.

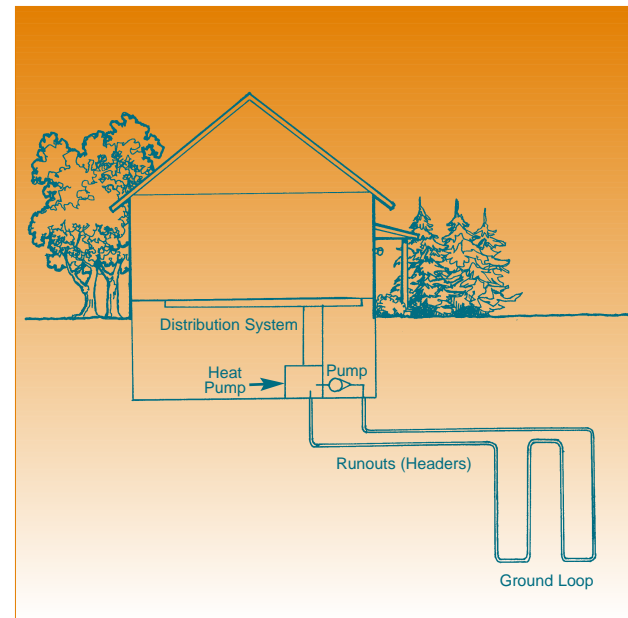
Every unit of electricity used to run an earth energy system transfers three to four units of energy to your home. That's why it's worth digging for energy in your backyard. It's free, it's renewable and it's clean.

Industry also uses other terms to describe earth energy systems, including ground and water source heat pumps, GeoExchange™, and geothermal heat pumps.

A Hot Investment

By installing an earth energy system, you are literally investing your money in an energy "well." After it's installed, about two thirds of the energy needed to heat your home and make hot water is taken directly from the ground around your home, reducing your home heating costs by 35 to 70 percent.

The value of your investment increases every time the cost of natural gas, oil, propane or electricity climbs. And you can feel good about your investment because it's helping reduce greenhouse gas (GHG) emissions that are contributing to climate change. That the system air-conditions your home as well is an added benefit that increases the comfort and value of your home.



▲ Components of a typical earth energy system.

Energy Independence and the Environment

With your own oil or gas well, the cost of fuel or a disruption in service wouldn't be a concern. You wouldn't have to rely on fuel suppliers and distributors. An earth energy system gives you some independence. Over two thirds of the energy needed to heat and cool your home is available right beneath your feet. You only have to purchase enough electricity to move the heat from the earth to your home; about 65 percent less than if you heated your home with electric heat.

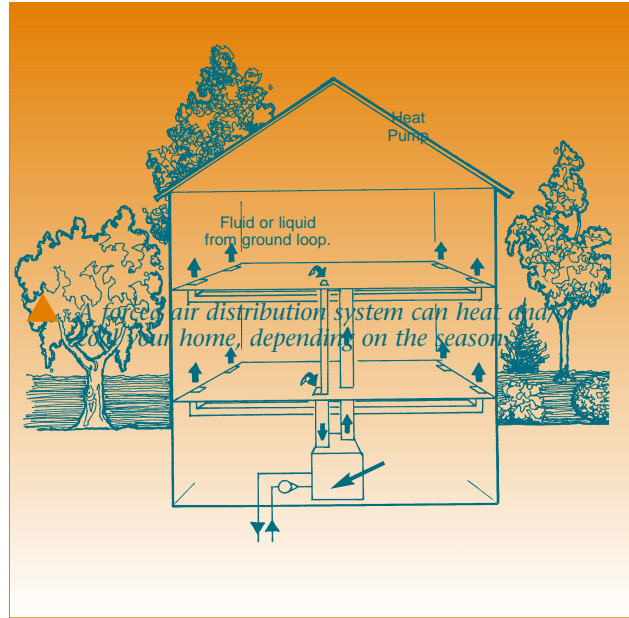
Unlike gas or oil wells, earth energy doesn't run out. As energy is withdrawn to heat your home it's replenished by the sun. All without burning fossil fuels or creating GHGs. The average home in Canada can reduce carbon dioxide (CO₂) emissions by 2.5 to 5 tonnes annually by using earth energy instead of electric heat or burning fossil fuels.

How Does it Work?

What do you have to do to make use of energy stored in the earth? First, the energy has to be moved into your home, then upgraded or concentrated enough to heat your home. The heat can then be distributed through your home (as it is in a conventional heating and cooling system).

A device called a heat pump is used to upgrade or concentrate the heat. Most homes already use a heat pump to keep food cool – a refrigerator. If you filled your fridge with jugs of 8°C well water, the fridge would cool it to about 4°C. The heat taken from the water would transfer directly into your kitchen through the coils on the back of the fridge. As long as you kept replacing the jugs of water as they cooled, you would be warming your kitchen with earth energy taken from the well water.

By circulating well water directly through a heat pump, the water is cooled and the heat is transferred into your home just like your fridge does. Or liquid can be circulated directly through a loop buried in the earth around your home. As the liquid is pumped through the system, it's cooled by the heat pump and warmed again by the earth. A properly designed system can heat and cool your home year after year.



The heat pump can produce warm air that's circulated through standard ductwork in your home, or make warm water for a floor heating system. And by reversing the system to take heat from your home and transfer it to the ground, your home can be air-conditioned during the hot summer.

Where Can it Be Used?

The best thing about earth energy is that it's accessible almost anywhere. Enough space can be found on an average suburban building lot to install an earth energy system.

On smaller properties, plastic pipe can be inserted in vertical boreholes drilled in the earth. Heat can even be drawn from liquid circulated through plastic pipe laid on the bottom of a pond, a lake or even the ocean.

If your water is supplied by a well, it may have enough water available to heat and cool your home and make domestic hot water.

Help is Available

For more information on earth energy systems, ask an industry representative for a copy of *Residential Earth Energy Systems: A Buyer's Guide* published by Natural Resources Canada (NRCan) or contact the Department at the address below.

The guide will help you make an informed decision about the technology and help you determine if an earth energy system is suitable for your new or existing home. It will show you some options and alternatives the technology can offer, and help you appreciate the knowledge a contractor with the necessary training can offer in your unique situation.

Contractors, manufacturers and distributors familiar with earth energy systems can be located in most Yellow Pages™ under the heading of "heat pumps." There are several Web sites where additional information can be found, and your local electric utility may provide information about earth energy systems.

Further Information

Natural Resources Canada
Energy Resources Branch
Renewable and Electrical Energy Division
580 Booth Street, 17th Floor
Ottawa ON K1A 0E4
Fax: (613) 995-0087

To find out about dealers, distributors or installers of earth energy systems in your area, please contact:
Earth Energy Society of Canada
124 O'Connor Street, Suite 504
Ottawa ON K1P 5M9
Tel.: (613) 230-2332
Fax: (613) 822-4987
Web site: www.earthenergy.org

Information is also available from the U.S. from Geothermal Heat Pump Consortium, Inc.
701 Pennsylvania Avenue NW
Washington DC 20004 - 2696, USA
Tel.: 1 888 255-4436
Web site: www.geoexchange.org

Find out more about how you can benefit from ground-source heat pump systems or other types of renewable energy technologies by visiting NRCan's Canadian Renewable Energy Network (CanREN)
Web site at <http://www.canren.gc.ca>

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Aussi disponible en français sous le titre :
Introduction aux systèmes géothermiques résidentiels



An Introduction to

Earth Energy Systems

