

ENERGYwise

FOR YOUR HOME



What is a Ground Source Heat Pump System?

A ground-source heat pump (GSHP) system is an electrically powered heating and air conditioning system that uses the earth's ability to store heat in the ground. The GSHP system operates based on the stability of underground temperatures, using available heat in the winter and putting heat back into the ground in the summer. A GSHP system differs from a conventional furnace or boiler by its ability to transfer or "pump" heat, versus the standard method of producing heat. As energy costs continue to rise and emissions become a concern, GSHP systems may address both of these concerns.

How does it work?

Ground-source heat pump (GSHP) systems promoted by Dakota Electric use a closed-loop of buried plastic tubing next to your home, a pump pack and a water-source heat pump. The purpose of the tubing, which can be installed either horizontally or vertically, is to transfer heat to and from the ground. The amount of plastic tubing needed depends on the size of the home being conditioned. Typically, one loop (400 to 600 feet) has the capacity of one ton or 12,000 British thermal units per hour (BTU/h). A GSHP for an average house will range from 3 to 5 tons.

The second component is a pump pack, which sends the water through the tubing and through the water-source heat pump.

Lastly, the water-source heat pump is the unit that replaces the existing furnace. This is where the heat from the tubing is transferred allowing for heating or cooling of your home.

Ground-source heat pumps have the ability to capture heat at one temperature reservoir and transfer it to another temperature reservoir. In a closed loop system, a water and non-toxic antifreeze mixture circulates through the tubing transferring heat to and from the water-source heat pump. Because the earth's temperature remains at a relatively constant 50 degrees year-round, GSHP systems are 300 to 400 percent

efficient, regardless of the outdoor air temperature. In addition, waste heat from the air conditioning cycle can be used to provide free water heating during the summer.

Is a ground-source heat pump right for your home?

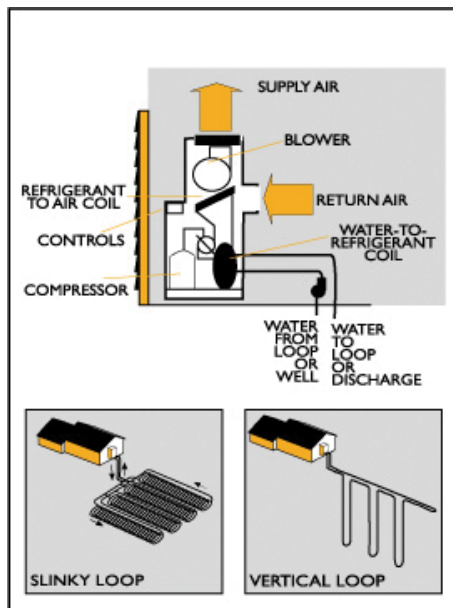
A GSHP system can be installed in and accommodate a residential home of any size, anywhere including both single- and multi-family units, and new or retrofit applications. Most lot sizes can hold the buried plastic tubing under lawns, landscaped areas and driveways. Many homeowners choose to retrofit their home with a GSHP using the existing ductwork. Your dealer/installer will be able to determine ductwork requirements and if any minor modifications are needed.

Maximum efficiency for your home

- The most efficient residential heating and cooling systems available today
- Heating efficiencies 50 to 70 percent higher than other heating systems and cooling efficiencies 20 to 40 percent higher than available air conditioners
- Energy savings of 20 to 50 percent, which result in recouping your investment in only a few years

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As energy costs rise and emission concerns continue, GSHP systems may hold a solution to both



Source: International Ground Source Heat Pump Association (IGSHPA)

Other benefits for your home

- Can be a combination heating/cooling and hot water heating system
- Some GSHP systems can save you up to 50 percent on your water-heating bill by preheating water
- Made of mechanical components that are either buried in the ground or located inside the home – no exposed equipment outdoors
- About the same size as a traditional heating/cooling unit
- Plastic tubing carries up to a 50-year warranty
- Very quiet, providing a pleasant environment inside and outside the home
- No open flame, flammable fuel or potentially dangerous fuel storage tanks
- May qualify for a low off-peak electric rate

Rebate Available

Dakota Electric residential members are eligible for a \$400 per ton rebate for GSHPs installed in Dakota Electric's service territory.

What you need to do

1. Check with Dakota Electric's Energy Experts® to verify funding and program parameters. We can also provide a list of contractors.
2. Download a GSHP rebate application from www.dakotaelectric.com or call member services at 651-463-6212.
3. Complete the GSHP rebate application and include proof-of-purchase and documentation of efficiency ratings.
 - Installation must be complete before rebate will be issued
 - Itemized invoices from equipment vendors/installers must accompany rebate application
 - Invoices must itemize labor charges, quantity and price of the equipment installed
 - Invoices must include manufacturer and model numbers for the installed equipment
 - Dakota Electric reserves the right to conduct inspections
 - Only new and complete ground-source heat pump systems qualify

Contact the Energy Experts®

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