

Geothermal

Comfort Systems



turn to the experts™ 



The Carrier® Geothermal Advantage

Throughout Carrier's historic 100-year legacy, the company has provided millions of homeowners with the finest comfort systems available. Offering a wide variety of state-of-the-art furnaces, air conditioners and heat pumps, Carrier dealers are experts when it comes to customized home comfort systems. But it doesn't end there. Carrier also offers a complete line of exceptional geothermal comfort systems for your home.

Carrier geothermal systems provide several good options for efficient indoor heating and cooling by tapping into the earth to capture its renewable energy.

Why Choose Geothermal?

Geothermal systems can provide homeowners with a wide range of benefits.

- **Savings:** Geothermal systems can offer lower operating costs compared to traditional forced air heating and cooling systems. Those savings can be as high as 79% in heating costs¹.
- **Comfort:** These systems can provide even temperatures throughout the home year round, with excellent dehumidification during cooling.
- **Reduce Environmental Impact:** Geothermal is a renewable technology that can reduce your carbon footprint now and for future generations.
- **Reliability:** Geothermal units are known for durability and can operate for years with little maintenance.
- **Quiet Operation:** Unlike ordinary air conditioners

Here's how it works: The earth absorbs energy from the sun and stores it in the ground. A geothermal system extracts that energy for home heating during the winter. For cooling, the system removes heat from the home and places it into the cooler earth. This transfer of heat energy is done through a series of pipes either buried in the ground, sunk in a pond, or by using well water.

and heat pumps, no outdoor unit is required. Carrier® geothermal units use heavy-duty, fully-insulated cabinets for quiet operation. Quiet, soft starting variable-speed blowers are used in many models.

- **Flexibility:** Geothermal comfort systems can provide heating, cooling and supplemental water heating from a single unit with a wide variety of models and options to fit most applications.
- **Hot Water:** Excess heat from system operation can be used to supplement the home's water heater.
- **Reduce Energy Independence:** Geothermal systems can reduce our need to import fuel.

The Energy Efficiency Story

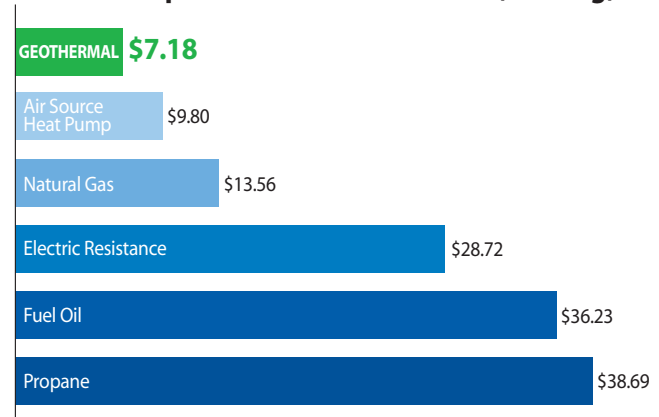
One of the main reasons many homeowners choose geothermal is the benefit of lower operating costs. The cost for heating, cooling and hot water can combine for up to 75% of a home's total utility costs. Therefore, the biggest opportunity to save in utility costs is to improve those systems. That's where geothermal can help in a big way.

For every one unit of energy purchased, a geothermal system can deliver up to four units of energy because it uses energy from the earth. In many scenarios, a geothermal system is significantly less expensive to operate than traditional forced air heating and cooling systems. Geothermal systems can save up to 79% in heating costs¹, up to 24% in cooling costs², and can save energy on domestic hot water costs.

One way to compare heating efficiency is to calculate the cost for 1 million BTUs of heat transfer. Using a standard formula, an "apples to apples" comparison can be made based on local fuel rates and equipment efficiency. The table at right demonstrates a typical savings opportunity with geothermal. To get the full picture for your home, contact your Carrier® geothermal dealer.

¹ According to LoopLink® software based on a comparison of a 6.0 ton Carrier model GT geothermal heat pump to an 80,000 BTU, 78% AFUE propane furnace in St. Louis, MO with electricity costs of \$0.098/kWh and propane fuel costs of \$3.18/gallon as of 4/30/14.

Cost Comparison for 1 Million BTUs (Heating)



Source of Energy Rates: U.S. Energy Information Administration as of 4/30/14.

Geothermal – 4.0 COP*, \$0.098/kwh

Air Source Heat Pump – 10.0 HSPF**, \$0.098/kwh

Natural Gas – 90% AFUE†, \$1.22/ccf

Electric Resistance – 100%, \$0.098/kwh

Fuel Oil – 80% AFUE, \$4.02/gallon

Propane – 90% AFUE, \$3.18/gallon

* COP – Coefficient of Performance

** HSPF – Heating Seasonal Performance Factor

† AFUE – Annual Fuel Utilization Efficiency

² According to LoopLink® software based on a comparison of a 6.0 ton Carrier model GT geothermal heat pump to a 3.5 ton, 13.0 SEER air source air conditioner in St. Louis, MO with electricity costs of \$0.098/kWh as of 4/30/14.

Renewable Energy From the Earth

Geothermal systems can be installed with a variety of loop system configurations. "Closed loops" use re-circulated fluid in a series of pipes installed vertically, horizontally, or in a pond. "Open loops" use well water. Your dealer will determine which design works best for your home.

Geothermal systems use renewable energy from the earth, so the technology is one that can reduce your carbon footprint.

On a grander scale, imagine the impact of the reduced emissions resulting from every current geothermal comfort system installation today. The collective result would be a dramatic reduction in carbon footprint.



Horizontal Loops:

Used on larger lots. Installed using a backhoe or trencher.



Pond Loops:

Coils of pipe are connected and sunk to the bottom of the pond.



Vertical Loops:

Used where land area is limited or soil conditions prohibit horizontal loops. Installed using a drilling rig.



Open Loop:

Well water from an existing well can be used, then discharged into a drainage ditch or pond.

Geothermal Product Selection Guide



Features	Package Units Vertical Upflow, Vertical Downflow, Horizontal		
	GT	GP	GB
Applications	Ultimate luxury "Best" overall Exceptional comfort and performance	Upscale Great choice for excellent performance and reliability	Entry Level Standard, solid performer at a base tier price
Sizes	2, 3, 4, 5, 6	2, 3, 4, 5, 6	1.5, 2, 2.5, 3, 3.5, 4, 5
AHRI Ratings (13256-1) Closed Loop (GLHP)	3.8 - 4.7 COP 18.5 - 32.0 EER	3.5 - 4.0 COP 15.5 - 24.5 EER	3.7 - 4.3 COP 18.5 - 21.7 EER
Ground Water (GWHP)	4.5 - 5.2 COP 23.1 - 37.0 EER	4.0 - 4.6 COP 19.6 - 30.0 EER	4.3 - 5.2 COP 22.7 - 28.1 EER
Refrigerant	Puron® refrigerant	Puron® refrigerant	Puron® refrigerant
Compressor	Two-stage unloading scroll	Two-stage unloading scroll	Single-stage scroll
Blower	Variable-speed ECM Constant CFM	Variable-speed ECM Constant CFM	Multi-speed ECM Constant Torque
Cabinet Configurations	Vertical upflow Vertical downflow Horizontal	Vertical upflow Vertical downflow Horizontal	Vertical upflow Horizontal
Stages (* with aux.)	Three-stage heating* Two-stage cooling	Three-stage heating* Two-stage cooling	Two-stage heating* One-stage cooling
Control	Microprocessor control Unit mounted display	Microprocessor control	Microprocessor control
Air Coil	Tin-plated copper tubing	Tin-plated copper tubing	Tin-plated copper tubing Coated coil
Air Filter	MERV 13, 2"	MERV 8, 2"	MERV 8, 2"
Cabinet Insulation	Closed cell foam	Closed cell foam	Fiberglass
Compressor Blanket	Yes	Yes	No
Desuperheater	Optional Internal mount pump	Optional Internal mount pump	Optional Internal mount pump
Auxiliary Heat	Optional Internal mount on vertical units	Optional Internal mount on vertical units	Optional Internal mount on vertical units
Comfort Alert	Yes	No	No
Smart Start	Yes	Optional (field installed)	Optional (field installed)
Zone Control	Optional	Optional	Optional
ENERGY STAR® qualified	All sizes	All sizes	All sizes
Dealer Notes			

Geothermal Product Selection Guide



	Split	Water-to-Water
Features	GS	GW
Applications	Versatility Great performance Used with air handler or gas furnace	Hydronic Heating and cooling capable for various applications
Sizes	2, 3, 4, 5, 6	2, 3, 4, 5, 10
AHRI Ratings (13256-1) Closed Loop (GLHP)	3.4 - 4.5 COP 15.4 - 26.4 EER	(13256-2) 3.0 - 3.2 COP 14.6 - 22.1 EER
Ground Water (GWHP)	3.9 - 5.1 COP 19.2 - 30.5 EER	3.4 - 3.8 COP 18.8 - 25.7 EER
Refrigerant	Puron® refrigerant	Puron® refrigerant
Compressor	Two-stage unloading scroll	Two-stage unloading scroll
Blower	Used with ECM furnace or fan coil	Not applicable
Cabinet Configurations	Compact cube	Compact cube
Stages (* with aux.)	Three-stage heating* Two-stage cooling	Two-stage heating* Two-stage cooling
Control	Microprocessor control	Microprocessor control
Air Coil	Depends on air handler selected	Not applicable
Air Filter	Depends on air handler selected	Not applicable
Cabinet Insulation	Closed cell foam	Fiberglass
Compressor Blanket	Yes	Yes
Desuperheater	Optional Internal mount pump	Optional Internal mount pump
Auxiliary Heat	Depends on air handle selected HYBRID HEAT® system option	Not applicable
Comfort Alert	Yes	No
Smart Start	Yes	Optional (field installed)
Zone Control	Optional	Not applicable
ENERGY STAR® qualified	All sizes (except 6-ton**)	All sizes
Dealer Notes		

** GS072 meets ENERGY STAR® requirement only for closed loop with matching evaporator coil.
Does not meet ENERGY STAR when used with a fan coil.

Key Features

Carrier offers a wide range of model options and configurations to fit a variety of applications. Our most popular models include the following product features and benefits.

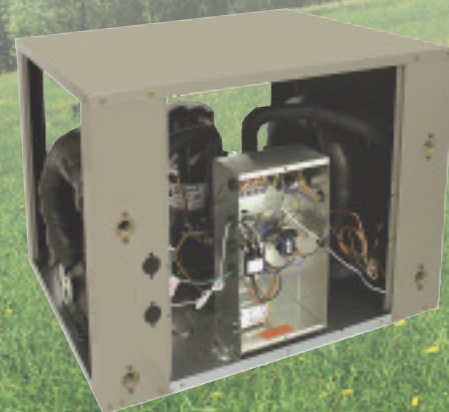
Main Product Features	Benefits
● Copeland Ultra-Tech™ two-stage unloading scroll compressor (single-stage scroll compressor on GB)	● <i>Energy savings, comfort, dehumidification, reliability, quiet operation</i>
● Variable-speed ECM fan (GT, GP models)	● <i>Energy savings, comfort, dehumidification, quiet operation</i>
● Tin-plated copper tubing in air coil	● <i>Durability, long life</i>
● Fully insulated cabinet	● <i>Quiet operation</i>
● Filter frame with two-inch MERV 13 filter (GT) (two-inch MERV 8 on GP, GB)	● <i>Improved indoor air quality, keeps coil clean for energy savings and comfort</i>
● Stainless steel drain pan	● <i>Durability, long life</i>
● Microprocessor control	● <i>Precise sequencing for optimum performance, ease of service</i>
● Dual level compressor isolation	● <i>Quiet operation</i>
● Heavy gauge steel cabinet	● <i>Attractive and durable, quiet operation</i>
● Comfort Alert™ and Smart Start (GT, GS)	● <i>Easy diagnostics – prevents dimming of lights when compressor engages</i>
● Unit mounted display (GT)	● <i>Displays operating status and faults</i>



Model GS



Model GT



Model GW

Note: Some features above are included in water-to-water and split units not shown.

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 between two to five times more efficient at producing heat than a gas, propane or oil furnace (based on the amount of energy consumed to produce a given amount of heat). For cooling, a geothermal system (30.0 EER) can be up to three times more efficient than an air source air conditioner (10.0 EER).

Q: Why are geothermal heat pumps so efficient?

A: Geothermal heat pumps use the ground temperature as a “source” for heat energy to help warm your home, and use the ground as a heat “sink” during cooling. The earth acts as a giant 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 for durability and long life.

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 geothermal system design software to determine the most appropriately 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 versus 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 must 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 half an acre and a minimum depth of 10 feet. Bigger is better.

Q: What is the actual efficiency of a geothermal system?

A: The energy efficiency of a geothermal system is rated by an industry standard known as ARI/ISO 13256-1, which 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 a high-efficiency air source 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 20.0-30.0. That's about two to three times 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 geothermal system design 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 some standard air source heat pumps during heating; or short, hot blasts of air associated with some 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 the existing duct work and electrical service be used?

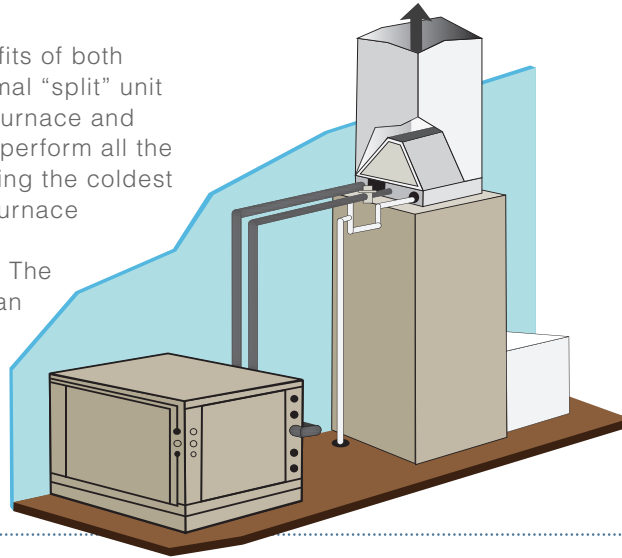
A: Generally, the existing duct work can be used with a geothermal unit without extensive modification. Variable-speed blowers used in many of the Carrier® geothermal units can compensate for a less-than-optimum duct system. For the electrical supply, a 200-amp service for the home is recommended.

Q: What about radiant floor heating?

A: A geothermal system can be designed to provide warm water for radiant floor applications. Carrier's water-to-water geothermal units are much more efficient than today's best boilers.

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 can switch over to furnace operation to provide the warmest air temperatures and maximum capacity. The most cost effective "balance point" can be pre-determined by the dealer to maximize efficiency and comfort. This HYBRID HEAT® system may be a good choice for a replacement installation or a new home.



Q: Are geothermal systems more expensive to install, and how long does it take for the extra expense to pay for itself?

A: Geothermal systems are generally more expensive to install than ordinary systems. For replacement installations, the added cost can be recovered faster than you think due to the high energy efficiency of geothermal. In a new home where the added cost of the system can be included in the mortgage, the monthly energy savings may be greater than the added cost, providing the homeowner with a positive cash flow from day one. Because every situation is somewhat unique, your Carrier® dealer can demonstrate the complete financial scenario for your home using the geothermal system design software. Many homeowners find that a Carrier geothermal system is a great investment.

Incentives, Rebates and Tax Credits

Because geothermal systems can be part of the solution for national energy policy, and for efficiency programs of various utilities, many incentives are available throughout the U.S. and Canada. Qualified homeowners in the U.S. may be eligible for a tax credit of 30% of the installed system cost (with no maximum). Check with your Carrier® dealer and tax professional to find out what incentives are available in your area, and which ones you may qualify for.

Limited Warranty

As part of our commitment to quality, all GT, GP, GS, and GW model geothermal units are backed with a 10-year parts and labor limited warranty upon timely product registration (10-year parts and five-year labor without timely registration). All GB model geothermal units are backed with a 10-year parts and five-year labor limited warranty upon timely product registration (five-year parts and five-year labor without registration). Ask your Carrier® dealer for details.



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Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice or without incurring obligations.



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