Debunking Five Common Geothermal Complaints

While geothermal has a long history, in the last 10 years or so, it's developed somewhat of a bad reputation. But, this isn't because of the system itself.

In 2005, the Energy Policy Act was signed into law, allowing the IRS to provide tax credit incentives to promote the use of geothermal energy. Extended in 2009, the act made the largest tax credit ever given possible. Homeowners would receive a 30% Federal Tax Credit when installing a geothermal system. Because it had no limits, it let homeowners save thousands of dollars. Soon, geothermal was in high demand, and geothermal contractors popped up everywhere.

But, while many people loved the tremendous savings, there was a problem. These new heating and cooling contractors began cutting corners during the geothermal design and installation phases by placing more emphasis on lowering the upfront cost. Unfortunately, many uneducated buyers thought they were getting a deal. But poor installation led owners to experience higher operating costs, excessive repairs, shorter life of the system, lack of comfort, and poor warranties.

Don't get swindled by bad contractors. By **doing your research**, you will learn the importance of choosing a reputable contractor and know exactly what questions need to be asked.

WATERLESS™ GEOTHERMAL

Call with questions:
863-701-0096

COMPLAINT 1: HIGH OPERATING COSTS

"The backup heat is expensive to operate, and the savings aren't as much as what I expected."

While new geothermal contractors tried to save on upfront costs, they began installing lower heat producing, poorly designed systems that relied on backup heat. Since homeowners were regularly using their backup heat, the heating system became more costly to operate. Backup heat is a nice convenience to have; however, it should just be used for emergencies during times when the system is down, or during extremely cold temperatures, usually when it's below 0°F.

SOLUTIONS TO HIGH OPERATING COSTS

The design considerations of any heating and cooling system can impact the system's overall performance, but that doesn't mean that you have to give up the tremendous savings a geothermal system can offer. Savings as much as 60-70% are very practical with today's geothermal technology. The maximum efficiency of a geothermal can be achieved by customizing each home to its own geothermal design while taking into consideration many factors which include: the size of the home, equipment and ductwork, as well as the ground loop design, geographic location, direction the house faces, the type of ceiling/wall insulation, and window surface area.

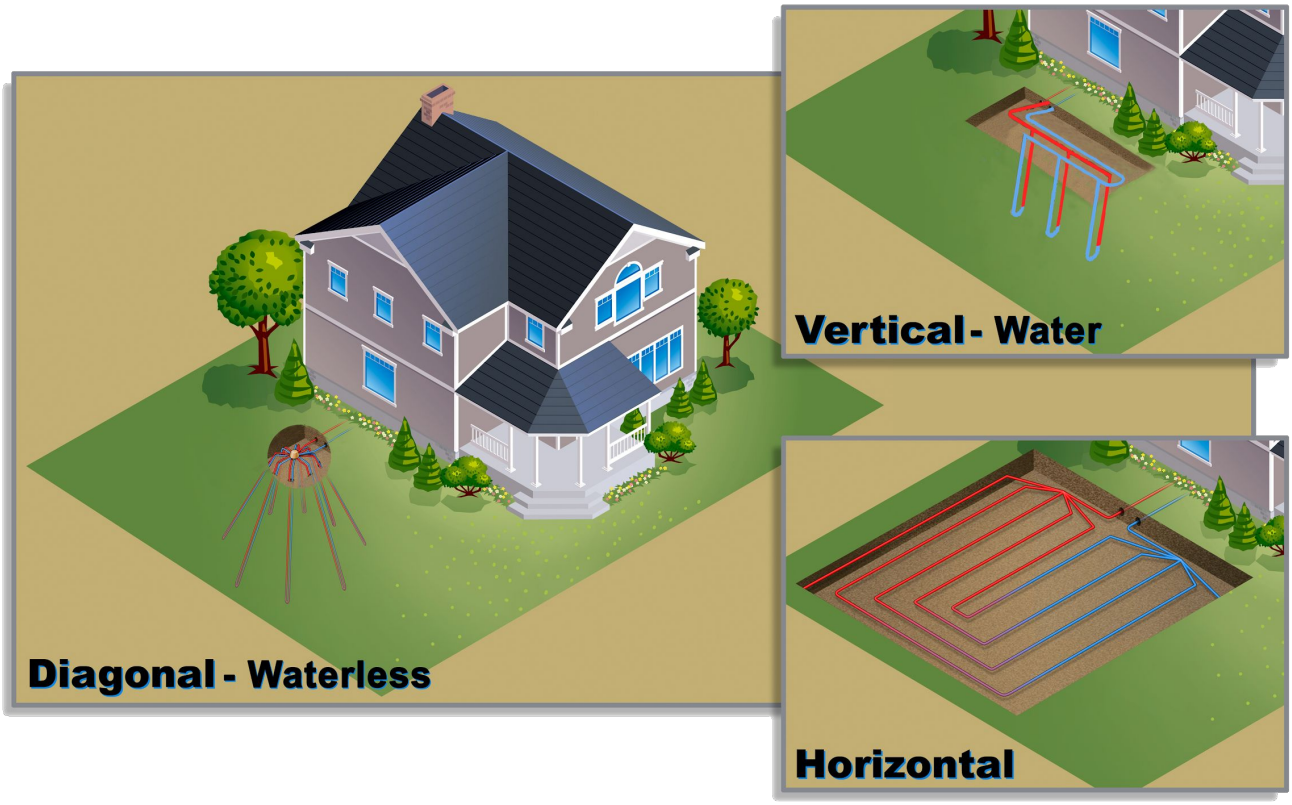
By having a **customized plan**, it allows the geothermal system to be engineered with higher efficiencies and lower annual energy cost so the system doesn't have to rely on backup heat.

1

Size of the Home: Large or Small, size doesn't matter; installing a geothermal in your home can save you lots of money on your energy bills each year! Even with a small home, you can make a good investment that will have a quick payback. For those with larger homes, you may also wonder, "Will a geothermal system provide enough heat for my home without using backup heat?" The answer is: Yes! It is possible when it's been properly designed! The right sized geothermal system can heat any home on its own when it's been customized to the home's construction.

2

Equipment Size: The size of the equipment is directly related to the size of the home. Traditionally, oversizing a gas furnace was a common practice, however, this resulted in a decrease in efficiency. With a geothermal system, it's important that the system is sized as close to both the heating and cooling requirements as possible. An oversized geothermal system can cause comfort issues, while an undersized system can cause higher operating costs. An accurate sized system gives you a balance of great comfort and great savings.To determine the accurate size of the equipment, all the other factors we referred to earlier should be considered as well.



3

Ground Loop Design: Designing an efficient ground loop system requires four critical aspects: **loop layout, ground loop material, amount of loop being installed, and the loop fluid**. Although each one of these is important, it all begins with deciding which loop layout makes the most sense for you. The loop layout can be either a horizontal ground loop or a vertical ground loop (the ground loop material and the loop fluid will be addressed later in the article).

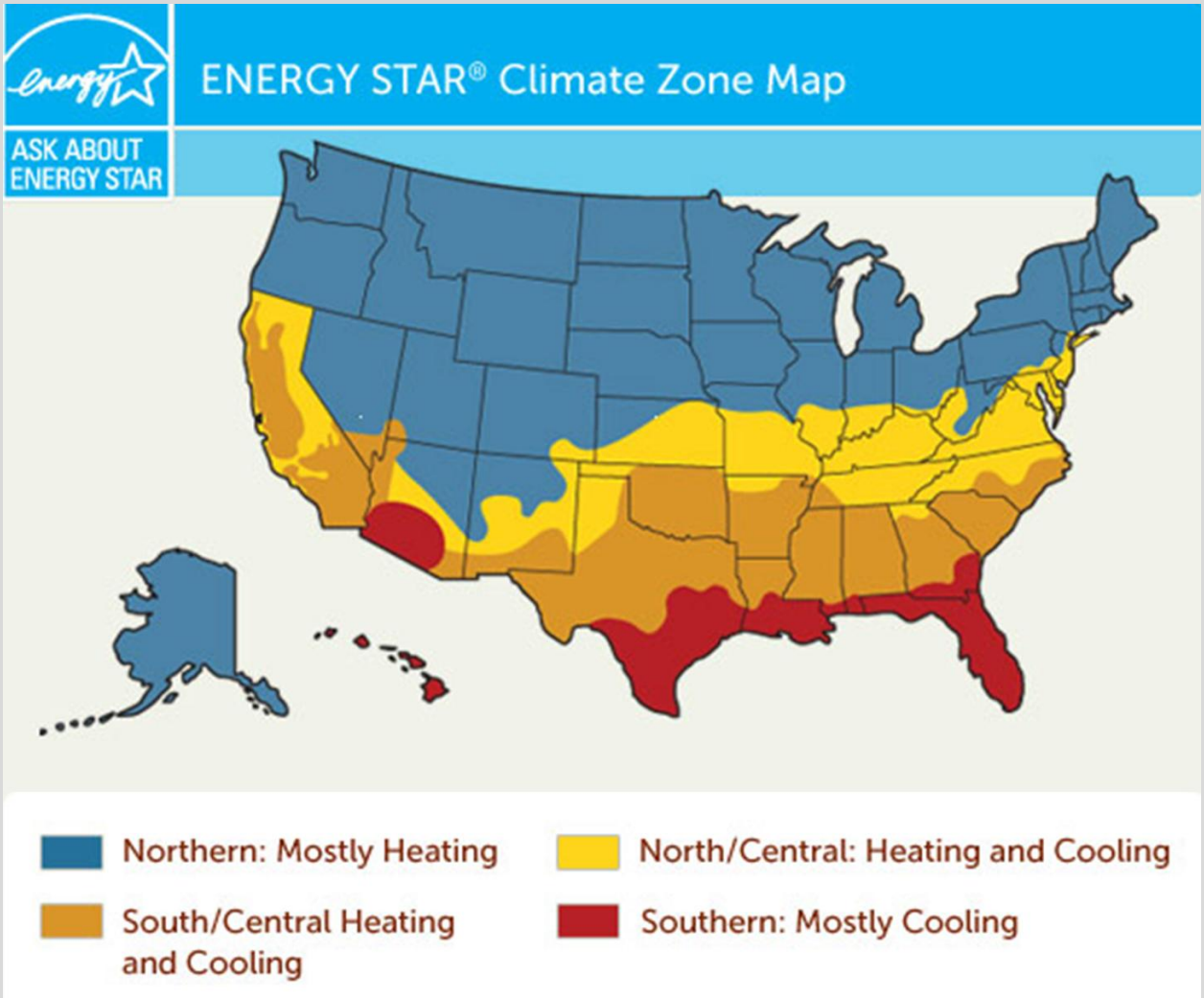
- ➔ **Horizontal:** A horizontal ground loop is 4-5 feet below the surface. The shallower depths associated with a horizontal ground loop is subject to more temperature fluctuations due to the outside temperature changes. These fluctuations can cause the backup heat to kick on earlier and more often during periods of cold temperatures throughout the heating season.

- ➔ **Vertical:** A vertical ground loop can reach anywhere from 70-125 feet deep! The vertical ground loop temperatures remain warmer and more consistent because of the warmer mass of earth above and below the loop. As a result, a vertical ground loop will produce more heat, reducing the use of the backup heat system.

- ➔ **Amount of Loop Installed:** The total length of the ground loop designed can range as much as 250-600 ft of tubing for every 12,000 units of heating output. The required length of ground loop is determined by multiple factors, such as geographic location, loop material (plastic or copper), loop layout (vertical or horizontal), and the temperature of the heat source for the system (earth ground temperature or pond water temperature). Ultimately, the more ground loop tubing used, the more heat the system can produce.

4

Geographic Location: Your operating cost for a geothermal system throughout the winter months will depend on your geographic location and how often temperatures reach below freezing (32°F). Most efficiencies that are advertised are achieved under laboratory conditions that simulate a moderate climate condition. The ratings under these moderate climate conditions represent the “peak efficiency” of the geothermal system. However, if the geothermal system is installed in a cold climate region, these efficiency ratings change dramatically. These efficiency ratings do not account for the factors that can reduce the overall efficiency and performance of your system, such as the change in temperature for a much colder climate, the cost of running backup heat, thermostat set temperatures, system design, and sizing parameters. To ensure your cost of operation estimate is accurate from your contractor, verify that these factors have all been taken into consideration.



COMPLAINT 2: EXCESSIVE REPAIRS

"I feel like my geothermal system gets serviced several times a year."

SOLUTIONS TO EXCESSIVE REPAIRS

Homeowners that owned heat pumps (including geothermal) and air conditioning systems experienced additional repairs because of the thinner, lighter, and cheaper materials that came from foreign countries like China and Mexico. There are different geothermal systems that have more parts than others, and when you have more parts in the system, there is a higher potential for problems.

1

Domestic Parts

Years ago, in an effort to cut cost, many domestic heating and cooling equipment manufacturers began to import parts from their suppliers with the intent to pass down these savings to the American people. After years of poor quality control, manufacturers eventually decided to bring a majority of their suppliers back to the US. As a result, the parts are now of a higher quality with more reliability. This is why it's so important to verify that your products are American-made.

2

Preventative Maintenance

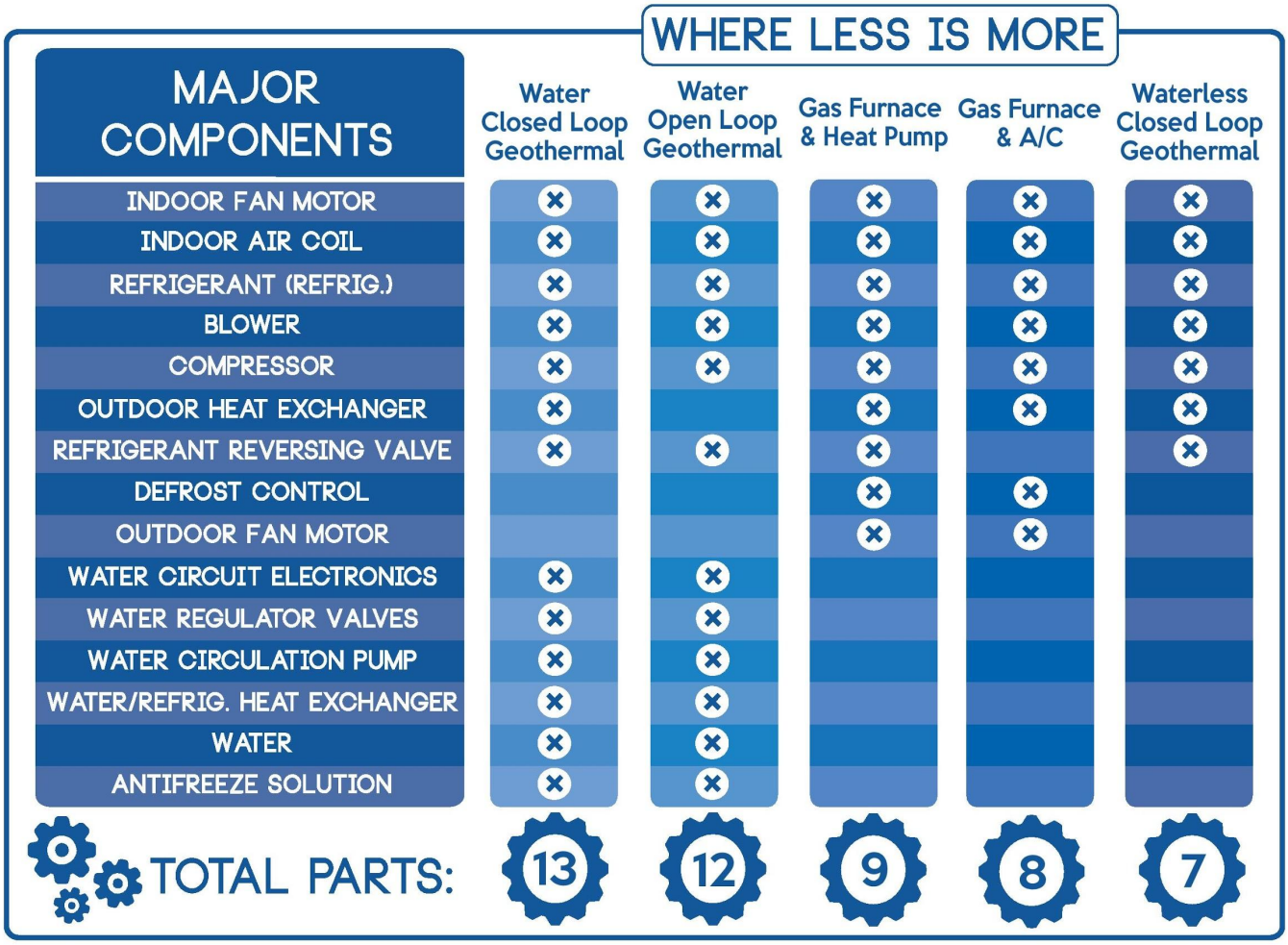
Like an automobile, any heating and cooling system (including geothermal) has many mechanical components which require preventative maintenance. Maintaining your system will end up paying for itself because it will help prevent unwanted costs and future repairs.

- ➔ **Optional Maintenance (HVAC Contractor):** Having your contractor do annual pre season check-ups on your equipment will help keep any heating and air conditioning system performing efficiently. If there is going to be an issue with the system, it's better to find it early and repair it before it starts to affect other areas of the system which can save you from larger and more expensive repairs.
- ➔ **Necessary Maintenance (Homeowner):** Some preventative measures that you are able to do on your own is inspect, clean, and change the system air filters. These checkups to your system should be done on a monthly basis. Although you will be inspecting the system monthly, it's not necessary to change your filter until it becomes dirty.

3 Less Parts

When comparing the amount of parts in a geothermal system to a standard gas furnace and central air conditioning system and an air source heat pump system, you'll find that they can be very similar. If you would list the different system designs in the order beginning with the system that contains the most parts, it would go as such: closed loop water geothermal, open loop water geothermal, gas furnace and air source heat pump, gas furnace and air conditioner, and finally, a waterless geothermal (see graphic below). Although some geothermal systems contain more parts than a traditional gas furnace and air conditioning system, one thing to consider is the significant efficiency advantage of a Geothermal system over that of a traditional gas furnace and air conditioner or heat pump system.

- ➔ **Closed Loop Water Geothermal:** The most commonly known geothermal design is a Closed Loop Water Geothermal System. The number of parts in the system is determined by the type of loop system installed. It utilizes a water/antifreeze solution along with a plastic ground loop (outdoor heat exchanger)
- ➔ **Open Loop Geothermal:** One of the original geothermal designs was an open loop system that uses your well water. This type of system doesn't require you to bury a ground loop. An open loop system has less parts than a closed loop system but the efficiency can be affected by the quality of water in your well. It's a good idea to check your iron and water hardness levels to ensure peak operating efficiency for the life of your system.
- ➔ **Waterless (Closed Loop) Geothermal:** A waterless geothermal operates with fewer number of components than many any other systems. By removing these components from the system there are less parts which means fewer problems.



COMPLAINT 3: SHORTER SYSTEM LIFE

"I can't believe my geothermal system only lasted 15 years."

If a geothermal system is not designed to provide the right amount of heat to the home, it can cause excessive run times or be subject to extreme conditions that can have a negative impact on the life of the equipment. By working the system harder and longer the system is more likely to fail sooner.

SOLUTIONS TO SHORTER LIFE OF SYSTEM

The four factors that affect the life of your system are: how well your home is insulated, the size of your equipment, the conductivity of your ground loop, and the rate of heat absorption in the loop fluid.

1

Well Insulated Home:

How well your home is insulated can determine how much heat may escape your home. If your home is losing large amounts of heat, your system will have to work much harder and run much longer during periods of cold temperatures.

- **Type of Insulation:** Many times contractors will choose the lowest cost insulation versus the best performance insulation. There are many different types of insulation you can install in your home. When deciding which insulation material you should use, be aware of which material is most suitable for your situation. Each type of insulation serves a very different purposes and has different applications. To find out more information about insulation visit the U.S. Department of Energy's website: https://www.energy.gov/energysaver/types-insulation

- **Fully Insulated Home:** The better your home is insulated the shorter run times your system will have since the heat is not being lost as quickly. Properly insulating every part of your home including the attic, crawlspace, and basement will allow the home to retain a higher amount of heat. A poorly insulated home is like running your heat with your window open. The heat in your home is being wasted as fast as it's being produced. Improving the insulation in your home will be like closing that window!

2 Equipment Size

The size of your system can have a big impact on how long the system will last. A lower heat producing system can result in longer run times. This mistake can be avoided by installing a properly sized system.

3 Conductivity of Ground Loop Material:

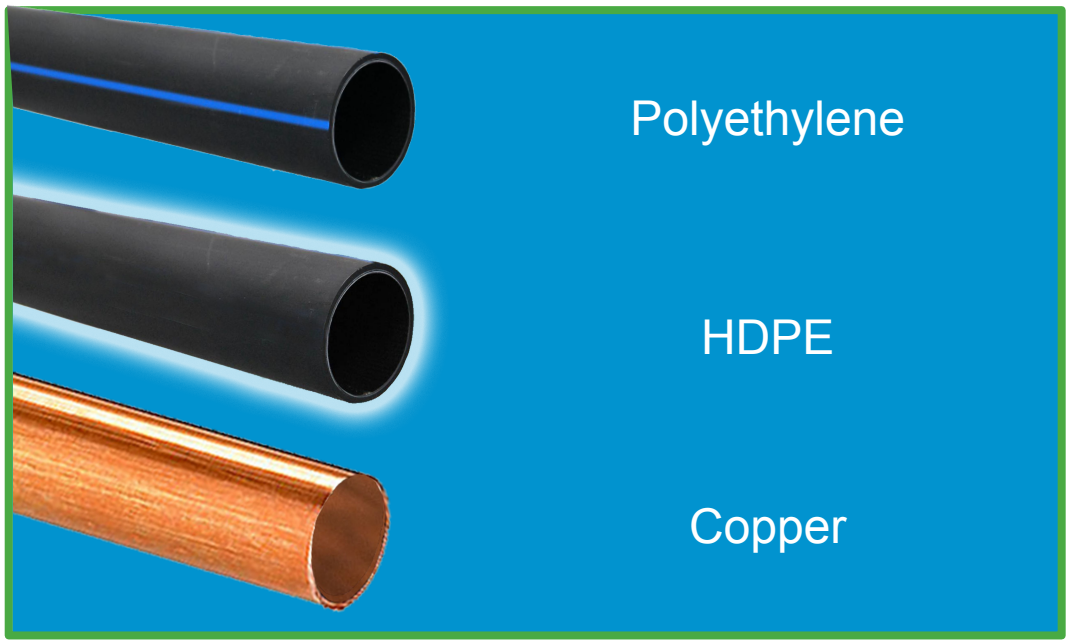
All geothermal loops are not the same. Although they look similar, the materials have different qualities and heat producing properties. The two most popular types of ground loop materials used are plastic and copper. Two types of plastic tubing can be used for a water geothermal design while copper is used for the waterless geothermal design. Each material is able to transfer heat but the question is, how much heat?

Ground Loop Material:

- **High Density Polyethylene (HDPE) Plastic Loop:** Polyethylene Plastic is the standard ground loop material used in most geothermal systems today. In the beginning HDPE pipe was intended to be used for water supply, performing more as an insulator. This is the entry level conductive ground loop material with the lowest cost and the lowest thermal conductivity.

- **Enhanced Plastic Loop:** Enhanced Plastic achieves a mid-level ground loop conductivity. Enhanced Plastic is an upgrade from the standard HDPE plastic tubing. This type of plastic is charged with a more conductive material than the conventional polyethylene plastic resulting in a more efficient ground loop.

- **Copper Loop:** Copper tubing is the most conductive loop material, and creates the largest amount of heat transfer. The thermal conductivity of copper is more than 600% greater than that of the conventional HDPE Plastic Ground Loop!



4

Ground Loop Fluid Efficiency

➔ **100% Refrigerant System**

Refrigerant is the foundation of many appliances used in our lives today. It's used both commercially and in many residential applications. Everyday appliances that contain refrigerant are things like your household refrigerator, freezers, air conditioners, ice machines, supermarket coolers, geothermal units and many more. The reason for refrigerants popularity is due to its ability to absorb large amounts of heat very efficiently. The waterless geothermal is a 100% refrigerant based system, which circulates refrigerant through both the inside unit and the outside ground loop. **The refrigerants ability to absorb large amounts of heat while circulating through the copper ground loop is what makes the system so efficient and the combination of the two is the secret to the systems low cost of operation.**

➔ **Water & Refrigerant System**

A water based geothermal is a 50/50, water/refrigerant based system which circulates refrigerant through the inside unit, but circulates water through the outside plastic ground loop. Circulating water through the outside plastic ground loop limits the amount of heat being absorbed from the ground, resulting in a lower efficiency.

GEOTHERMAL FLUID COMPARISON

Geothermal Designs	Refrigerant	Water	Antifreeze
Water Closed Loop	✓	✓	✓
Water Open Loop	✓	✓	
Waterless Closed Loop	✓		

By having a higher heat producing/ thermally conductive ground loop system you can increase the lifetime of the equipment. As this warmer heat enters your home, the system doesn't have to run as long because you are satisfying the set temperature much quicker. The less run times the system has, the longer the system will last. This ultimately results in a more efficient system and higher energy savings.

COMPLAINT 4: LACK OF COMFORT

"We feel hot and cold spots, and there is poor airflow in our home."

SOLUTIONS TO LACK OF COMFORT

The air duct systems should be customized to the specifications of each home to ensure the appropriate amount of warm and cool airflow is delivered to each area. To maximize your comfort, the duct installation and design should be calculated according to industry standards.

1

Duct Installation:

When the ductwork is being installed in your home there are many details that need to be considered to ensure your comfort. The degree of each bend and how the duct transitions from one size to another can seriously impact the entire performance of the system. The branch duct lines coming from the main trunk should be limited in length. When there is excessive lengths of branch duct lines installed it can cause poor airflow to your home. You may also want to consider a zone system if your home has multiple levels. In this case, a thermostat is installed in each area (zone) of your home to ensure your comfort is consistent from room to room, even in two story homes.

If you're installing a geothermal in an existing home it's possible to reuse your existing duct work, however it may require a few modifications to allow for the suitable amount of airflow to each room. You won't regret making these modifications because it will create a more efficient system, and a more enjoyable environment. Testing your duct system for any air leakage, and sealing it if there is any will help boost your comfort level even more.

2

Duct Design

To create a proper duct design, industry standards require heating and cooling contractors to perform a Manual D duct design calculation and a Manual J heat load calculation on each project. By doing these calculations the contractor takes into consideration the supply air requirements for each room which includes the amount of air volume, air velocity, air leakage, and heat loss (through the duct) that occurs. Accounting for all of these features in the duct design allows for the appropriate amount of warm or cool air to have access to each spot in your home. Discussing these aspects with your heating and cooling contractor will reveal how much experience they have designing ductwork systems. This can also help prevent you from sacrificing your comfort and making a costly mistake.

COMPLAINT 5: POOR WARRANTY

“That’s all the longer the warranty is?”

“Knowledge and support from the dealer and factory stinks after the sale.”

SOLUTIONS TO POOR WARRANTY

Warranties and support are very different depending on which contractor you go with and the brand of system that is installed. As with any warranty, it’s important to know what is covered and what is not. In every industry you have to be aware that although a warranty says “Lifetime” it may not cover the whole life of the product.

1

A Comprehensive Warranty

No one system is ever perfect, no matter how hard a contractor/manufacturer works to achieve perfection. Eve product in any industry has it’s own glitches.The more comprehensive the warranty, provided by the manufactur and the contractor, the better the warranty will end up bei for you. You will be spending the next few decades with your geothermal system, and it’s crucial that you are covered in every aspect of your warranty. Most warrantie entail two separate components for each area of your system, the parts and labor inside and the parts and labo outside. When reviewing geothermal warranties be sure t ask what is covered under each. If things like excavating, or refrigerant are missing from the outside parts warranty it may become very costly if a problem occurs. The more complete a warranty is the more satisfied you will be.

2 Contractor Reputation

To know what kind of service you will receive after the sale, you should look at the quality of service the heating and cooling contractor provides before the sale. Seek out people who have had a geothermal system installed and ask them if they have had any trouble with their geothermal system, then ask them “How well did the contractor take care of them after the sale?” A few other great questions to ask are: “How much do you pay to heat and cool your home each year using your geothermal?” and “Is there any type of cost of operation guarantee after the system is installed?” Knowledge is crucial throughout the whole process and if your heating and cooling contractor is experienced it will show! Ask questions, and find out the answers!

Ultimately, when you're choosing which installer to go with it comes down to the knowledge, experience, and reputation of your heating and cooling contractor.

That’s why it is so important to do your research ahead of time to find a qualified installer that is credible and has installed many geothermal systems in the past. You can also contact the International Ground Source Heat Pump Association or the Geothermal Heat Pump Consortium for a listing of qualified installers in your area.

ENERGY STAR

BBB ACCREDITED BUSINESS A+ Rating Better Business Bureau

RSES REFRIGERATION SERVICE ENGINEER SOCIETY

GEOEXCHANGE

INTERNATIONAL GROUND SOURCE HEAT PUMP ASSOCIATION

Let's Wrap it Up:

Geothermal is a highly efficient technology that can create large amounts of energy savings for homeowners when it's properly designed, engineered, and installed. Doing your research allows you to enjoy the many rewards of your investment.

WATERLESS™ GEOTHERMAL

Schedule an Analysis Today
863-701-0096

426 Stachler Dr.
St. Henry, OH 45883

www.WaterlessGeothermal.com