

Geothermal Comfort Systems



Qualifying
Models Only

GC, GP, GB, GZ, GW



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. 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.

Why Choose Geothermal?

Geothermal systems provide homeowners with a wide range of benefits.

- *Savings:* Geothermal systems can offer lower operating costs compared to ordinary forced air heating and cooling systems. Those savings can be as high as 70% in annual heating and cooling costs.¹
- *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. In fact, a single geothermal heat pump can reduce greenhouse gas emissions by 11 metric tons over its 20-year lifespan², the equivalent of taking two cars off the road³.
- *Reliability:* Geothermal units are known for durability and can operate for years with little maintenance. In addition, ordinary heat pumps and air conditioners are located outdoors and are subject to wear and tear caused by extreme temperatures, rain, snow, hail, and pollution which can potentially reduce their life expectancy. Because geothermal units are located indoors, they can last 20+ years⁴.
- *Quiet Operation:* Unlike ordinary air conditioners 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.

1 Savings calculated using Carrier® LoopLink® software. Comparison based on simulation in Dallas, TX. Carrier 6-ton unit vs. standing pilot propane furnace, standard air conditioner and local fuel rates. Actual savings will vary based on configuration, weather and local energy costs.

2 https://www.nvenergy.com/brochures_arch/conservation/environmentandheatpumps.pdf

3 <http://www.epa.gov/otaq/climate/documents/420f14040a.pdf>

4 http://www.energy.gov/sites/prod/files/guide_to_geothermal_heat_pumps.pdf

The Energy Efficiency Story

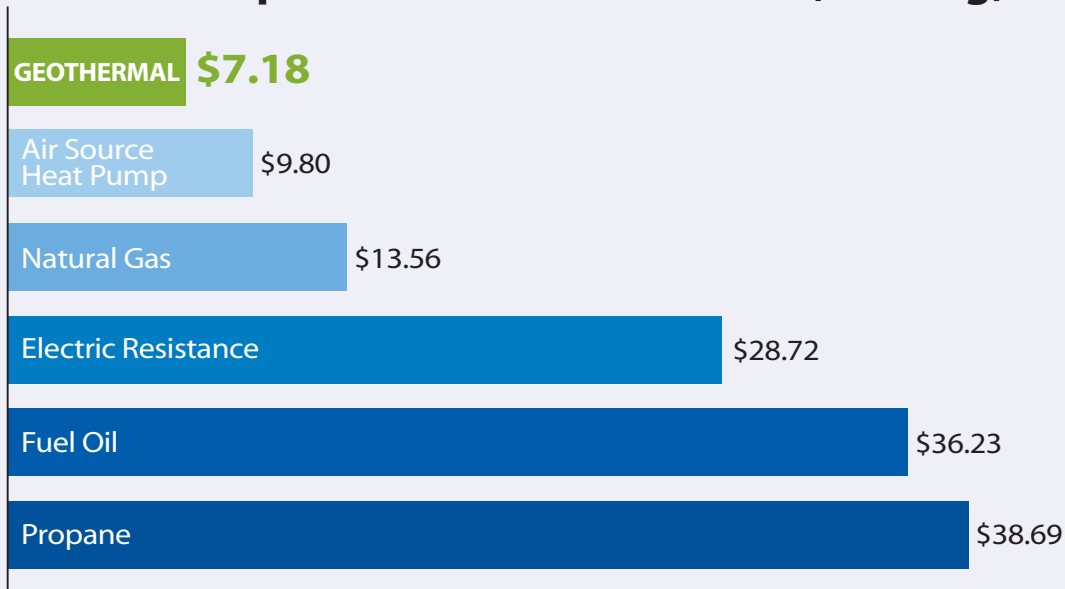
One of the main reasons many homeowners choose geothermal is the benefit of lower operating costs. The cost for heating, cooling and hot water can combine for up to 75% of a home's total utility costs. Therefore, the biggest opportunity to save in utility costs is to improve those systems. That's where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

systems. Geothermal systems can save up to 70% in annual heating and cooling costs 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 below demonstrates a typical savings opportunity with geothermal. To get the full picture for your home, contact your Carrier® geothermal dealer.

Cost Comparison for 1 Million BTUs (Heating)



Source of Energy Rates: U.S. Energy Information Administration.

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

Renewable Energy From the Earth

Geothermal systems can be installed with a variety of loop system configurations. “Closed loops” use recirculated 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.



Horizontal Loops:

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



Vertical Loops:

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

Renewable Energy From the Earth

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.



Pond Loops:

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



Open Loop:

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

Geothermal Product Selection Guide

PACKAGE UNITS



INFINITY SERIES

GC
Ultimate Luxury
"Best" overall. Exceptional comfort, performance and control



Performance SERIES

GP
Upscale
Great choice for excellent performance and reliability




Comfort SERIES

GB
Entry Level
Standard, solid performer at a base tier price

| Features | GC Ultimate Luxury "Best" overall. Exceptional comfort, performance and control | GP Upscale Great choice for excellent performance and reliability | GB 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 Auxiliary) | Three stages heating* Two stages cooling | Three stages heating* Two stages cooling | Two stages heating* One stage cooling |
| Control | Infinity® System Control Wi-Fi® remote access Advanced diagnostics | 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 |
| Infinity® System Control/ IAQ Products | Yes | No | No |
| Smart Start | No | Optional (field installed) | Optional (field installed) |
| Zone Control | Infinity® Zoning System | Optional | Optional |
| ENERGY STAR® Qualified | All sizes | All sizes | All sizes |

* Ratings are subject to change.
See AHRI.org for official ratings.

Geothermal Product Selection Guide

| Features | <div>  <p>SPLIT UNITS</p> <p>INFINITY[®] SERIES</p> <p>GZ Versatility Great performance. Used with fan coil or gas furnace. Install indoors or outdoors.</p> </div> | <div>  <p>WATER-TO-WATER UNITS</p> <p>Performance[®] SERIES</p> <p>GW Hydronic Heating and cooling capable for various applications</p> </div> |
|---|--|---|
| | | |
| Sizes | 2, 3, 4, 5, 6 | 2, 3, 4, 5, 6, 10 |
| AHRI Ratings (13256-1) Closed Loop (GLHP) | 3.3 – 4.6 COP 14.8 – 28.8 EER | (13256-2) 3.0 – 3.2 COP 14.6 – 22.1 EER |
| Ground Water (GWHP) | 3.8 – 5.2 COP 19.2 – 29.1 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 Auxiliary) | Three stages heating* Two stages cooling | Two stages heating Two stages cooling |
| Control | Infinity [®] System Control Wi-Fi [®] remote access Advanced diagnostics | Microprocessor control |
| Air Coil | Depends on fan coil selected | Not applicable |
| Air Filter | Depends on fan coil 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 fan coil selected Hybrid Heat [®] option | Not applicable |
| Infinity [®] System Control/ IAQ Products | Yes | No |
| Smart Start | No | Optional (field installed) |
| Zone Control | Infinity [®] Zoning System | Not applicable |
| ENERGY STAR [®] Qualified | All sizes (except 6-ton**) | All sizes |
| | **GZ072 does not meet ENERGY STAR [®] requirement when used with 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 (GC, GP models) | • <i>Energy savings, comfort, dehumidification, quiet operation</i> |
| • Tin-plated copper tubing in air coil | • <i>Formicary corrosion is a known issue when it comes to indoor air coils. The tin-plated copper provides a coating on indoor air coil to help prevent decay of tubing and provide heightened durability and longer life.</i> |
| • Fully insulated cabinet | • <i>Closed cell and fiberglass insulation inside cabinet provides additional insulation against the normal operating sound of the compressor.</i> |
| • Filter frame with two-inch MERV 13 filter (GC) (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>Stainless steel drain pans are a high quality option that provide increased resistance to bacteria growth and ability to resist corrosion and leaks.</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>Heavy gauge steel cabinets give an attractive unit look while providing durable casing that helps contain sound.</i> |
| • Smart Start (optional feature) | • <i>Factory installed electronic start assist device for compressor that reduces start-up amperage to reduce noise, eliminate light flicker, and increase compressor life. This feature is optional on GP, GB and GW units.</i> |



Key Features – GC and GZ Infinity® Models

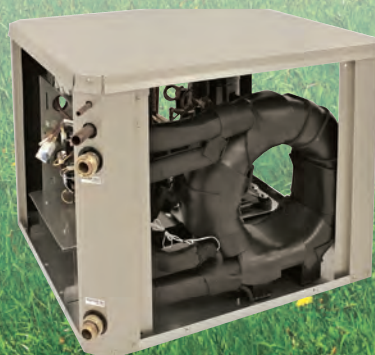
New Technology Available in the Infinity® Geothermal Units with the Infinity System*

- | | |
|--|---|
| • Remote Access | • Access your Infinity® System from anywhere in the world with Internet access. Monitor energy usage, change schedules and setpoints, receive email alerts, and more, all with your mobile device. |
| • Advanced Comfort Control and Energy Efficiency | • The Infinity® System continuously monitors indoor and outdoor conditions to give you the best balance of comfort and efficiency, all at your command. The optional Advanced Smart Setback feature chooses the right temperature for your home while you're away, while anticipating comfort on your return, to help maximize energy efficiency. |
| • Ideal Humidity System™ Technology | • Ideal Humidity System™ technology does not require a call for cooling to initiate dehumidification, providing an increased level of comfort in the home. Super Dehumidify mode allows the maximum amount of dehumidification, with the minimum amount of overcooling. |
| • Personalized Comfort Anywhere in Your Home | • The Infinity® Zoning System allows you to set personal comfort levels in up to eight areas of your home, while allowing you to choose individual energy-efficient setpoints and schedules for those areas when no one is using them. |
| • SmartEvap™ Technology | • This Carrier® patented technology operates after a dehumidification cycle in cooling and turns off the blower for five minutes to allow condensate to drain from the evaporator coil, and not re-evaporate into the home. |
| • ComfortFan™ Technology | • Unlike ordinary systems with only one continuous fan setting, this Carrier® patented technology allows a homeowner to select their fan speed for constant fan mode, and have different settings for each programmed Comfort Profile. |

* Full Infinity® System with the Infinity System Wall Control with Wi-Fi® capability. Remote access requires Wi-Fi model wall control and Apple™ or Android™ mobile device. Energy Tracking requires compatible equipment. Wi-Fi® is a registered trademark of Wi-Fi Alliance Corporation.



Infinity® System Control



Model GZ



Model GC

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 a half acre and a minimum depth of 10 feet. Bigger is better.



Frequently Asked Questions (con't)

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.

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

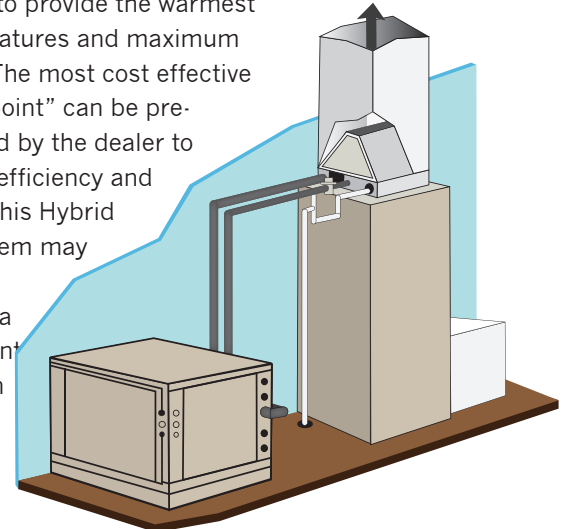
A: Generally, the existing duct work can be used with a geothermal unit without extensive modification. Variable-speed blowers used in many of the Carrier® geothermal units can compensate for a less-than-optimum duct system. For the electrical supply, a 200-amp service for the home is recommended.

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 and Rebates

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. Check with your Carrier® dealer 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 GC, GP, GZ, 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.



As an ENERGY STAR® partner, Carrier Corporation has determined that qualifying models meet ENERGY STAR guidelines for energy efficiency. Ask your dealer for details or visit www.energystar.gov.



Visit the geothermal section of our website.