



A New Paradigm for GeoExchange retrofits



Background

Typical GeoExchangeK systems locate all the equipment inside the house except the ground loop --

protecting the compressor from the elements and eliminating freezing, thawing, corrosion, and defrost cycles. While resulting in many benefits, this configuration complicates the retrofit of older homes with GeoExchange systems, since the ground loop must be piped inside the house. This leads to extra expense and can cause disruption to landscaping. In addition, it sometimes is hard to get a replacement unit through the house to where it is to be installed. ClimateMaster of Oklahoma City, Oklahoma, has introduced its new Paradigm system to address some of these retrofit difficulties.

Paradigm provides a simpler way to retrofit homes with geothermal technology. The Paradigm system has an outdoor compressor unit that replaces the outdoor unit of an existing air-source heat pump or central air conditioner. The outdoor unit houses the ground loop fluid-to-refrigerant heat exchanger, pump module, compressor, and expansion valve.

The Paradigm's outdoor unit does not use a condenser fan and, therefore, can be sealed and insulated to reduce noise and exposure to the elements. The unit can also be installed inside the house in the basement, garage, closet, utility room, or attic.

Another benefit of the Paradigm that will help it capture more of the residential retrofit market is the fact that it can be installed in less than a day. In many cases, a

customer without air conditioning can be back in service within hours given a bit of temporary assistance from the domestic water supply.

According to Linn Vick, owner of Air-O Heat and Air, "An easy sale and extremely quick installation are what we have been experiencing with the Paradigm outdoor split product." Mr. Vick adds, "in most cases, our three-man crews can complete two 3-ton retrofits in a single day including the loops. The Paradigm is the way to go." Air-O Heat and Air installed nearly 150 GeoExchange systems in 1996 and anticipates more than 300 installations in 1997 now that the company has added Paradigm to the products it offers.

In Position to Capture a Larger Market

ClimateMaster considered a variety of factors when conceiving the new Paradigm system. ClimateMaster's Executive Vice President Daniel Ellis notes that "the concept represents a radical change, a paradigm shift, from current practice in the geothermal industry. Many of the intrinsic problems it solves have become accepted and are generally overlooked. While some participants may not immediately comprehend the Paradigm's true potential, I believe the whole industry will eventually move towards this type of system."

The installation ease and reduced cost of the Paradigm system helps expand the largely untapped retrofit and replacement market to GeoExchange technology. Nearly 5.8 million unitary air conditioners and heat pump units were shipped by U.S. manufacturers in 1996. Over half were installed in residential replacement applications. The GeoExchange industry

now has a product suited for this profitable market.

Electric utilities are also encouraged by the new market opportunities created by the Paradigm. According to Randy Jarvis, Manager of Marketing at Central Electric Cooperative in Stillwater, Oklahoma, the GeoExchange split system makes more of their electric customers potential GeoExchange users. "We consider a ground-source heat pump split system, at an affordable price, a major breakthrough. We have been working hard for a number of years to get more of our 14,000 customers to use ground-source heat pumps. We feel, in most cases, that ground-source heat pumps are the most economical way to heat and cool."

The Paradigm system has successfully retrofitted existing natural gas heating systems. "In many cases, we can retain all of the existing indoor equipment, and just tie into it," says Mr. Ellis. Only the indoor coil might need to be changed on an existing furnace or possibly the air handler on an older heat pump.

By using a gas furnace as the blower and supplemental heat, the Paradigm removes a major consumer barrier in that GeoExchange has traditionally compelled an all-electric home decision. A gas furnace add-on application also allows the option of sizing the GeoExchange system to the cooling load rather than the heating load, which can further reduce installation costs in northern locations.

Two Oklahoma City Retrofits

The Taussig residence in Oklahoma City, Oklahoma, offers an example of a Paradigm residential retrofit application. The Taussig's replaced their old gas-fired heating and electric air conditioning system with a new Paradigm system in November 1996. Sylvia Taussig says that with the old system, "I would either be hot or

cold and kept going to the thermostat to see if someone had turned it up or down." Sylvia notes, "the Paradigm system provides much more consistent comfort."

Since this is the Taussig's first winter in the house, utility bills before and after installation of the Paradigm system are not available. However, Table 1 shows the Taussig's estimated heating, cooling, and water heating costs with the Paradigm system compared to those of a propane furnace/electric air conditioning system and an air-source heat pump.

Homeowner Claude Rappaport had three Paradigm units installed in his home in Oklahoma city, Oklahoma, and is very pleased with the savings he has seen since installing the units. "Last month, we had the lowest electric bill since moving into our home ten years ago," states Mr. Rappaport. He went on to add, "and our home is much more comfortable than before, when we were using a gas furnace and an air-to-air unit outside."

Costs and Benefits

By eliminating the need to pipe the ground loop inside the house, the Paradigm system can save the homeowner about \$1,000 in installation fees. In many cases, the existing inside unit can be reused. These two features can trim the cost of a complete GeoExchange system by about 20 to 30 percent. With annual energy savings for a typical home between \$600 and \$1,000, the Paradigm's installation flexibility can reduce the simple payback period by more than three years in some cases.

Air-O Heat and Air of Stillwater, Oklahoma, installed the Taussig's Paradigm system. Based on an outdoor, split-system application, Air-O Heat and Air can generally install a turn-key Paradigm system in the

Stillwater/Oklahoma City area for \$4,995 depending on the type and condition of existing indoor equipment.

Conclusion

Its ease of installation makes the Paradigm a powerful tool for increasing the number of GeoExchange units in the residential retrofit market. With the high volume of conventional units being installed as replacements in existing homes, HVAC contractors will appreciate the ability to offer this segment of the market an affordable GeoExchange option.

More about GHPC

The Geothermal Heat Pump Consortium is a non-profit organization with participation and support from the U.S. Department of Energy, the U.S. Environmental Protection Agency, and the Nation’s utilities. GHPC’s mission is to promote the use of GeoExchange — the most energy-efficient, environmentally-friendly heating and cooling systems available anywhere

All of the GeoExchange manufacturers and many qualified architects, engineers, designers, and installers are members. You’re welcome to join with us too — and at no cost. Call for an application today.

<p>Key Players</p> <p>GeoExchange Heat Pump Manufacturer:</p> <p>Dan Ellis, Ext. 204 Mindy Blackman, Ext. 289 ClimateMaster 7300 SW 44th Street Oklahoma City, OK 73125 Phone: (405) 745-6000</p> <p>Utility:</p> <p>Randy Jarvis, Manager of Marketing Central Rural Electric Cooperative P.O. Box 1809 3304 S. Boomer Road Stillwater, OK 74076-1809 Phone: (405) 372-2884</p> <p>HVAC and Ground Loop Contractor:</p> <p>Linn Vick Air-O Heat and Air 3518 S. Boomer Road Stillwater, OK 74074 Phone: (405) 377-3910</p>

Table 1 - Estimated Operating Cost Summary

System	Annual Heating Cost	Annual Cooling cost	Annual Water Heating Cost	Total Annual Cost	Average Monthly Cost
Paradigm	\$189	\$258	\$228	\$675	\$56
Air Source Heat Pump (10 SEER)	\$380	\$419	\$476	\$1,275	\$106
Gas Furnace/Electric AC	\$653	\$507	\$228	\$1,388	\$116
Propane Furnace (65%) Electric AC	\$1,443	\$507	\$476	\$2,426	\$202

Estimates provided by ClimateMaster. Due to the variability of weather, system installation, and living habits, this analysis should be considered an estimate.