



Lipscomb University's Ezell Center

Case Study



Lipscomb University's Ezell Center is the first university building in Nashville, Tenn., to use geothermal technology for heating and cooling. The 77,000-square-foot academic building, finished and commissioned in 2006, was planned to address the university's concerns over rising energy prices and interest in environmental stewardship.

The Ezell Center contains 21 classrooms, television and radio studios, a missions center to serve the hundreds of people who attend Lipscomb-coordinated mission trips each year, a chapel with an impressive stained glass window and a collaborative learning space. Local civic, business and religious groups also use the building's conference space.

Lipscomb began to research energy-efficient and environmentally

friendly technology after the Nashville Ezell family provided funding for the new academic building. When Lipscomb contacted Nashville Electric Service (NES) Energy Services Manager Jim Purcell about geothermal, he enlisted the help of the Tennessee Valley Authority (TVA). Purcell said NES constantly pushes geothermal but does not have the manpower to facilitate the technology. "We strictly rely on the TVA for geothermal," Purcell said.

The existing partnership between the utilities helped Lipscomb secure an on-site feasibility study and the test bores needed to gage pipe suitability. Thermal conductivity tests were also done to determine energy transfer for a loop field.

Partnering with TVA and the NES helped Lipscomb choose ground source heat pump (GSHP) technology.

That choice set a new Nashville area standard for environmentally friendly technology with the highest energy efficiency available.

Blake Neville, a geothermal consultant with Neville Engineering, designed the loop field to fit under a new softball field to maximize space. The vertical installation required 144 boreholes drilled to a depth of 300 feet. They were spaced 25 feet apart to minimize ground warming and increase the longevity of the system. The zoned system allows for individualized comfort for activities of faculty and students.

Project Information

Name and Location:

Lipscomb University's Ezell Center
Nashville, Tenn.

Building Type:

The Ezell Center at Lipscomb University, a 77,000-square-foot academic building that cost \$10.5 million, is the first university in Nashville's metropolitan area to install geothermal technology.

System:

- 210-ton system
- 94 Trane Tracer Summit heat pumps with 72 heating and cooling zones
- 140 boreholes 25 feet apart drilled to a depth of 300 feet
- Loop field uses two 30-horsepower circulating pumps
- Loop field installed under softball field near the Ezell Center site

"The geo has the absolute best pay back in the industry for any of the alternatives," said Don Johnson, who was Lipscomb's facilities manager at the time Ezell was built."

Don Johnson

Lipscomb facilities manager



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Lipscomb University received the 2009 Governor's Environmental Stewardship Award for excellence in green school higher education. The Tennessee Governor's Environmental Stewardship Awards are the most prestigious environmental and conservation awards in the state.

"It is financially sound," said Don Johnson, Lipscomb's facility manager during Ezell's construction. "We built the Ezell Center with a mechanical system that paid for itself. Return on investment is huge."

The Ezell Center saves Lipscomb \$70,000 to \$90,000 a year in energy costs and paid off the \$1.2 million installation in 16 months through energy and building maintenance savings.

"We got into the sustainability side of it because it goes along with our mission at Lipscomb of conservation of natural resources," Johnson said.

A 20 percent increase in electrical usage costs handed down from the TVA helped push Lipscomb toward GSHPs even though the facility

manager said the technology was still a hard sell with many because of the up front cost.

Federal grant money helped with the expense of Lipscomb's first loop field. When the return on investment was so positive, school officials began considering the technology for other campus projects. Lipscomb has since put GSHP technology into its Burton Health Science Center and its new residence halls, the first in the state of Tennessee to use GSHPs for heating and cooling.

Project Highlights

- Lipscomb designed the Ezell Center using energy-efficient and environmentally friendly techniques.
- The lowest energy consumption feasible is reached through the use of all available methods and technology.
- Lipscomb partnered with its local utility Nashville Electric Service (NES), who partners with the Tennessee Valley Authority (TVA), to assist businesses and institutions interested in geothermal systems.
- The NES and TVA partnership provided Lipscomb access to an on-site feasibility study.
- Test bores and thermal conductivity tests determined pipe suitability and energy transfer capacity for the loop field.
- Lipscomb also expected the partnership to yield technical assistance, a credit on its utility bill and leasing options for the system.

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:

Students and faculty have the benefit of 72 heating and cooling zones.

• 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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