Take Control & Save®

A Cooperative Effort for Energy Efficiency

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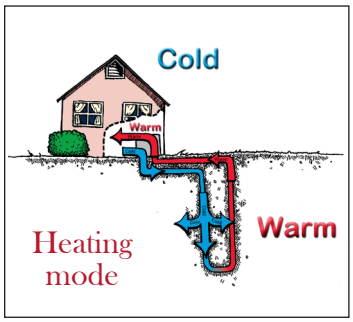
Ground-source heat pumps

What is a ground-source heat pump?

Ground-source heat pump (GSHP) systems, also referred to as geothermal, use the constant temperature of the earth to transfer heat to and from your home.



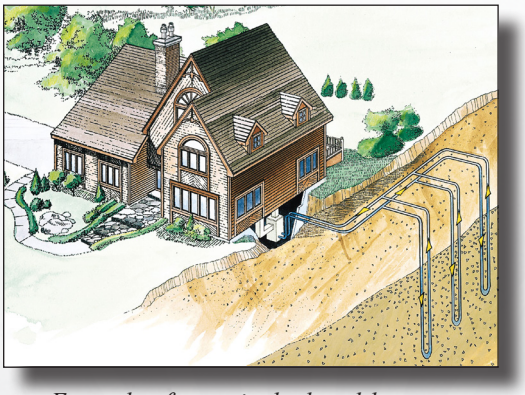
In the heating mode, GSHP systems transfer heat using a loop system installed in the ground. Heat energy is carried into the home through piping connected to and powered by a heat exchange unit inside the home. In the summer this process is reversed to transfer heat from the home into the ground. A GSHP may also be used for water heating at no or very little additional cost.

Benefits of a GSHP

- Uses 25–50 percent less electricity than conventional heating or cooling systems.[1]
- Allows for design flexibility and can be installed in both new and retrofit situations.
- Provides excellent "zone" space conditioning, allowing different parts of your home to be heated or cooled to different temperatures.
- Durable and highly reliable.

Types of ground-source heat pumps

There are four basic types of ground loop systems. Three of these, horizontal, vertical, and pond/lake, are closed-loop systems. The fourth type is an open-loop. Your best option depends on climate, soil conditions, available land and local installation costs at your site.



Example of a vertical, closed-loop system.

GSHP terminology explained

Coefficient of Performance (COP):
A measure of efficiency for ground-source heat pumps in the heating mode, that represents the ratio of total heating capacity to electrical energy input. The larger the number, the less electricity the unit uses.

Compressor:
The central part of a heat pump, the compressor pumps refrigerant to meet the heating or cooling requirements of the system.

Energy Efficiency Ratio (EER):
A measure of efficiency for ground-source heat pumps in the cooling mode that represents the ratio of total heating capacity to electrical energy input. The larger the number, the less electricity the unit uses.

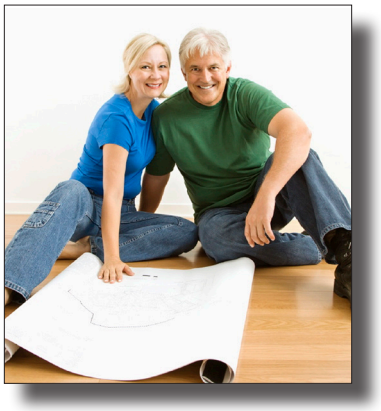
System Capacity:
A measurement of the total amount of heat or cooling your system can produce in one hour.

Money saving tip!

Contact your local electric cooperative to determine EER rating eligible for heat pump rebates.

[1]Source: U.S. Department of Energy

Equipment sizing is critical



Geothermal heat pumps have the potential to be extremely energy efficient, but an improperly sized system can sacrifice your comfort and energy savings. An undersized system will run longer than necessary trying to meet the desired heating or cooling required. The equipment uses more energy in order to constantly run the heat pump, causing your electric bills to spike. And even if it runs constantly, an undersized system will fail to deliver the desired amount of heated or cooled air into the home or building.

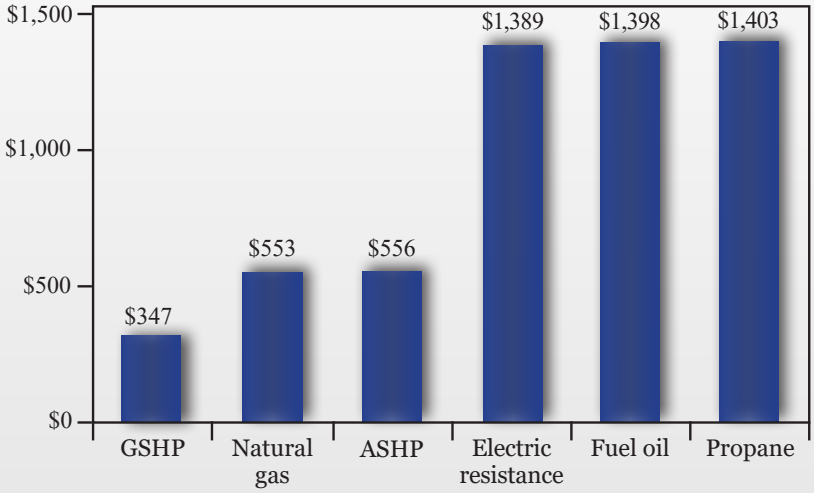
Oversized equipment can produce too much airflow, resulting in short run times causing the unit to cycle on and off more frequently than it should. This can cause reduced efficiency and shorter equipment life. It can also lead to reduced comfort since short cycles may fail to reduce the humidity in your home during hot summer months.

Calculating the equipment size

The first step in determining the proper equipment size is to calculate the heat-gain/heat-loss for the home or building. A trusted contractor or your cooperative's energy advisor can help with these calculations. Your equipment should not be sized solely on the square footage of your house or by your existing equipment size, as it may not have been correct in the first place.

Many contractors will use the Air Conditioning Contractors of America's (ACCA) "Manual J" calculation, which takes into account several factors (including location, type and number of windows, number and location of doors, insulation type and more) in order to determine exactly how much heat you gain and lose in your home. The recommended system capacity will be specified in either Btu/h (British thermal units of heat removed per hour) or refrigeration tons (one ton being equal to 12,000 Btu/h).

Estimated annual cost to heat a 1,500 square foot home[1]



[1]Annual cost estimate based on a home with a heat load of 47.4 MMbtu/year, from U.S. Energy Information Administration (EIA) data for the Midwest region.

Based on electric rate of $.10/kWh; propane at $2.41/gal and fuel oil at $3.45/gal from 2021-2022 EIA data for the Midwest region. Natural gas at $1.05/therm from 2021 EIA data for Missouri. Efficiency assumptions include 400 percent for GSHP (COP of 4), 250 percent for ASHP (HSPF of 8.5), 90 percent for natural gas, 78 percent for fuel oil, 89 percent for propane and 100 percent for electric furnaces.

Your operating costs may vary based on your local rates and your home's heating need (which is affected by size, insulation value, temperature maintained, etc.,).

Contact your local electric cooperative for more information.

Take Control & Save on your heating and cooling!

HOME COMFORT™

Although the cost to purchase a ground-source heat pump is more than other heating and cooling equipment, you can save with lower monthly energy bills. And you may be able to reduce the initial cost of the heat pump by taking advantage of Federal tax incentives and possible rebates from your local electric cooperative.

Be sure to contact your cooperative ***prior to purchasing and installing*** a heat pump to ensure it qualifies for the tax incentives and/or rebate.

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