

Frequently Asked Questions

Q: How efficient are geothermal heat pump systems?

A: Actual efficiencies will depend on a number of factors, but generally speaking a geothermal heat pump can be three to five times more efficient at providing heat than a gas, propane or oil furnace based on the amount of energy consumed to provide a given amount of heat. For cooling, a geothermal system is generally 30-50% more efficient than an air conditioner or heat pump.

Q: Why are geothermal heat pumps so efficient?

A: Geothermal heat pumps use the ground temperatures as a "source" for heat energy during heating, and use the ground as a heat "sink" during cooling. The earth acts as a giant, free energy battery, providing an endless, renewable source for heating and cooling comfort. Standard heat pumps use outdoor air for heating and cooling. Because the ground temperature is much more moderate and stable than air temperatures, geothermal system operation is much more energy-efficient, especially at extreme outdoor temperatures.

Q: Are these systems reliable?

A: Yes. Geothermal units are not subject to some of the same forces that cause wear and tear on other types of systems. And earth loops are installed using a special grade of polyethylene pipe with heat-fused fittings designed to last 50 years or more.

Q: What kind of underground loop system is best?

A: It depends on several factors. Homes on larger lots usually have horizontal loops installed. Smaller lots may require a vertical loop. A nearby pond can also be used. If you have a well water system, that may be an option. Your Carrier dealer is trained to determine which loop design is most appropriate for your home. Regardless of the loop system selected, the operating costs are all about the same.

Q: How much space is needed for a closed loop system?

A: The smallest closed loop design, the vertical loop, may require a space of only 15x15 feet, or a line of 3x45 feet, located at least 10 feet away from the home, and 10 feet from property lines. Horizontal loops require considerably more space.

Q: How is the unit size and loop design determined?

A: Carrier dealers use GeoDesigner software to determine the most appropriate sized unit and loop for your home. The software takes many factors into consideration including: the heating and cooling requirements of the home, loop type, depth, soil conditions, earth temperatures, outdoor air temperature extremes, local fuel rates and much more. In addition, the software can demonstrate energy costs for a Carrier geothermal system vs. another type of heating and cooling system.

Q: Will the fluid in the loops freeze during a long, cold winter?

A: No. Antifreeze in the loop fluid eliminates any concerns about freezing.

Q: Can a well be used instead of an earth loop?

A: Yes. Prior to using a well for a geothermal installation, the water quality should be checked. Sufficient water volume is needed for the unit, usually about four to nine gallons per minute during unit operation. A discharge location like a pond or drainage ditch is also required.

Q: How big does a pond have to be for use with a geothermal system?

A: For most installations, the pond should have a surface area of at least a half acre and a depth of 10 feet. Bigger is better.

Q: What is the actual efficiency of a geothermal system and how does it compare to a furnace, air conditioner or heat pump?

A: The efficiency of a geothermal system is rated by an industry standard known as ARI/ISO 13256-1, that specifies a set of conditions by which efficiency is determined. The rating for heating is Coefficient of Performance (COP). It's a ratio of the amount of energy used to operate the unit compared to the amount of energy output. Carrier's highest efficiency geothermal units have a COP in excess of 4.5 (that's 450% efficient), compared to the highest efficiency gas furnace with a COP of 0.95 (95% efficient AFUE) or a high-efficiency heat pump with an average seasonal COP around 1.8. The rating for cooling is called Energy Efficiency Ratio (EER). It's calculated by dividing BTUs per hour output into the watts used. Carrier's highest efficiency geothermal units have EERs around 18-27. That's about 30-50% better than many air conditioners and heat pumps. But because geothermal units are not rated according to the same industry standard as furnaces, air conditioners, and heat pumps, it is difficult to compare, for example, an AFUE and HSPF to COP, or SEER to EER. To get the full energy efficiency story, compare the dollars. Your Carrier dealer can calculate operating cost estimates using Carrier's GeoDesigner software.

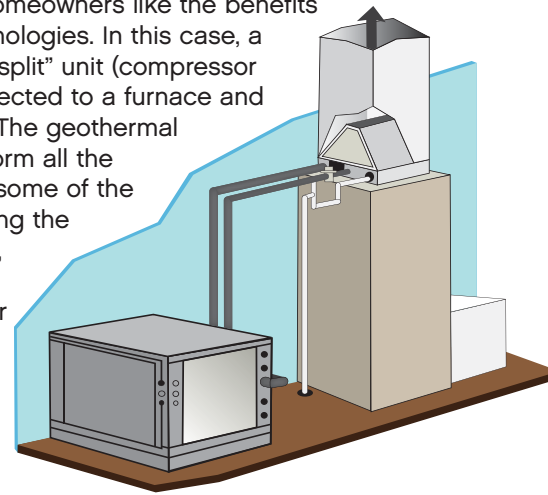
Q: Is comfort compromised to get all this efficiency?

A: No. In fact, geothermal systems can provide exceptional comfort without the "cold blow" from an air source heat pump during heating; or short, hot blasts of air associated with standard efficiency gas furnaces. Geothermal units deliver air at temperatures that provide comfort throughout the house. The Carrier dual capacity units with variable speed fans precisely match the needs of the home to deliver comfort no matter what the outdoor air temperature is.

Frequently Asked Questions (con't)

Q: Can a geothermal unit be combined with a gas or propane furnace?

A: Yes. Some homeowners like the benefits of both technologies. In this case, a geothermal "split" unit (compressor only) is connected to a furnace and cooling coil. The geothermal unit will perform all the cooling and some of the heating. During the coldest days, the system switches over to furnace operation. This type of system may be a good choice for a replacement installation.



Q: Can the existing duct work and electrical service be used?

A: Generally, the existing duct work can be used with a geothermal unit without extensive modification. Variable speed blowers used in many of the Carrier geothermal units

Factoids

- With over 1 million geothermal installations, the total estimated annual energy savings is 8 billion kWh of electricity and 40 billion BTUs of fossil fuels. It reduces our reliance on imported fuels by 21.5 million barrels of crude oil per year.
- Homeowners with geothermal systems installed are saving a combined, estimated \$750 million over 20 years.
- Surveys by utilities have shown that more than 95% of geothermal system owners would recommend the technology to others.
- The amount of the sun's energy absorbed by the earth is more than 500 times the energy required for all of mankind every year.
- Geothermal systems installed in schools are saving over \$25 million in energy costs annually, saving more money for books, equipment and teachers.

(Source: Geothermal Heat Pump Consortium)



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