

SPOTLIGHT

WaterFurnace International, Inc.

Case Study 2

Elementary school teaches lesson in efficiency

Key Features

Square Footage: 39,564

Type of System: Vertical Closed Loop

Number of Units: 36

Total Capacity (HVAC Tons): 123

Educational excellence

One rural Kentucky elementary school is setting a new standard for educational excellence that can't be found in the books or on the boards.

It's in the structure. It's under the floor. It's energy efficiency, and it's a lesson most of us are just beginning to learn.

Paint Lick Elementary School, located in Garrard County, is space conditioned by a geothermal heating and cooling system (also known as GeoExchangeSM). The 300 students who attend Paint Lick are learning in the newly built school that holds the prestige of being the first geothermal school project in the state of Kentucky.

"As educators, we try to encourage our children to make wise use of the environment, and I think this will be something that they (the students) will be able to look back on as adults," said Mary A. Davis, principal of Paint Lick Elementary School.



Paint Lick Elementary, heated and cooled by a 123-ton WaterFurnace system, holds the prestige of being the first geothermal school installation in Kentucky.

Geothermal pilot project

Completed in June of 1992 and opened for the first day of classes on September 8, 1992, the highly efficient Paint Lick Elementary School project was envisioned by the Kentucky Department of Education and East Kentucky Power Cooperative (EKPC) as a "pilot project" for future constructions. The Department of Education's goal was to reduce energy consumption, operating costs and system upkeep.

"We look at each technology and each installation on an individual basis," said Michael Lushcer from the Department of Education. "In this

case, it appeared we were at a point when the technology had caught up with the theory. For that reason, we stepped into a pilot project with some assurances from the utilities and WaterFurnace."

Inter-County Rural Electric Cooperative Corporation (IRECC) and its generation and transmission supplier, East Kentucky Power Cooperative (EKPC), shared the cost of a \$125/ton rebate, which was a total incentive of \$15,375. EKPC and WaterFurnace International, Inc., supplied technical assistance.

"We always have an interest in our end-users, and that interest is that we

want them to have a system with the lowest operating cost possible,” said Leo Hill, IRECC. “And at this time, we know that there isn’t a better system that can do that better than this one (geothermal).”

The 39,564 square-foot facility is space conditioned by a 123-ton WaterFurnace Premier® Series geothermal system, which consists of six 1-ton units, two 2-ton units, 20 3-ton units, two 5-ton units, two 6.5-ton units and four 7.5-ton units.

“In my understanding, we are experiencing glowing results from a cost savings and comfort stand point.”

*—Michael Lushcer,
Department of Education*

Underground heat transfer is achieved via a vertical closed loop pipe configuration, constructed of PE3408 (high density polyethylene pipe). The loop field consists of five sets of 16 vertical loops, 163 feet deep, and four sets of vertical loops, each 188 feet deep.

Key Players

- Facility:** Paint Lick Elementary School Garrard County, KY
- Architect:** Clotfelter-Samokar Architects
- Mechanical and Electrical Engineers:** Kaiser-Taulbee Associates, Inc.
- Electrical Contractor:** Cutter-Pulliam Electric Company
- Loop Contractor:** Climate Controlled Comfort
- Mechanical Contractor:** Green Mechanical Construction
- HVAC Manufacturer:** WaterFurnace International, Inc.
- Utilities:** East Kentucky Power Cooperative
Inter-County Rural Electric Cooperative

System cost/savings

Total project cost was \$2,339,111, which translates into a cost of \$59.12 per square-foot. The WaterFurnace geothermal system cost was \$380,000, which translates into a cost of \$272,887 (\$6.90 per square-foot) for HVAC and \$107,123 (\$2.70 per square-foot) for the ground loop.

The reduction in energy consumption is projected to be 37% to 40%, a savings of 296,000 kWh at a rate of .05/kwh. Other savings are achieved in water, chemicals and general deterioration of the evaporative cooler.

System benefits

In addition to the enhanced comfort levels and energy usage reductions, the system provided the school with several other benefits: the elimination of unsightly outdoor cooling devices and the reduction in mechanical space requirements due to the elimination of boilers and evaporative coolers.

Dr. William Wesley, superintendent of the Garrard County School District, said geothermal provides a financial cost savings in terms of service because alternative systems

Expected Savings

Evaporative cooler fan power	\$750
Evaporated water savings	\$250
Labor	\$1000
Chemicals (tower treatment)	\$250
Geothermal system winter booster energy	\$14,000
(296 kwh at a rate of .05/kwh)	
Total	\$16,250

**Information obtained from Kaiser-Taulbee and Associates Inc., the mechanical and electrical firm for the project.*

are more labor intensive and require continual custodial care.

Design characteristics

The entire pilot for Paint Lick Elementary School included other energy efficient design characteristics, such as efficient lighting, architectural design and energy efficient construction. These, combined with the GeoExchange system, account for the school’s achievement of an Engineering Excellence Award given by the National Society of Professional Engineers (NSPE).

A valuable lesson

Although the children who attend Paint Lick Elementary School may not realize it now, they are learning — and experiencing—a valuable lesson in preserving the environment.

“I think there is no better lesson that a school board can set than to encourage students to protect the ecology of our region,” Wesley said.

As GeoExchange enters the grade school classrooms of today’s youngsters, maybe tomorrow’s leaders will leave a little wiser about energy, ecology and economy, learning a lesson to last a lifetime.