

GEOTHERMAL TECHNOLOGY

Heating and cooling with ground water

Tapping into renewable energy

It is not new technology but the popularity of geothermal heating and cooling systems is getting a new boost by green energy trends.

Ground source heat pumps use the relatively constant temperature of the earth to provide remarkably efficient space heating and cooling in a concept that exchanges heat rather than create it.

A ground source heat pump uses the earth or ground water, or both, as sources of heat in the winter and as the "sink" for heat removed from the home in the summer. Often referred to as geothermal heat pumps, the system removes heat from the earth through a liquid, such as ground water or an antifreeze solution,

upgraded by the heat pump and transferred to indoor air. During summer months, the process is reversed as heat is extracted from indoor air and transferred to the earth through the ground water or antifreeze solution.

Geothermal/geoexchange energy systems are available for use with both forced air and hydronic heating systems. They can also be designed and installed to provide heating-only, heating with "passive" cooling or heating with "active" cooling. Heating-only systems do not provide cooling. Passive cooling systems provide cooling by pumping cool water or antifreeze through the system without using the heat pump to assist the process.

How it works

There are two parts: a circuit of



underground piping outside the house and a heat pump unit inside the house. The entire ground source heat pump unit is located inside the house. The outdoor piping system can be either an "open system" or "closed loop."

Open loop consists of at least one well to supply the water for the heat pump system and another well (discharge well) to re-inject the water to the same aquifer.

An open system takes advantage of the

SS135

TABLE DRIVE

PTO Drive <ul style="list-style-type: none"> · 8 1/2" Table · 10,900 lb. single line pull on drawworks (3 part sheaving) 	Mud Options <ul style="list-style-type: none"> · 4 x 3 centrifugal · 5 x 6 piston · 5 1/2 x 8 piston 	Air Options <ul style="list-style-type: none"> · 300 cfm @ 200 psi · 475 cfm @ 200 psi · 750 cfm @ 250 psi
---	--	--

30K

TOPHEAD DRIVE

PTO Drive <ul style="list-style-type: none"> · 30,000 lb. pullback · Single rod loader · Rod spinner · 6 piece carousel · Jib boom with 25,000 lbs. winch 	Mud Options <ul style="list-style-type: none"> · 4 x 3 centrifugal · 5 x 6 piston 	Air Options <ul style="list-style-type: none"> · 1,000 cfm @ 350 psi · 750 cfm @ 350 psi · 475 cfm @ 200 psi
---	--	--

• Get it done with a GEFCO Rig. •

The deepest holes, in conditions that would make other rigs crumble. For more than 75 years, GEFCO has built portable drilling rigs and equipment that set the standard for durability and performance. With proven technology and top-grade materials. With so many variables, bank on a sure thing. Tested toughness — GEFCO.

GEFCO
FAILING · SPEEDSTAR · KING OIL TOOLS

580.234.4141 · domsales@gefco.com · gefco.com

heat retained in an underground body of water. The water is drawn up through a well directly to the heat exchanger, where its heat is extracted. The water is discharged either to an aboveground body of water or back to the underground water body through a separate well.

Closed loop consists of a grid of wells containing supply and return pipes in the well circulating the same liquid and exchanging heat to and from the ground.

Closed-loop systems collect heat from the ground by means of a continuous loop of piping buried underground. An antifreeze solution, or a refrigerant that has been chilled by the heat pump's refrigeration system to several degrees colder than the outside soil, circulates through the piping and absorbs heat from the surrounding soil.

The heating cycle

In the heating cycle, the ground water, antifreeze mixture or refrigerant that has circulated through the underground piping system and has picked up heat

from the soil, is brought back to the heat pump unit inside the house. It then passes through the refrigerant-filled primary heat exchanger for ground water or antifreeze mixture systems.

The heat is transferred to the refrigerant, which boils to become a low-temperature vapour. In an open system, the ground water is then pumped back out and discharged into a pond or down a well. In a closed-loop system, the antifreeze mixture or refrigerant is pumped back out to the underground piping system to be heated again.

The reversing valve sends the refrigerant vapour to the compressor. The vapour is then compressed, which reduces its volume and causes it to heat up.

Finally, the reversing valve sends the now-hot gas to the condenser coil, where it gives up its heat. Air is heated as it is blown across the coil and then forced through the ducting system to heat the building. Having given up its heat, the refrigerant passes through the expansion device, where its temperature

and pressure are dropped further before it returns to the first heat exchanger, or to the ground, to begin the cycle again.

The cooling cycle

The cooling cycle is basically the reverse of the heating cycle. The direction of the refrigerant flow is changed by the reversing valve. The refrigerant picks up heat from the house air and transfers it directly to the ground water or antifreeze mixture. The heat is then pumped outside, into a water body or return well, or into the underground piping. Once again, some of this excess heat can be used to preheat domestic hot water.

Design considerations

Unlike airsource heat pumps, geexchange systems require that a well or loop system be designed to collect and dissipate heat underground.

An open system uses ground water from a conventional well as a heat source. The ground water is pumped into the heat

Continued on page 20

NOBODY HANDLES THE PRESSURE BETTER.



Large Eye 350 and 150 Ton & Standard Links



85 Ton Power Swivels



Drilling & Workover Swivels



150 Ton Power Swivels



Tongs



KING OIL TOOLS

2215 S Van Buren, Enid OK 73703
580-234-4141 • 800-759-7441 • kingoiltools.com

The API Registered mark is either a trademark or registered trademark of the American Petroleum Institute in the United States and/or other countries.






PRODUCT NEWS

- Options to display current or minimum/maximum temperature and humidity readings.
- User-replaceable battery. USB-enabled triple-speed data downloading.

Dickson Company:
www.dicksondata.com

All-in-one quad function geothermal system

Canada's GeoSmart Energy has launched its latest geothermal heating and cooling system, the Premium Q.

The Cambridge, Ont., company unveiled the leading edge "all-in-one" quad function geothermal system at its annual GeoSmart dealer training session in Negril, Jamaica.

"The Premium Q represents the latest in environmentally friendly geothermal

technology, moving heating and cooling functionality, reliability and optimum home comfort to new levels," says Stan Marco, CEO, GeoSmart Energy. "Compared with regular furnaces and air conditioners, this versatile unit can provide homeowners with energy savings up to 60 per cent."

Hidden behind its attractive, compact stainless steel and blue exterior is a multi-function unit that taps into the earth's energy to provide homeowners with forced air heating and cooling, hydronic (radiant) heat and domestic hot water production, all-in-one convenient package. Hydronic heat is widely considered to offer the greatest home comfort, while forced air is regarded to be the most cost-effective way to heat and cool a home. GeoSmart's new system combines the best of both worlds.

"The Premium Q can potentially eliminate the need for homeowners to purchase a boiler unit for radiant heat, a furnace for the rest of the house, and an air conditioner for cooling the home in the summer," notes Chad Brezynskie, vice-president of sales and marketing, GeoSmart Energy. "They'll find all three in this one, convenient unit."

The Premium Q quad system combines environmentally friendly R410A refrigerant, a dual capacity scroll compressor and the unmatched energy efficiency of geothermal technology. It can be coupled with the company's intelligent thermostats and an integrated monitoring system.

GeoSmart Energy:
www.geosmartenergy.com ■

Continued from page 13

pump unit, where heat is extracted. Then, the "used" water is released in a stream, pond, ditch, drainage tile, river or lake. This process is often referred to as the "open discharge" method.

Another way to release the used water is through a rejection well, which is a second well that returns the water to the ground. A rejection well must have enough capacity to dispose of all the water passed through the heat pump, and should be installed by a qualified well driller.

Regardless of the approach used, the system should be designed to prevent any

environmental damage. The heat pump simply removes or adds heat to the water; no pollutants are added. The only change in the water returned to the environment is a slight increase or decrease in temperature.

The size of the heat pump unit and the manufacturer's specifications will determine the amount of water needed for an open system. The water requirement for a specific model of heat pump is usually expressed in litres per second (L/s) and is listed in the specifications for that unit.

The well and pump combination should be large enough to supply the water needed by the heat pump, in addition

to the domestic water requirements. Enlarging the pressure tank or modifying the plumbing may be necessary to supply adequate water to the heat pump.

Ground water temperatures in Canadian aquifers are constant year-round, ranging from about 4 C in the prairies to 10 C in southern British Columbia and Ontario.

At these temperatures, the energy potential of ground water is almost limitless. Ground water energy sources can operate continuously, 24 hours per day, and unlike wind and solar energy systems, they are not constrained by weather conditions. ■

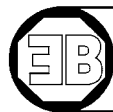
TWO COMPANIES...ONE LOCATION

DEUX COMPAGNIES...UNE ADRESSE



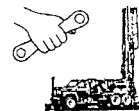
M. Beauregard
Équipements inc.

Drilling • Municipal • Construction
MARIO BEAUREGARD
1-888-657-1889
 TÉL.: (450) 447-9009 FAX: (450) 447-5284



ENTREPRISE
BERNARD
OSTIGUY INC.

Heavy Equipment Repair • Specialty: Rig & H.P. Compressor
BERNARD OSTIGUY
1-866-658-0452
 TÉL.: (450) 658-0452 FAX: (450) 447-5284



DISTRIBUTOR FOR THE FOLLOWING COMPANIES:

acker
 DRILL COMPANY

SCHRAMM
 ROTADRILLS

Johnson screens™

IR Ingersoll Rand.
 COMPRESSOR PARTS & REPAIRS

NUMA
 DOWN HOLE HAMMERS & BITS

WELLMASTER
 Pipe & Supply Inc.

HYDRO-FRAC®
 Kyle Equipment Co., Inc.

SULLAIR

8910, BOUL. INDUSTRIEL, CHAMBLY, QUÉBEC, CANADA J3L 4X3