

# Using ETA Geothermal to Heat Your Home

## Objective -

Provide warm and comfortable heat to your home at the lowest cost.

## Principals Utilized -

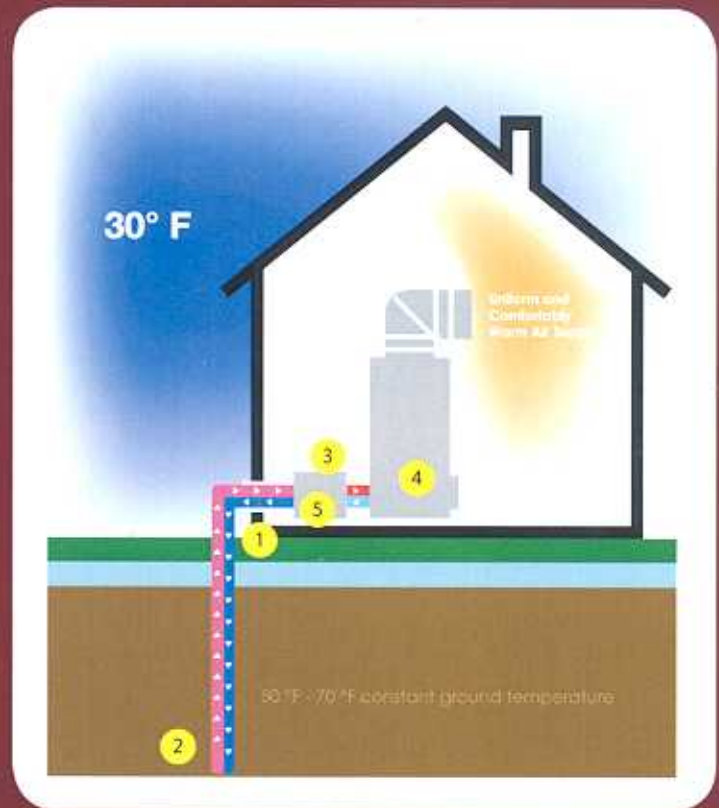
A. Heat will always travel to "cold". The heat from an object will naturally travel to an area with a lower temperature.

B. Any object will transfer heat at some specific rate. The higher the heat transfer rate of an object the faster it will either absorb or reject heat. ETA systems utilize a copper ground source heat exchanger as opposed to polyethylene ("PE") pipe. Copper has 1,000 times better heat transfer than PE, which provides ETA technology with a far greater heat transfer advantage within the underground geology. This means ETA systems need less excavation.

C. Expanding a refrigerant fluid will cause its temperature to drop.

D. Compressing a refrigerant vapor will cause its temperature to rise.

Note: A raised letter (e.g. <sup>B</sup>) refer to the corresponding principals outlined above.



**1. ETA's geothermal unit sends an environmentally friendly cold refrigerant into a patented copper (<sup>B</sup>) based ground source heat exchanger ("CGSHE").**

R-410A, the new environmentally friendly refrigerant leaves the ETA geothermal unit as a cold liquid, and is then circulated into the ground through ETA's patented CGSHE.

**2. Earth naturally provides heat to refrigerant.**

Heat from the earth, which is warmer than the temperature of the refrigerant, is naturally absorbed by the cold refrigerant. (<sup>A</sup>) The cold liquid refrigerant becomes warmer as it absorbs the earth's renewable heat.

**3. Efficient "phase-change" occurs.**

As the refrigerant absorbs enough heat, a powerful phase-change occurs. This phase change results in the refrigerant changing from a cool liquid to a warmer vapor refrigerant.

**4. Naturally warmed refrigerant sent back through ETA geothermal unit.**

The warmed vapor refrigerant travels back through the ETA geothermal unit and is compressed into a hot vapor refrigerant. (<sup>D</sup>)

**5. Heat provided to your home's air supply.**

The hot vapor refrigerant is sent to the air handling unit. The cool return air from your home is sent through the air handler where it is blown over the hot vapor refrigerant. This results in the heat from the hot vapor refrigerant being absorbed by the cooler return air. (<sup>A</sup>)

As the cool feeling return air in your home absorbs heat, the resulting warm and comfortable air is supplied back to your home. After providing heat to the air supplied to your home, the hot vapor refrigerant cools and experiences another phase change. The hot/warm vapor refrigerant becomes a cool/cold liquid refrigerant and is sent back through the ETA geothermal unit into the warm ground.

This process is repeated until your desired indoor air temperature is achieved, with the earth freely providing the actual heating work.

ETA geothermal systems can also be utilized to heat water as part of a residential radiant system. Using ETA geothermal technologies as part of your radiant design is much more efficient than conventional electric or fossil fuel based designs. ETA systems can also heat your pool at a fraction of the cost of traditional systems.



# Using ETA Geothermal to Cool Your Home

## Objective -

Provide cool and comfortable air to your home at the lowest cost.

## Principals Utilized -

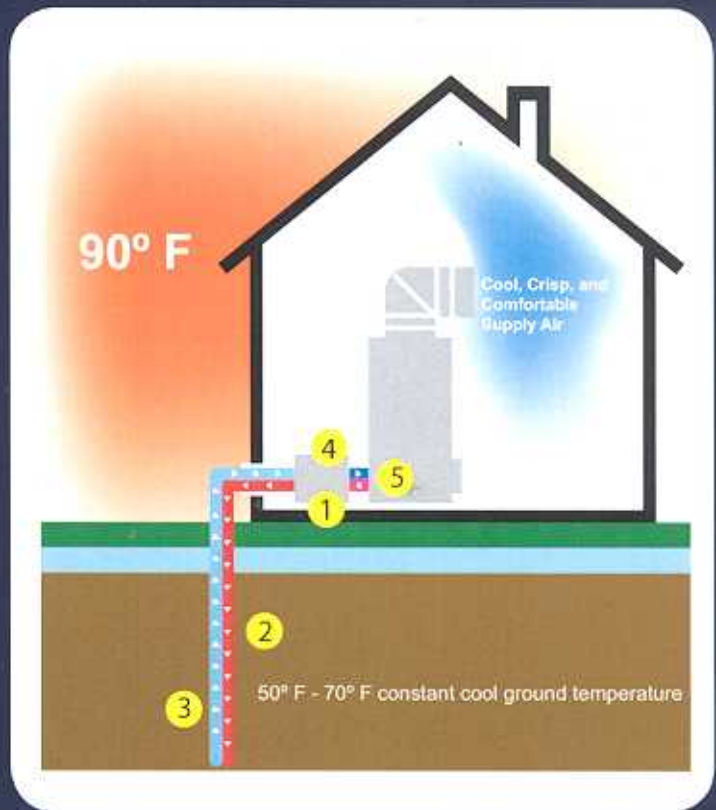
A. Heat will always travel to "cold". Heat from an object will naturally travel to an area with a lower temperature.

B. Any object will transfer heat at some specific rate. The higher the heat transfer rate of an object the faster it will either absorb or reject heat. ETA systems utilize a copper ground source heat exchanger as opposed to polyethylene ("PE") pipe. Copper has 1,000 times better heat transfer than PE, which provides ETA technology with a far greater heat transfer advantage within the underground geology. This means ETA systems need less excavation.

C. Expanding a refrigerant fluid will cause its temperature to drop.

D. Compressing a refrigerant vapor will cause its temperature to rise.

Note: A raised letter (e.g. B) refer to the corresponding principals outlined above.



1. ETA geothermal unit sends an environmentally friendly hot refrigerant (R-410A) into a patented copper (B) ground source heat exchanger ("CGSHE").

2. The earth naturally removes heat from the refrigerant.

The temperature of the earth is much colder than the hot refrigerant. This results in the earth naturally absorbing and removing the heat from the refrigerant (A).

3. Efficient "phase-change" occurs.

As the heat is removed from the refrigerant it becomes much colder and changes into a cool liquid refrigerant.

4. Naturally cooled refrigerant sent back through ETA geothermal unit.

The cool liquid refrigerant travels back through the ETA geothermal unit and is sent to an expansion device (C), which further reduces the refrigerant temperature.

5. Heat from your home is removed.

After traveling through the expansion device, the cold refrigerant is sent through the air handler. The warm return air in your home is blown over the cold liquid refrigerant containment tubing in the air handler. This results in the heat from your home being absorbed by, and removed from, the cold refrigerant in the air handler (A).

As the heat is removed from the hot air in your home, cool and crisp air supplied back to your home in its place. As the cold liquid refrigerant absorbs the heat from your home, it warms up and experiences another phase change. The cooled liquid refrigerant becomes a warm vapor refrigerant and is sent back to the ETA geothermal unit. The warm vapor is compressed (D), with the resulting hot gas being sent back into the cooler earth.

This process is repeated until your desired indoor air temperature is achieved with the earth freely providing the actual cooling work.

Distributed and Installed by:  
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