

Risky Business

What You Need To Know About...

Geothermal Heating and Cooling Systems

What are Geothermal Heating and Cooling Systems?

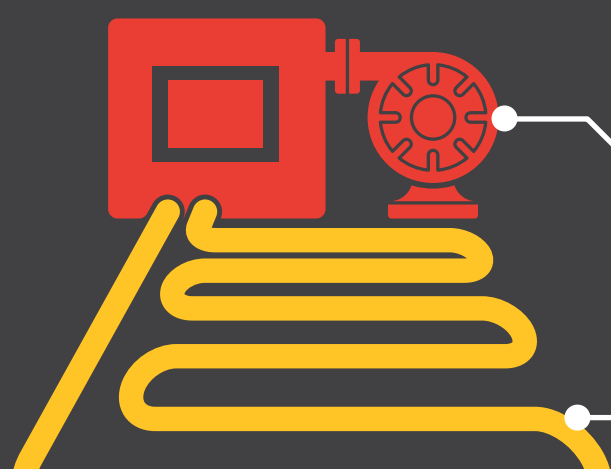


Geothermal Heating and Cooling Systems (GHCs) utilize the constant temperature underground to warm and cool a home or building.



They focus on **energy savings** associated with heating and cooling.

How do GHC Systems Work?



At the heart of a GHC system is a **heat pump** that operates in two modes: heating and cooling.

Geothermal heat pumps use a heat exchange liquid inside a **pipng system** to release or absorb heat from the ground.

In **heating mode**, the system absorbs heat from the ground.



Heat Absorption

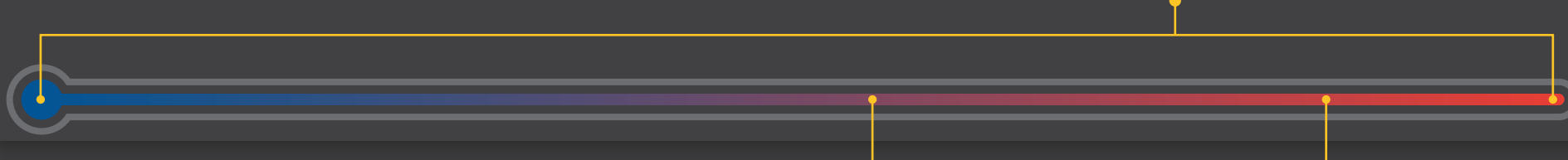
In **cooling mode**, the system releases heat to the ground.



Heat Dispersion

This type of setup takes advantage of year-round ground temperatures.

In most parts of the United States, the **air temperature can fluctuate over 100°F** from summer to winter.



In contrast, the **ground temperature** in the first 10 feet **fluctuates between 45°F and 75°F**.



A GHC system doesn't generate heat, it simply collects it and moves it to an area where it can be used, like inside a home or business.

Interesting Facts



GHC is an alternative to traditional systems for heating and cooling a home.



GHC systems have been in use since the 1940s.



GHC systems don't use geothermal energy but rather ground source energy.²



Geothermal heat pump technology relies on the sun to heat the ground at the earth's surface, rather than the earth's core to heat it from below.



There are about 1.4 million geothermal heat pumps in the US.³



What are the Benefits of GHC?

Geothermal systems are **safer, greener, quieter** and **less expensive** than traditional methods.⁴



They can save **30–60%** on heating and air conditioning energy costs, compared to conventional equipment.⁵



Replacing an ordinary HVAC system with GHC is the environmental equivalent of **planting 750 trees**.⁶

A geothermal heat pump is about **400% efficient**.



Conventional heating and cooling appliances are only **70–95% efficient**.



Geothermal heating is flameless, producing none of the health and safety concerns associated with fossil fuels.⁸

Expected Growth and Trends



The geothermal heat pump market (GHP) is expected to nearly triple to **\$17.2 billion by 2020**.⁹

Geothermal heat pump unit controls are evolving, which makes it possible for them to:

- Operate wirelessly
- Analyze operational data
- Diagnose issues¹⁰

Disadvantages

GHC systems offer many advantages over traditional energy sources, but there are also some downsides.



Expensive



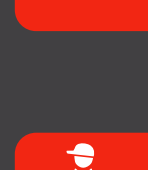
Lack of consumer education on GHC benefits



Requires a lot of land for underground piping



Difficult to install



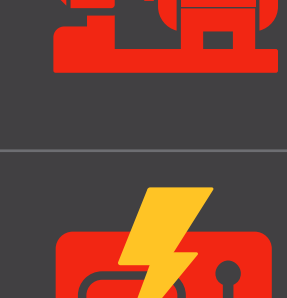
Lack of qualified installation contractors who understand GHC systems

Common Causes of Failure



Mechanical Breakdown

By far the most common type of loss that occurs at these locations. Equipment such as pumps are most often damaged. Since most GHC systems operate year-round, this equipment is important for maintaining a constant indoor air temperature for personal comfort.



Electrical Damage

Most often affects electrical and electronic equipment due to power surges and electrical arcing. Dust accumulation, temperature extremes and humidity affect the reliability of electric motors, switches, and electronic controls, which increase the potential of equipment damage.

References

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