



Hope Crossing Case Study

Hope Crossing is a 217-home development built by Central Oklahoma's Habitat for Humanity (COHfH) in Oklahoma City, Okla. The five-phase project located at NE 83rd and Kelley Avenue, covers 59 acres and features brick, three-bedroom, two-bath homes averaging 1,250 square feet.

A private-sector collaborative team consisting of COHfH, Oklahoma Gas & Electric (OG&E) and Oklahoma City-based geothermal heat pump manufacturer ClimateMaster was formed with the ambitious goal of making Hope Crossing a showcase large-scale demonstration of affordable low-energy housing. It is the largest Habitat for Humanity development in the United States. It will also be the largest ground source heat pump (GSHP) residential development in the country when finished.

All Hope Crossing homes will be certified through the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED), by the efforts of another Oklahoma City-area business, Guaranteed Watt Saver Systems Inc. GWS is donating its third-party validation services. Energy savings from the use of GSHPs, the use of energy-efficient insulation, low-E windows and other measures add points for certification.

Savings in utility costs from energy efficiency will add to disposable

income of Hope Crossing homeowners. OG&E contributed funds to help underwrite the cost of energy-saving improvements at Hope Crossing that included low-E windows, expandable foam insulation, compact fluorescent lighting (CFL) and energy-efficient appliances. The homes all meet OG&E's Positive Energy Standard. OG&E also helped Habitat obtain a \$4,000 Oklahoma State Energy Efficiency Tax Credit on each home. OG&E also inspects the homes and conducts blower door tests.

The project's GSHP systems provide homeowners with year-round comfort in a mixed-humid climate area of the country that presents substantial humidity throughout the year and requires significant heating and cooling. Air-based distribution systems are the norm in the region and most new residential construction use either a central forced-air gas furnace coupled with a split-system air conditioner or a split-system central air-source heat pump and supplemental resistance heat.

Hope Crossing's GSHP systems also provide high-efficiency performance and much lower utility bills, increasing the affordability of the homes. The integration of ground loop pumping and purging valves in the heat pump was planned and designed to control costs and to save on space requirements, equipment cost and field labor. Other cost savings design strategies included the use of

a single 400-foot geothermal loop installed directly under the floor slab in garage areas. Use of this innovative method allowed installation without the separate excavation step to manifold and route the piping to the house needed when using two 200-foot heat exchangers 20-feet apart in the lawn.

The homes in Hope Crossing are being monitored to see how GSHP units and the high-efficiency energy measures perform. Conclusions from information show that total energy reduction of 50 to 75 percent is possible using both GSHPs and the extra energy saving measures OG&E funded.

Project Information

Name and Location:

Hope Crossing
Oklahoma City, Okla.

Housing Type:

This affordable residential housing project utilizes ground source heat pumps, low-energy building construction techniques, and in several experimental homes, on-site solar electricity production to reduce energy consumption by 60 to 80 percent from current practice.

System:

- ClimateMaster Tranquility 20 series GSHPs.
- Single geothermal loop installed at depth of 400 feet.
- Innovative cost saving design for loop under slab in garage near utility closet housing heat pump.
- Heat pump integrated ground loop pumping and purging valves.

"Rather than just a one-time gift of helping somebody out, you are not only doing that, but they get the benefit year after year for the next 20 to 30 years over the life of this system."

Dan Ellis
ClimateMaster



Making Residential GSHP more affordable

The partnership of COHFH with ClimateMaster and OG&E allowed for residential installation of ground source heat pumps in low-income housing and the extra building envelope measures to ensure expected energy efficiency for Hope Crossings homes.

Homeowners in Hope Crossing are expected to save more than \$100 a month on utility energy usage, than that of other Habitat-built homes. OG&E's Ken Grant, managing director of marketing, says the Hope Crossing homes, as a whole, cost less than \$90 per month to cool in the summer

and less than \$100 a month to heat in the winter.

Habitat International CEO Jonathan Reckford said that Habitat homes are becoming more energy efficient. Hope Crossing has a special distinction for setting the tone and path for the rest of the country's Habitat affiliates, he said. "Hope Crossing is going to be the largest green-build Habitat community in the United States when it's completed," Reckford said.

Environmentally, according to Dan Ellis, president of ClimateMaster, the 217 low-energy geothermal homes to

be constructed in the Hope Crossing project will collectively save nearly 1,100 metric tons of CO₂ annually or 22,000 metric tons over a nominal 20-year lifespan, compared to the standard gas homes that COHFH had been building.

Ann Felton, CEO of COHFH, acknowledges that ClimateMaster and many other corporate partners "are stepping up to the plate in a big way" on the Hope Crossing project, and said that she and COHFH are very appreciative for the role ClimateMaster is taking in supporting the project.

Project Goals

- Install GSHP systems in all Hope Crossing homes.
- Reach the lowest energy consumption feasible in all homes by using cost-effective available measures such as insulation and window upgrades, and high-efficiency lighting and appliances.
- Track the energy consumption of all homes to establish a baseline of performance, and install a proportion of "smart" data-recording meters to develop detailed electricity-demand profiles.
- In a limited number of homes, integrate on-site solar photovoltaic (PV) grid connected systems to demonstrate the benefits of zero peak energy (no net grid electricity use during summer peak periods) and eventually zero net energy (no net grid electricity use over a full year.)
- Utilize this large-scale, affordable, low-energy housing demonstration as a market transformation publicity tool, as a platform to generate spin-off projects with other HFHI affiliates and as a means to attract additional COHFH donations.

GSHP Benefits

• Lower utility costs:

The GSHP system is projected to save 50 to 75 percent of the traditional heating and cooling costs.

• Improved comfort:

Residents have the benefit of heating and cooling from the quiet and clean geothermal system.

• Reduced maintenance:

Since there is no outdoor equipment, damage from weather is eliminated. All routine maintenance is performed inside.

• Vandalism:

All equipment is located inside, minimizing the risk of vandalism and theft.

• Environmentally safe:

Meeting new government energy standards, the GSHP refrigerant circuits are precisely sealed at the factory and will seldom require recharging.

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