

Earth To Air
www.earthtoair.com

About Earth To Air Systems

Earth To Air Systems, LLC (ETA) was founded in 2002, in Franklin, TN, USA to develop, patent, and market direct exchange (“DX”) geothermal heating and cooling technologies.

DX technology is an industry term used to describe geothermal heating/cooling systems that do not require an intermediary water exchange loop, as do water-source geothermal systems. By utilizing innovative and proprietary approaches to solve what many believed to be irreconcilable problems, ETA has shattered major hurdles typically associated with geothermal heating and cooling systems.

ETA DX technologies have not only proven to operate at the highest known levels of efficiency, but can also require 20% to 50% less excavated area than properly installed conventional water-source geothermal technologies.

ETA designs utilize the most advanced components known to exist... including the environmentally friendly R-410A refrigerant. More importantly, ETA geothermal technologies can be installed for virtually any application... in almost any environment.

With the introduction of ETA technology, realizing ultimate levels of comfort, efficiency, and safety has never been more achievable.

How Geothermal Works

Basically, geothermal heating/cooling systems operate via sub-surface conductive heat transfer, using the naturally renewable temperature of the earth's crust as a heat source in the winter, and as a heat sink in the summer.

Cooling Mode Operation

In the cooling mode, the hot refrigerant (well over 100 degrees F) exiting the compressor is sent directly into the approximate 50 to 60 degree F range deep earth, which now absorbs and takes the heat away. The cooled refrigerant fluid is then circulated through the air handler where it absorbs and removes unwanted heat from the interior air. The heated refrigerant travels to the ETA system's compressor where the process is repeated. Thus, in the cooling mode, the ground removes your heat for free.

Heating Mode Operation

In the heating mode, approximate 50 to 60 degree F range naturally occurring heat from deep within the earth travels to, and is absorbed by, a much colder refrigerant fluid that is circulated within the copper tubing inside a deep well/borehole. Such naturally occurring heat is transported by the refrigerant fluid to the system's compressor where the fluid is compressed, thereby raising its pressure and temperature, transforming the 55 degree F temperature into a temperature well over 100 degrees F. The hot refrigerant is then circulated through the finned tubing within an air handler, where the cold return interior air absorbs the heat. The heated air is supplied, via a fan, to the interior air space. With the heat now removed from the refrigerant fluid, it becomes very cold and is re-circulated into the ground to absorb more naturally occurring and renewable heat. Thus, the ground supplies your heat for free.

Hot Water Heating

Utilizing the ETA geothermal system's optional Hot Water Pre-Heater (HWPH), the system can also produce virtually free hot water. Capturing excess heat in the refrigerant, this module can typically provide about 50% of the total hot water needs for an average home or business. Additionally, the ETA system can be designed to solely provide heat for low-cost hot water generation for hot tubs, swimming pools, or for in-floor hydronic heating purposes.

ETA units can be specifically designed to solely heat water for residential, commercial, and industrial applications at a fraction of the cost of conventional methods.

Technology Benefits

ETA Geothermal Technologies are believed to be unrivaled in terms of efficiency, comfort, and aesthetics.

Efficiency

ETA technologies have attained the highest known efficiency ratings for a single-speed compressor unit under comparable strenuous test conditions. These ultra-high efficiencies can have a material positive impact on your heating/cooling expenditures. A properly installed ETA geothermal system can reduce conventional annual heating and cooling expenses 40% to 80%.

Comfort

ETA geothermal technologies provide ultimate levels of comfort in both heating and cooling modes. While the outside air temperatures significantly fluctuate, the deep ground temperature remains relatively constant. ETA systems take advantage of this physical principal to provide cool-crisp air in the summer (typically 48-58F) and warm comfortable air in the winter (typically 90 - 100F).

Appearance

Noisy outdoor equipment is a thing of the past when you install an ETA geothermal system. ETA systems utilize copper ground source heat exchangers ("GSHE") that are deeply buried in the ground. Once installed, no one can see or hear the advanced GSHE hard at work beneath the surface. ETA's designer stainless steel compressor unit makes about as much noise as a household refrigerator and can be placed indoors or outdoors.

Geothermal Installation Techniques

Deep Well (Closed Loop Vertical) Direct Exchange (“DWDX”)

One of the greatest benefits of ETA’s patented geothermal technology is the fact that deep wells can now be utilized at depths from 100’ to 300’ per hole for a DX system, which requires less ground area exposure than a water-source system. The high cost and extensive drilling requirements for traditional water-source vertical ground loops have been one of the major hurdles to overcome when considering the installation of a geothermal system. Water-source technologies can require up to 250 feet of borehole depth per ton of design capacity. ETA’s DX technology generally requires only 100 - 120 feet of depth per ton of design capacity.

Further, with the ETA system, the need for multiple small (50’ to 75’) wells in older, R-22 based, DX system designs are eliminated. For example, instead of having to use six 50’ wells, the ETA technology only requires one 300’ well to be installed. Such an ability to reduce borehole numbers, and to operate at significantly greater depths than older, first generation, DX designs, decreases installation time and expense, and increases geothermal heat transfer stability since near-surface temperature fluctuations caused by atmospheric conditions are no longer a significant factor.

ETA Deep Well Direct Exchange (“DWDX”) System Installation Procedure

Step 1 - Deep well is drilled by licensed contractor.

Step 2 - ETA “seamless” ground loop is installed into the deep well, along with a ‘trimmie tube’ which will be used to transfer cementitious grout to seal up the well.

Step 3 - Deep well is grouted, from the bottom up, with Grout 111. Grout 111 was developed by Brookhaven National Laboratories specifically for geothermal applications. Unlike other grouting materials, Grout 111 is virtually water impermeable, is shrink resistant, is crack resistant, and boasts the highest known heat conductivity of any other known grout in existence. By utilizing this material, and grouting from the bottom up, your installer is providing a total seal around the well. This both protects the copper tubing and provides a safe sealant to prevent the cross-contamination of underground aquifers at varying depths.

Step 4 - A shallow trench is excavated to bury the copper tubing that will be used to connect the deep well to the compressor unit, which unit can be positioned either inside or outside your home or business.

Step 5 - The copper heat exchange loops within the well(s) are connected to the ETA compressor unit and to the interior air handler.

A DWDX system is generally the most efficient design, as the majority of geothermal heat transfer occurs at depths unaffected by near-surface atmospheric temperature fluctuations. Atmospheric conditions can affect ground temperatures down to about 65.5 feet, or 20 meters of the ground surface.

Other Installation Techniques

In-Ground Installation - When adequate land surface area is available, the copper heat exchange loops can be placed within mostly horizontally oriented trenches, about 4 to 6 feet deep. This installation procedure provides operational efficiencies close to those of a DWDX system, but is typically less costly to install.

In-Water Installation - When adequate water is available, such as a lake, a stream, a bay, or an ocean, subject to obtaining appropriate permits, the copper heat exchange loops can simply be placed under the water. This is typically the most economical installation procedure, which also typically provides operational efficiencies close to those of a DWDX system.

Geothermal and the Environment

ETA is proud to provide consumers with the opportunity to purchase highly efficient products that are 100% environmentally friendly. Copper is a naturally occurring element that has been used in pipe form to convey drinking water for centuries. All sub-surface fluid components are deemed non-hazardous by OSHA Reporting Material Safety Data Sheets, and are deemed safe for sub-surface installation (safe for both ground and ground water) by the United States Environmental Protection Agency. Further, due to its relatively even and low operational energy requirements, the ETA system will help to reduce dependency on foreign and/or expendable energy sources, and will help to reduce electric utility brown-out and black-out concerns.

Unlike other, first generation, DX designs which utilized R-22 or a similar refrigerant, all ETA systems have been engineered to operate on the new R-410A refrigerant. Since R-410A poses absolutely no threat to the earth's ozone layer, it is one of the most environmentally friendly and safest refrigerants to utilize. Further, all R-22 (Freon) systems in the U.S.A., and in other countries adhering to the Montreal Protocol, will be affected by the upcoming phase-out of R-22. Thus, your selection of ETA's R-410A refrigerant system will eliminate this expensive obsolescence concern, which will soon present itself to millions of others.

Energy Independence Option

The ETA system requires such a small amount of power to operate that the use of an ETA heating/cooling system, in conjunction with a renewable electric power source (solar, wind, hydro, etc.) can be economically feasible. Please contact ETA to discuss available options for your specific region/application.

For a complete overview of the ETA technology and the environment please download and read the following articles:

Benefits For The Home

By selecting an ETA geothermal system for your home, you are selecting state-of-the-art equipment providing ultimate levels of comfort and savings. Benefits of installing an ETA unit include:

- * Reduce your heating/cooling expenditures up to 80%.
- * Experience ultimate levels of indoor comfort.
- * Improve aesthetics of your home - ETA technologies have no exposed and noisy outdoor equipment.
- * Increase the re-sale value of your home.

ETA systems can typically be installed within one to two days, exclusive of interior ductwork. Each system will typically only require several trenches and/or one to two 5" -6" inch diameter boreholes drilled to depths of 300 feet or less. Once the holes have been drilled, the refrigerant transport copper tubing is inserted, and the remaining empty space is typically filled with a specially designed heat conductive and protective cementitious grout. The refrigerant tubing is hidden/buried within a trench from the borehole to the structure, where it is simply connected to the compressor unit and air handler.

When sufficient land surface area is available, the system may be mostly installed within only several trenches situated below the frost/heat line. The system is then charged with a safe and environmentally friendly R-410A refrigerant, that is not on the obsolescence/phase-out list (as is Freon/R-22), so as to be ready for operation.

The compressor unit makes about as much noise as a refrigerator when running and is typically quieter than an electric fan. There is no unsightly and noisy outdoor unit. In areas near the seashore, there is no exterior equipment subjected to corrosive salt-water air.

Benefits For The Office

Space heating, cooling, and hot water heating can represent over 50% of total energy consumption for most commercial buildings. The ability to impact this segment can provide a dramatic reduction in total energy expenditures per square foot.

By selecting ETA geothermal systems for your business, you are selecting state-of-the art equipment providing ultimate levels of comfort and savings.

Benefits of installing ETA include:

- * Dramatic reduction in energy costs per square foot.
- * Increase property rental margins.
- * Hedge against rising energy prices.
- * Superior indoor air comfort impacting employee comfort and health.
- * Ability to decrease square footage of mechanical area via use of compact ETA technology.
- * Ability to eliminate outdoor equipment exposed to weather damage.
- * Increase re-sale value of your business and building property.

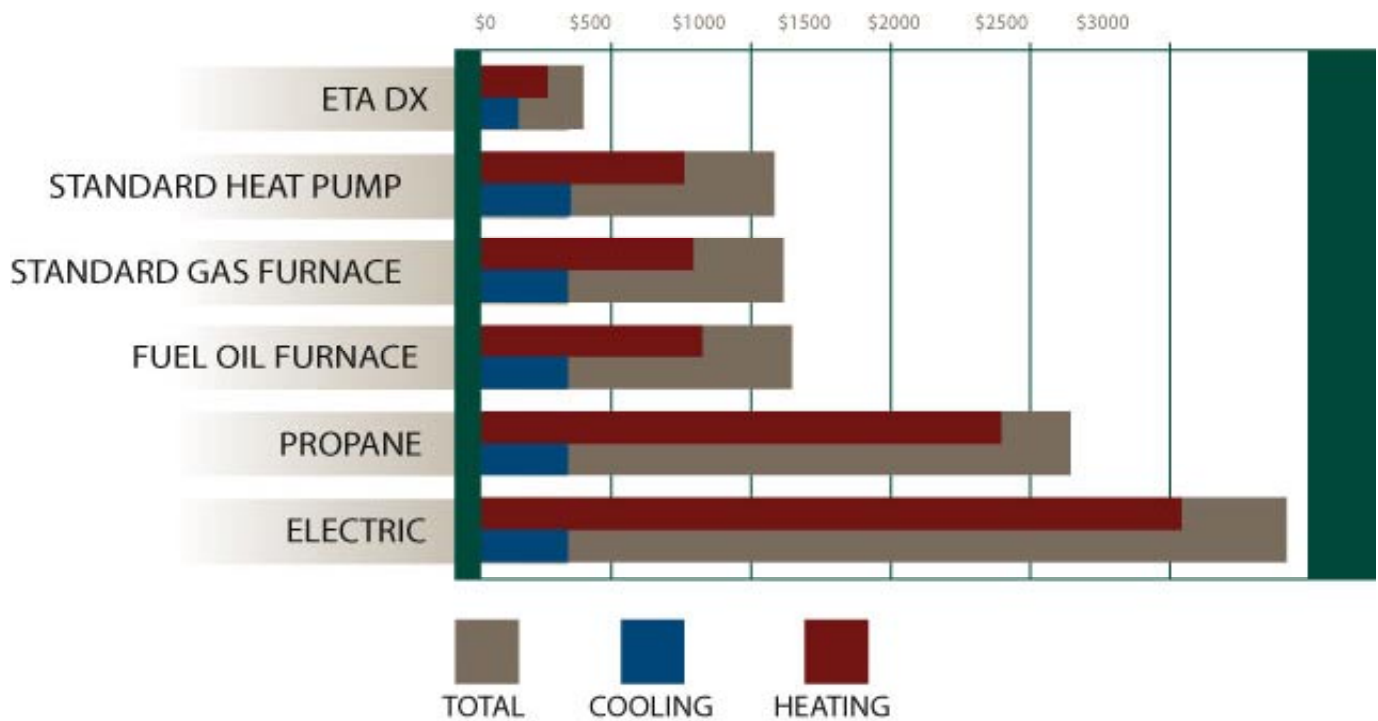
The amount of time it takes to install an ETA geothermal system will depend on the size of the building/project. Projects may take as little as several days, or as much as several months.

The benefits of ETA geothermal systems, when compared to the older water-source geothermal designs include the facts that ETA technologies can require 20% to 50% less excavation than properly installed watersource systems, are more efficient, and require less maintenance. The dramatic decrease in excavation can provide a much more timely installation and preserve a greater amount of land area for other purposes. Boreholes can be installed under parking and driving areas, along the perimeter of the building, under the building, or even in available nearby land areas. Further, ETA technologies do not require the use of water circulation pumps, which can increase available space in your mechanical room and which will totally eliminate broken pump water damage.

Saving money with Earth to Air Systems

Because of its state-of-the-art technology and components, and because of its long-life rugged copper ground loops, ETA's technology may be initially priced higher than a conventional unit. However, a value-conscious individual quickly realizes an ETA system ultimately costs less - significantly less - than a conventional system. In fact, it is quite possible to realize a significant increase in cash flow the first month an ETA geothermal system is utilized.

It is not uncommon to realize a system payback within several years when favorable rebates, tax credits, and financing are available and utilized. As utility rates and fossil fuel costs rise, your savings will only increase and your playback period will accelerate. Further, your selection of the optional Hot Water Pre-Heater ("HWPH") can add additional savings by providing a large portion of your hot water requirements virtually for free. The re-sale value of a home with heating/cooling bills half those of others in the area, and with enhanced comfort levels, is self-explanatory.



Based on a heating load of approximately 4,300 degree days per year, 48,000 BTU load.
Heating/Cooling savings will vary based upon climate and equipment.

Architects and Builders

Energy efficient homes/buildings are becoming one of the leading design/purchase factors for consumers and business owners. Leading builders and architects realize that “minimum major mechanical” is no longer acceptable for new construction. Consumers are now looking just as much, if not more, at the cost of operating heating/cooling systems for their home/building as much as the visible aesthetics. In fact, market data has indicated that consumers are willing to pay a premium for energy efficient technologies.

ETA geothermal technologies can provide your clients with tremendous benefits as you embark upon the design/build process. By specifying and selecting ETA geothermal technologies, you are validating your commitment to provide your clients with the highest efficiency and comfortable technologies available, all with no noisy and unsightly outdoor units.

Benefits your clients will realize:

- * Maximum Comfort. ETA systems provide warm, comfortable heat in the winter that typically is supplied in the 90's to 100's F.
- * No noisy and unsightly outdoor equipment.
- * Extremely low heating/cooling bills.
- * Minimal maintenance and repair expenditures
- * Likely to have higher re-sale value.

Benefits your firm will realize:

- * Marketing benefits. You provide the best system with the maximum savings.
- * Builders may qualify for tax credits/deductions and/or other geothermal system rebates from utility companies.
- * Show commitment to environment. ETA systems are 100% environmentally friendly.
- * Show commitment to building/designing with cutting-edge technologies. ETA systems are state-of-the-art.

Interested in Working with ETA?

HVAC Dealers/Distributors

Earth to Air Systems, LLC (“ETA”) regionalized dealerships and/or distributorships may be available in your area, both in the USA and internationally. If you are interested in promoting ETA’s technology in your region, you are welcome to contact us to discuss terms and conditions. Dealerships/distributorships are potentially available for HVAC contractors, for well drillers, or for entrepreneurs capable and willing to set up and manage an appropriate organization.

Geothermal Installers

ETA is always interested in speaking with qualified and experienced contractors capable of providing services applicable to its geothermal system installations. Specifically, if you are actively involved with any of the following facets of geothermal installation:

- * Deep Well Drilling
- * Grouting with cementitious Grout 111
- * Ground Loop Installation