Geothermal Living

Your Guide to Understanding Geothermal Heating and Cooling Systems

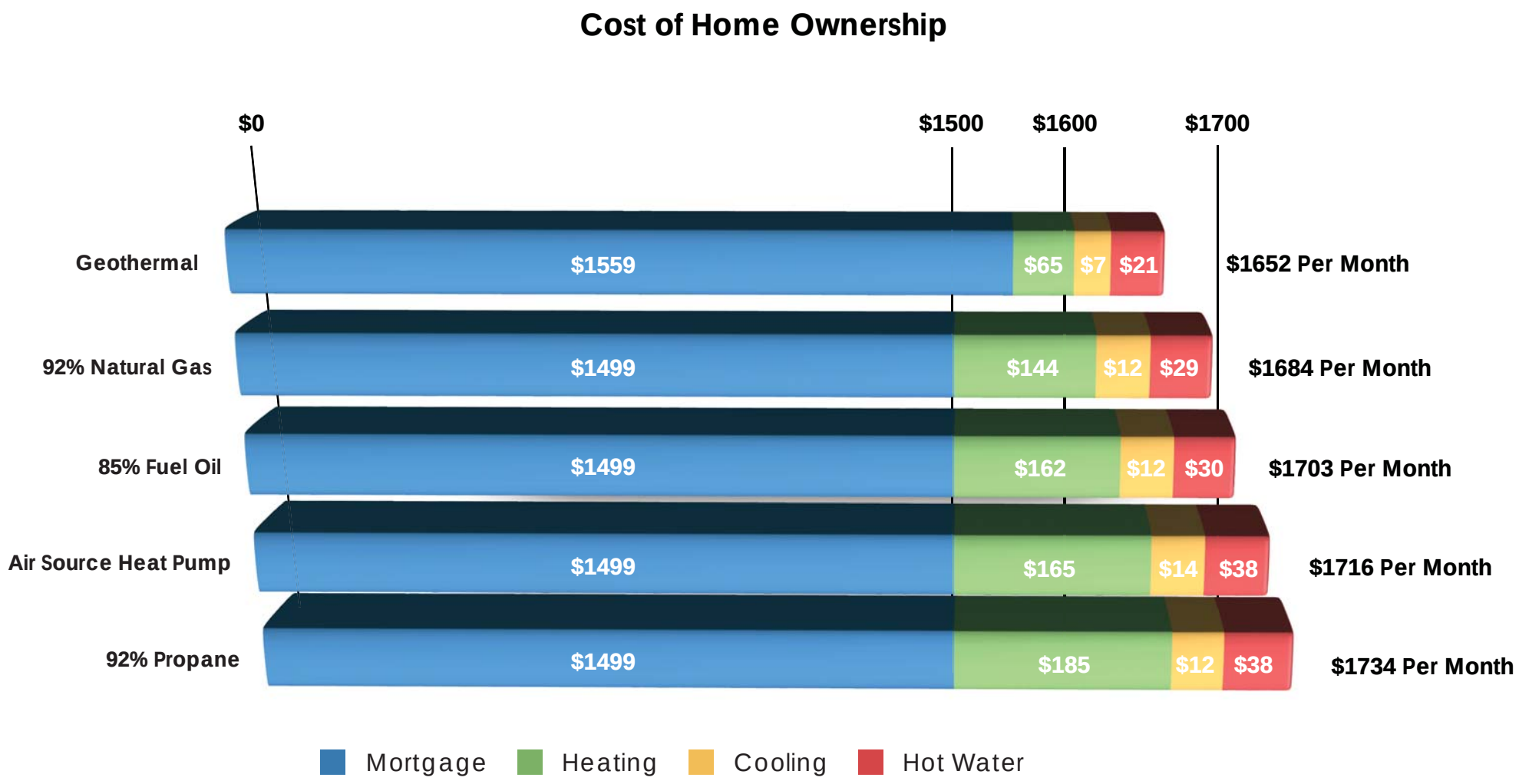
EARTH FRIENDLY

See how superior technology saves you money and the environment at the same time!

ALSO INSIDE!
Geothermal Benefits, Typical Cost Savings, and, All About Geothermal Loops

OWNING A GEOTHERMAL SYSTEM...

COSTS LESS



Think: Economics

Geothermal technology not only saves you money, but saves the environment as well.

When looking at all the choices you have to make when planning and building your new home, one of the most overlooked decision is the heating and cooling system.

However, choosing the right heating and cooling not only affects how comfortable you are, but it can also affect how much it cost to own your home more than you might think.

It is widely known that geothermal systems cost more to install than conventional systems. Most of this additional cost is related to the installation of the geothermal earth heat exchanger, known as the closed loop system. (see the section called “Geothermal Loops” for more information)

While this type of system’s initial costs are in fact higher, it’s increased efficiency means you will be spending up to 70% less for your home energy needs. The life expectancy of the closed loop system means that this savings will continue over the next 50 years or so with this single, initial investment. No matter how high energy costs rise, you can have peace of mind knowing your decision to invest in a geothermal heating, cooling, and hot water comfort system will save you up to 70% on your energy bills for a very long time.

The vast majority of the costs related to owning a home is your monthly expenditures including the mortgage, heating, cooling, and hot water. The graph above illustrates how installing a geothermal system will actually result in lower monthly home ownership costs.* In this example $10,000 for a geothermal system is added into the principle of the mortgage, but the additional mortgage cost is more than recouped through monthly utility savings. By adding a geothermal system to your home, you start out with a positive cash flow for ownership the day you move in.

Assumptions: Weather data from Chicago, IL; typical heating and cooling loads of a 2500 square foot house with walkout basement; air conditioning units are 13 SEER systems; Air source heat pump is 14 SEER in conjunction with backup electric heat and electric water heater. The geothermal system is using domestic water heating assist option. Mortgage rate is 6% for 30 years based on $250,000 loan.

Did You Know?

While many homes have been fitted with geothermal systems, commercial enterprises, including factories, retail stores, office buildings and schools also use geothermal to save energy and protect the environment. In fact, there are now more than 900,000 installations in the United States alone.

GETTING STARTED WITH GEOTHERMAL...

THE BENEFITS

An investment in a geothermal system offers you more than a way to heat your home in the winter and cool it in the summer. Whether you are committed to improving the environment or you dread the hassles of home maintenance and upkeep, or maybe you just want to save on your monthly utility bills (and who doesn't?!), a geothermal system is your total solution.

Listed below are just a few of the many benefits of a geothermal system.

• **Safe and Secure** - no fossil fuel exhaust means no chimney or flue is required. There is no opportunity for explosions or carbon monoxide poisoning, which makes a geothermal system the safest choice for your family.

• **Money In Your Pocket** – Geothermal systems are recognized by the EPA as the most energy efficient heating and cooling systems available today. Savings are produced by tapping into the free energy naturally stored in the earth.

• **Earth Friendly** – Geothermal systems actually have a positive impact on our environment since they burn no fossil fuels and use very little electricity. This enhances our efforts to control pollution, green house emissions, and other issues that impact our everyday environment.

• **Noise Free Environment** - no noisy outdoor air conditioner is required, so air conditioning no longer has to detract from your outdoor activities. An additional bonus: there is no unsightly outdoor unit to detract from your landscaping.

• **Less Maintenance and Service** - a single system heats, cools, and produces hot water. Since this unit is located inside the home, it is not exposed to harsh outdoor conditions which could lead to mechanical issues.

• **Comfort, Comfort, Comfort** – because of the way geothermal systems cycle, they do a better job of air purification and dehumidification than conventional systems. They also provide more consistent air temperatures throughout the house, eliminating hot and/or cold spots. Additionally, zoning can allow you to maintain a different temperature in different areas of your home.

• **Free Hot Water** – a geothermal system has the capability of capturing reclaimed heat during the heating and cooling modes thus reducing a typical 4-person household's water heating cost by 50% to 60%!

• **Longer Life Expectancy** – you can expect your geothermal system to provide you with, on average, 20 to 24 years of reliable total comfort and savings as compared to a 13 to 15 year life expectancy of conventional systems.

• **Flexibility** – there is no job too big or too small for a geothermal system. Our versatile equipment can be installed in existing homes, new construction homes, small shopping centers, and even the largest commercial structures.

Did You Know?

Surveys by utility companies indicate a higher level of satisfaction for geothermal systems as compared to conventional systems. Polls consistently show that more than 95% of all geothermal customers would recommend geothermal to a family member or friend.

For information about GeoComfort brand Geothermal Systems, to locate a factory trained dealer / installer, or to order a free informational DVD, please visit www.geocomfort.com

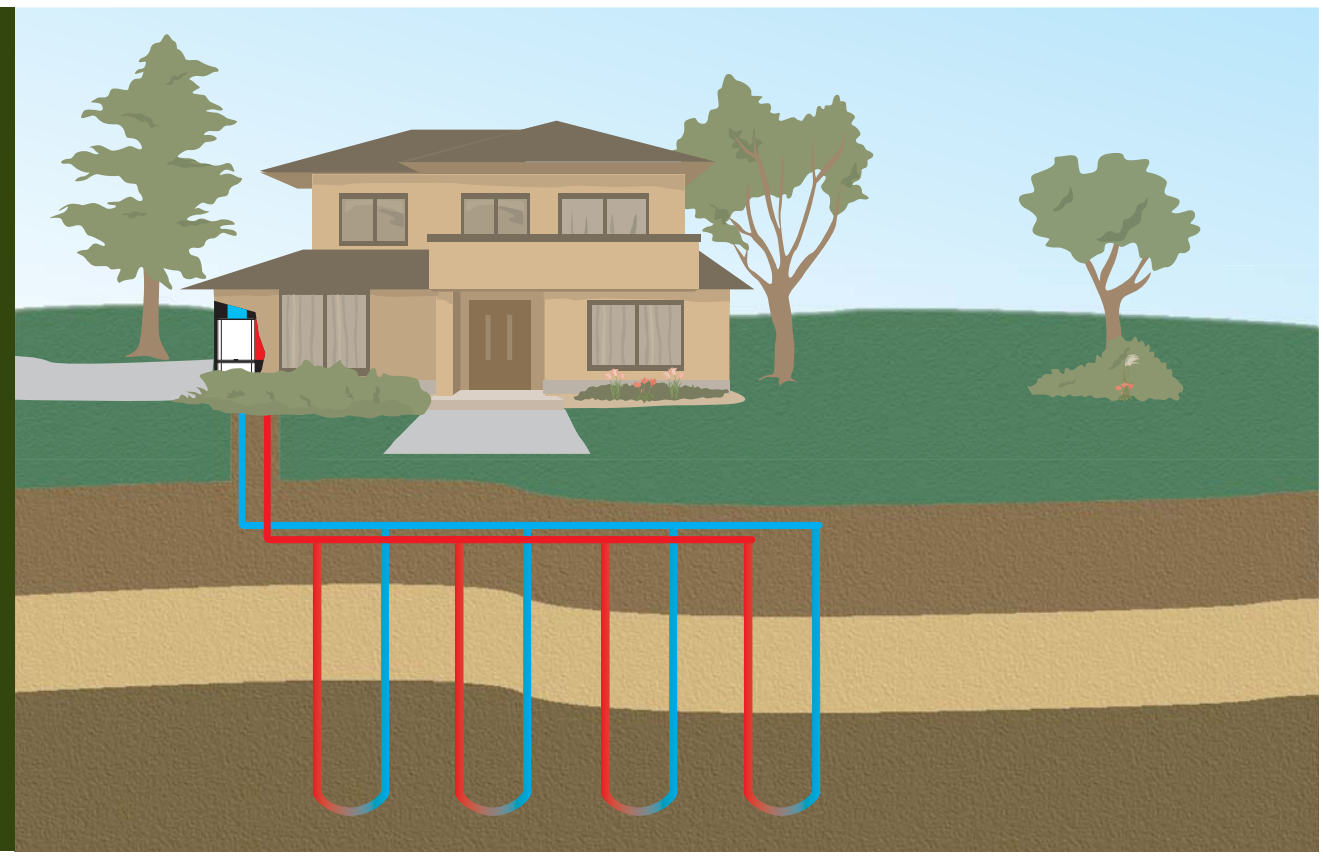
THE HEART OF THE SYSTEM...

GEOTHERMAL LOOPS

The heat exchanger also known as the loop system, captures the stored solar energy in the ground and delivers it back to the geothermal system in the house. There are 4 different types of loops.

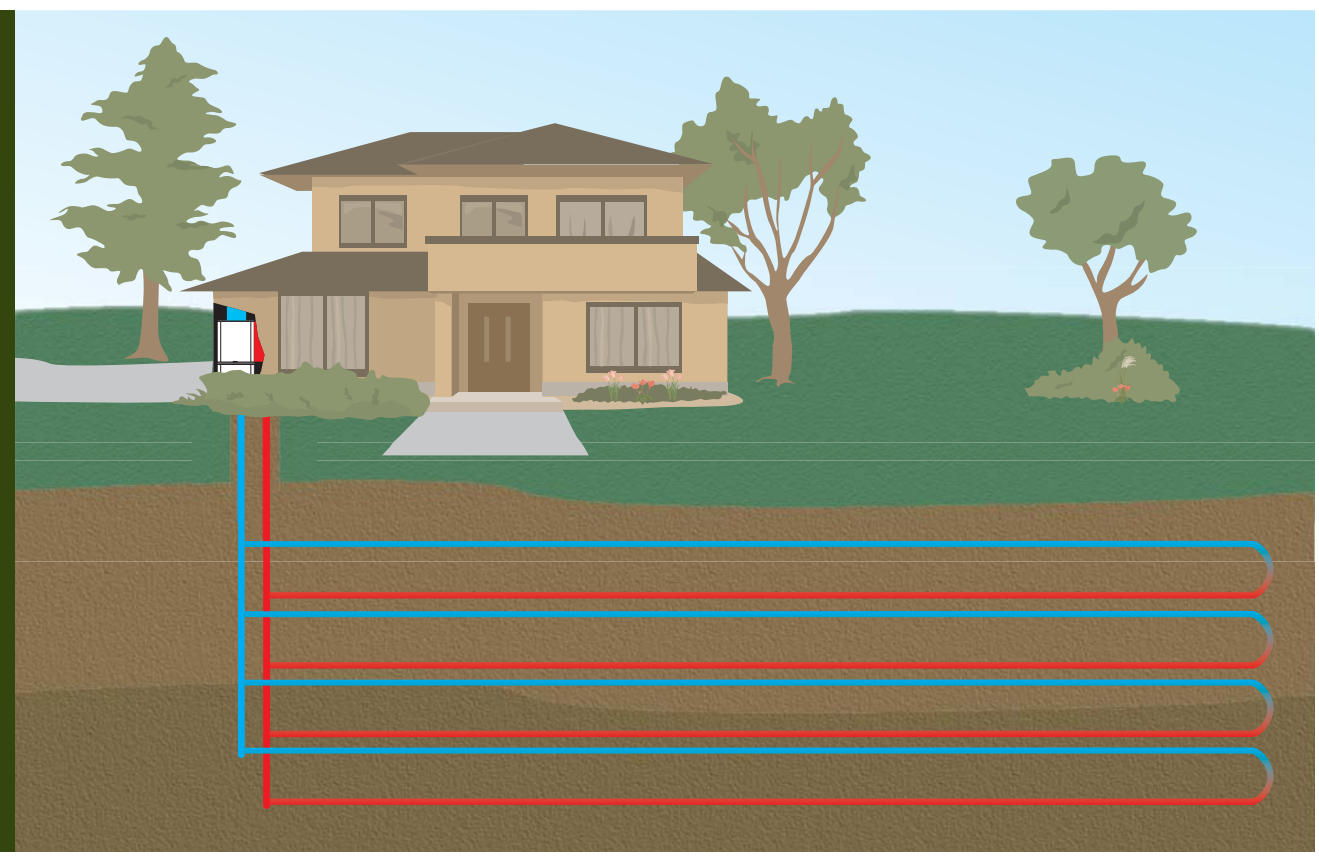
Vertical Loop: This loop is used mainly when land area is limited and in retrofit applications of existing homes. A drilling rig is used to bore holes at of depth of 150 to 200 feet. A U-shaped coil of high density pipe is inserted into the bore hole. The holes are then backfilled with a sealing solution.

VERTICAL LOOP



Horizontal Loop: This is the most common loop used when adequate land area is available. Loop installers use excavation equipment such as chain trenchers, backhoes and track hoes to dig trenches approximately 6-8 feet deep. Trench lengths range from 100 to 300 feet, depending on the loop design and application.

HORIZONTAL LOOP



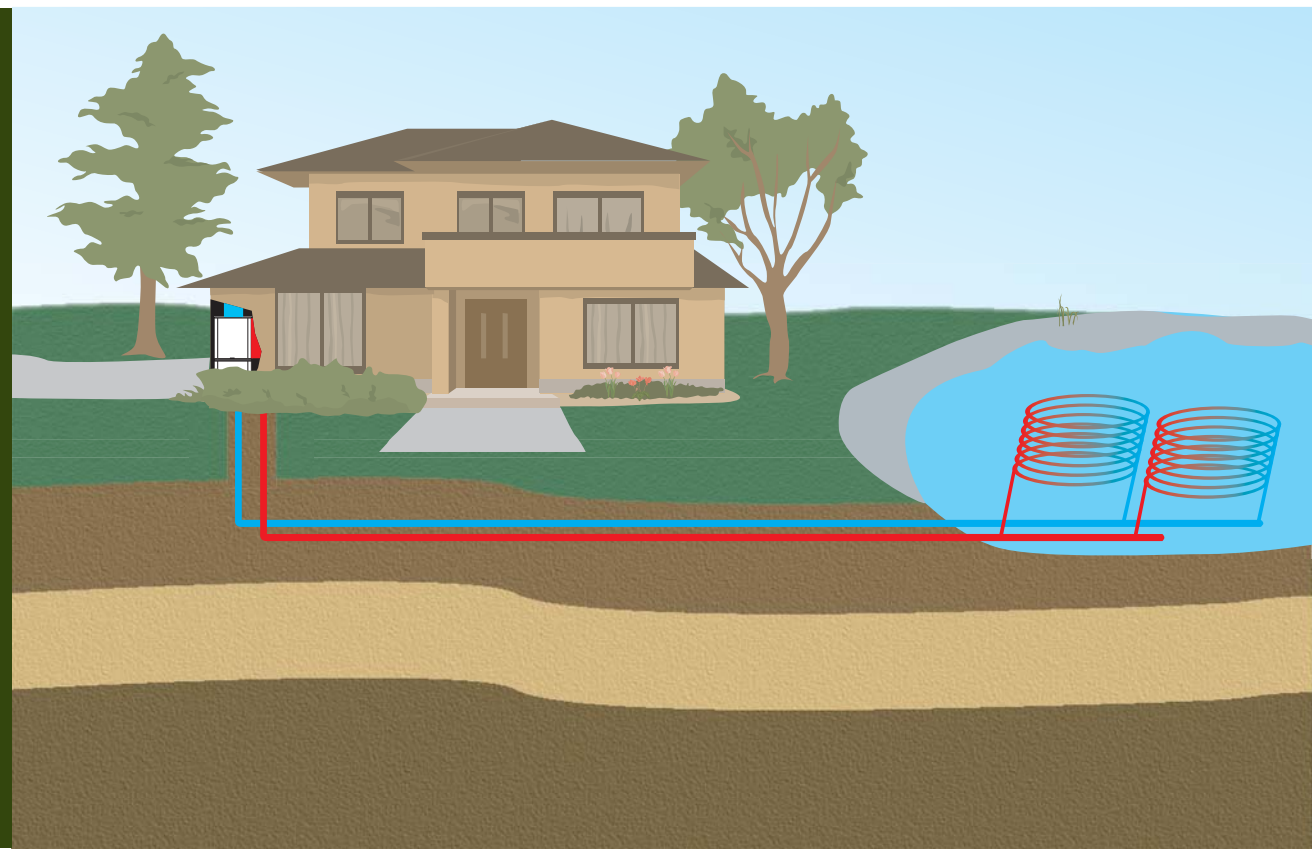
Your loop system is the heart of geothermal technology. Regardless of the option you select, it will deliver over 300% efficient comfort and savings for many years into the future. Your local geothermal dealer will help you select the proper loop system based on a site survey and by conducting a detailed energy analysis of your home. Installing a geothermal loop system is like getting a 70% discount on energy for the life of your home.

THE HEART OF THE SYSTEM...

GEOTHERMAL LOOPS

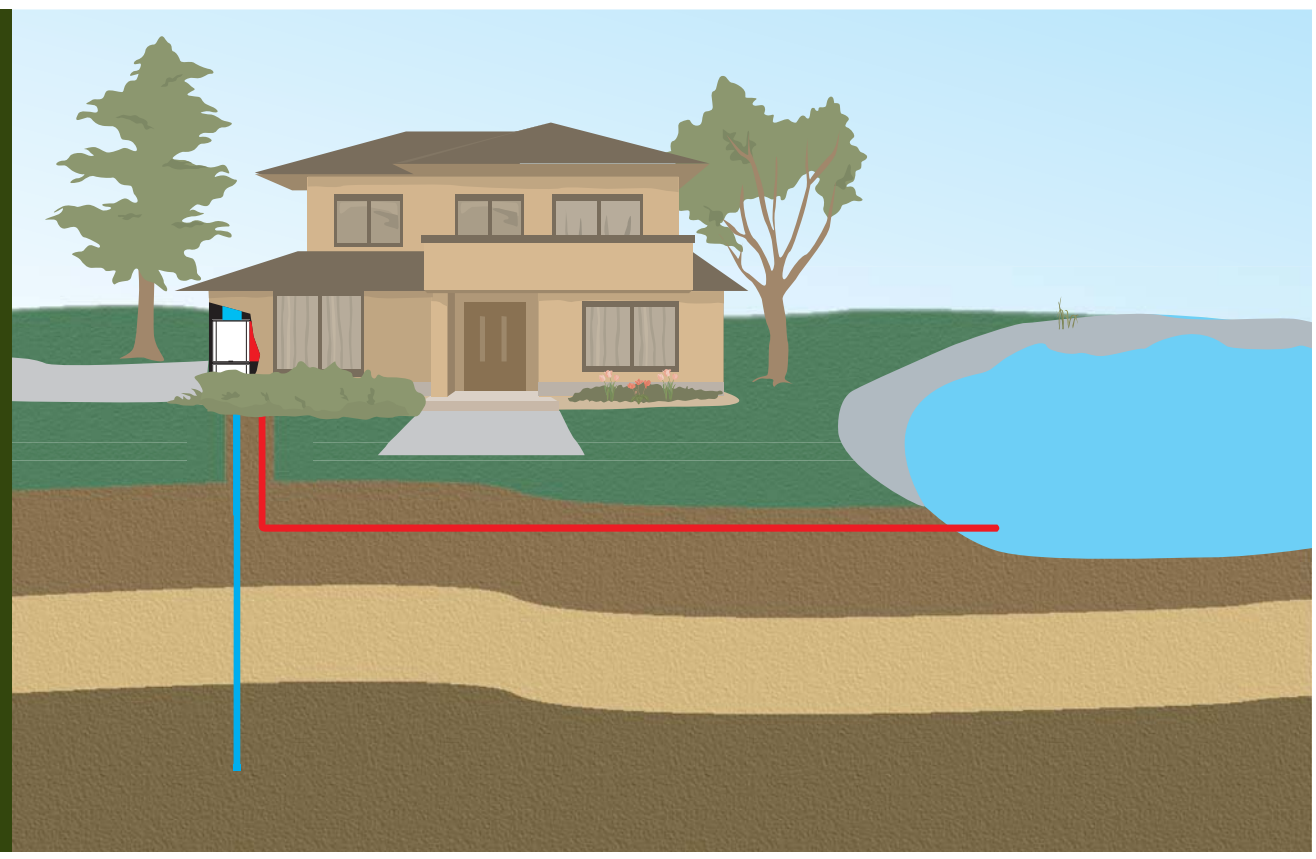
Pond Loop: A pond loop is an option if a large body of water is available within approximately 200 feet of the home. A ½ acre, 8 to 10 foot deep body of water is usually adequate to support the average home. The system uses coils of pipe typically 300 to 500 feet in length. The coils are placed in and anchored at the bottom of the body of water.

POND LOOP



Open Loop: This system can be installed if an abundant supply of high quality well water is available. A typical home will require 4 to 8 gallons of water per minute. A proper discharge area such as a river, drainage ditch, field tile, stream, pond, or lake must be present. Check your local codes for restrictions before selecting a specific discharge method.

OPEN LOOP



Did You Know?

The earth absorbs and stores 47% of the sun's energy annually in the form of clean, renewable energy. That represents 500 times more energy than mankind could ever use in a single year. Geothermal systems use this stored energy in the winter time to provide heat and return it to the earth during the cooling season.

JUST THE FACTS...

GEOTHERMAL 101

What is geothermal heating and cooling?

Geothermal heating and cooling is the process of capturing the solar energy stored just below the surface of the earth. This stored solar energy is removed from the earth to heat your home during the winter months and similarly heat is removed from the home and deposited back to the earth during the cooling season. This is accomplished through the use of a geothermal unit located in the mechanical room and a high density polyethylene pipe buried in the earth. The earth is now being used as a heat exchanger to keep your home or building at its optimum comfort level all year round.

How does it work?

Virtually every household around the world has an appliance that works by using the same principles as a geothermal system: the refrigerator. The refrigerator's internal compressor and refrigerant system has the ability to move heat from one location to another. Rather than applying cold, the refrigerator actually absorbs heat from the contents inside and deposits that heat out through the back or bottom of the appliance. A geothermal system operates in the same way with one big difference; our system has the capability of reversing the refrigerant cycle, allowing the geothermal system to heat in addition to air condition.

The earth absorbs and stores approximately 47% of the sun's solar energy. The result is a fairly constant underground temperature of 45 degrees in northern climates to 70 degrees in southern climates. The geothermal system takes advantage of this stored energy by using it to provide the most energy efficient heating and cooling system available today.

The heat exchanger, commonly referred to as a closed loop system, which is buried in the ground circulates a water solution through a series of pipes. This solution captures the stored solar energy and delivers it back to the geothermal system located in the house. The geothermal unit then transfers the solar heat throughout the house using standard forced air ductwork or the use of in-floor radiant heat, providing comfortable heat in the winter.

The geothermal unit and buried heat exchanger will then reverse this cycle during the cooling season. Through the use of a forced air system it is able to remove heat and humidity from the air. The captured heat is transferred and deposited back into the earth through the same series of buried pipe, providing comfortable air conditioning throughout the summer.

How long has geothermal heating and cooling existed?

Geothermal heating and cooling is not new. This technology has been available for many decades. The modern era of geothermal technology became recognized during the late 1970s and early 1980s. The country's energy crisis forced home owners and building owners alike to begin looking for alternatives to expensive conventional fossil fuel heating, similar to the situation we find ourselves in today. Since that time, hundreds of thousands of geothermal systems for homes, schools, commercial buildings, industrial facilities, and federal buildings have been installed all over the world.

Did You Know?

The impact of the current use of geothermal technology is equivalent to taking 1.6 million cars off the road, planting more than 346 million trees or reducing the U.S. dependence on foreign crude oil by 19.3 million barrels a year.

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ENERGY COST COMPARISON

The following scale illustrates the cost of fossil fuel that would be required in order to equal the same amount of out of pocket monthly expense as operating a geothermal system. Find your current electric rate in the top row of the chart and then follow that column vertically to determine the fossil fuel price you would need to equal the same monthly operating cost as the geothermal system. Example: if you are purchasing electricity at 7 cents per kwh you would need to purchase propane at 41cents per gallon in order to equal the same total monthly cost to heat your home. You'll see that current fossil fuel rates can't come close to offering the same low operating cost of a geothermal system. Compare for yourself and imagine what you could do with the money you will save!

Energy Equivalency Scale

Geothermal $ per electric kWh	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.100
Natural Gas 92% $ per CCF	0.245	0.330	0.410	0.495	0.580	0.656	0.740	0.830
Propane 92% $ per gallon	0.175	0.235	0.295	0.350	0.410	0.470	0.530	0.590
Fuel Oil $ per gallon	0.250	0.330	0.415	0.500	0.585	0.670	0.750	0.835
Air Source Heat Pump $ per electric kWh	0.015	0.020	0.025	0.030	0.035	0.040	0.045	0.050

Think: Comfort

A home is more than the sum of the walls that define it. A home is a concept, an idea, a feeling...

Home is where we go after a hard day's work to be with our family. It's a place where we relax, unwind, and enjoy life.

The temperature inside your home is one of the largest factors that affect the comfort in your home. More so than an old couch, or a paint color you don't like; being too cold in the winter, or too warm in the summer affects how much you enjoy your home more than any other factor.

However, a GeoComfort Geothermal Heating and Cooling system can take all the effort and worry out of keeping your home comfortable.

Using advanced, natural technology, GeoComfort systems provide constant and even temperatures through all areas of your home.

For more information on how a GeoComfort System can change the way you think about comfort, visit www.geocomfort.com today!

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