

Residential Geothermal Heating and Cooling Systems

Over 500,000 homes throughout the United States use geothermal heating and cooling systems with national customer satisfaction ratings over 90 percent. Over 1,000 customers a year in Michigan choose these geothermal systems.

Geothermal systems have successfully been installed north of the Arctic Circle, so the cold weather in Michigan is no problem. Review the cost comparison below to see the potential savings for an average Detroit Edison customer.

Note: This chart is based on MichCon natural gas prices and propane prices at \$1.90 per gallon. Detroit Edison offers a special electric rate for electric heating, cooling and water heating applications.

How Geothermal Works

Geothermal is an electrically-powered water source heat pump (similar to your refrigerator) that converts the natural resources of the earth into an efficient heating and cooling system for your home or business. A Geothermal system consists of three components:

- Heat exchanger to collect the heat
- Compressor to enhance the heat
- Fan to distribute the heated or cooled air through a standard duct system

The heat exchanger is a continuous loop of polyethylene pipe buried in the ground outside the house that is filled with water and an environmentally-friendly antifreeze. Michigan ground temperature is constant and remains

around 50 degrees Fahrenheit. During the summer, the hot air from the house is fed into the ground through the continuous loop, where it is cooled by the 50-degree temperature and then returned to the house.

During the winter, the solution goes through the loop and absorbs heat from the earth. The compressor increases the temperature and the warm air is returned through the house via the duct system. Some Geothermal systems use "Radiant Floor Heating" rather than a forced-air system.

The Heating Cycle:

A. Ground loop: An environmentally safe water/antifreeze solution is pumped through a system of buried, polyethylene loops. As it courses through the system, the solution absorbs the earth's heat.

B. Pump: The pump forces the water/antifreeze solution through the buried loop system.

C. Refrigerant loop: Liquid refrigerant flows through this tube, headed toward the evaporator.

D. Evaporator: As the liquid refrigerant flows through the evaporator (at this point, it's in a tube within a tube) and absorbs the heat of the ground water, it changes state from liquid to a gas.

E. Compressor: In the compressor, gas from the evaporator is pressurized, raising the gas to a temperature of 180 degrees.

F. Refrigerant loop outlet: The 180-degree gas is conveyed from the compressor to the radiator.

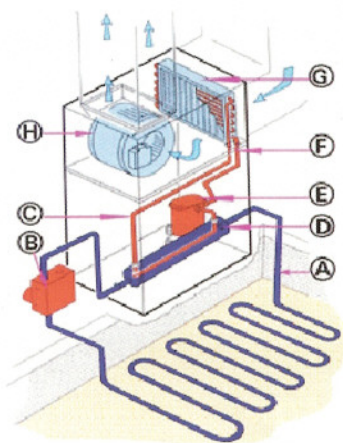
G. Radiator: As the heated gas from the refrigerant loop circulates through the radiator, the fins of the radiator absorb the heat of the gas through conduction.

H. Distribution fan: This fan pulls air over the radiator fins which have absorbed heat from the compressed gas. The warm air is then distributed throughout the house, via the house's ductwork system. The gas in the loop system, as it loses its heat, changes back to a liquid, and the cycle starts all over again.

Geothermal Systems Offer You Numerous Benefits

- Economical — provides operating cost savings of 30 percent to 60 percent.
- Earth Friendly — uses the renewable thermal energy of the earth.
- Comfortable — maintains an even temperature and humidity level throughout your home.
- Safe — no open flames, no fumes, no soot.
- Flexible — one single unit handles heating, cooling, and water heating.
- Dependable — contains few moving parts and no outdoor equipment, requiring little maintenance.
- Value — increases the value of your home by decreasing your heating and cooling bill; generally produces higher cash flow.
- Efficiency — as much as four times as efficient as conventional systems.

Source: DTE Energy Company, <http://my.dteenergy.com>. ●



Home Size	With a Geothermal System	With a Natural Gas System*	With a Propane/Oil System**
1,800 sq. ft.	\$500	\$2,130	\$2,800
2,400 sq. ft.	\$620	\$2,600	\$3,500
3,000 sq. ft.	\$760	\$3,150	\$4,200
4,000 sq. ft.	\$1,000	\$4,000	\$5,600

* Based on 90% efficient gas furnace, gas water heater, and electric central air conditioning

**Based on 90% efficient propane furnace, propane water heater, and electric central air conditioning

Costs listed are typical; your actual costs may vary.