



GEOTHERMAL HEAT PUMP CASE STUDY:

Westwood Hills Nature Center

Nature Center Achieves Net-Zero
Certification With Geothermal Heat
Pump System



Name: Westwood Hills Nature Center's Interpretive Center Building

Location: St. Louis Park, Minnesota

Size:

- 13,500-square-foot, net-zero-designed building
- 32 boreholes drilled 200–250 feet deep into an aquifer
- Nearly 3.5 miles of underground piping
- 1 water-to-water heat pump
- 15 water-to-air heat pumps

Unique Features:

- Borefield located under the parking lot and sidewalk
- 3,000-square-foot radiant floor heated by a water-to-water heat pump
- 122-kW rooftop solar array
- High-performance building envelope
- 9 ceiling fans and operable windows to increase natural ventilation and occupant comfort

Sustainability Results:

- Minnesota's first International Living Future Institute Zero Energy certified commercial building
- Reduces annual energy costs by \$6,750—a 35% savings
- Building envelope provides a 20% energy savings and improves user comfort
- 50-year building life span

The Westwood Hills Nature Center in St. Louis Park, Minnesota, was designed as a net-zero energy building with geothermal heat pumps providing heating and cooling. *Photo from Pete Sieger Photography*

A Hub for Environmental Education

The Interpretive Center building at Westwood Hills Nature Center, run by the City of St. Louis Park, Minnesota, opened July 6, 2020. The net-zero energy designed building—both an educational facility and a community gathering space—is a hub for environmental education, natural history, and recreational activities. Surrounded by 160 acres of marsh, woods, and prairie, the facility offers a haven in the city for people to connect to nature.

Sustainable at Its Core

Environmental stewardship has long been a priority of the city, which was among the first in Minnesota to institute a recycling and compost collection program.

Before breaking ground for the new Interpretive Center building on Earth Day in 2019, a team of four city staff spent four years planning the project with architects, engineers, and city leaders. Together, they decided that balancing electrical consumption and production to achieve a net-zero-energy building was most aligned with the city's commitment to sustainability.

During this time, city staff also met with community members to explain the benefits of a net-zero-designed facility, built to last more than 50 years with minimal maintenance needs. Feedback from these meetings was incorporated into the design where appropriate.

Prioritizing sustainability and energy efficiency in the building's design, project architects and engineers used a combination of passive and active design strategies. Primary among the active strategies was the building's geothermal heat pump (GHP) system.

"Mechanical engineers looked at every possible strategy to reduce the amount of electricity needed to run a building like this in Minnesota's cold climate," said Mark Oestreich, manager of the City of St. Louis Park Nature Center. "Geothermal was one of the strategies we chose that made sense to help us achieve this goal."

System Draws Heat From Aquifer Hundreds of Feet Below

The Interpretive Center's geothermal, closed-loop heat pump system features 32 boreholes drilled vertically nearly 250 feet down into an aquifer. To preserve the native prairie surrounding the building, the borefield is located under the 500-square-foot parking lot and sidewalk.

Nearly 3.5 miles of underground piping circulate 2,500 gallons of 30% propylene glycol water through the geothermal heat pump system. Heating and cooling for the 13,500-square-foot building is provided by 15 water-to-air heat pumps. A single water-to-water heat pump serves the 3,000-square-foot radiant floor.

Net-Zero Certified and 100% Satisfied

The all-electric Interpretive Center received Zero Energy Certification from the International Living Future Institute in 2022, one of the highest energy performance standards a building can achieve.

"The Interpretive Center did a great job of laying the foundation for what our city council expects from our buildings," said Emily Ziring, St. Louis Park sustainability manager. "The center also exemplifies our high standards around climate mitigation and shows us leading by example."



The Westwood Hills Nature Center's Interpretive Center surrounds visitors with educational opportunities—as well as comfort provided by the geothermal heat pump system that heats and cools the air around them and the radiant flooring under their feet. *Photo from Pete Sieger Photography*


In addition to the geothermal heat pump system, active performance strategies that contributed to the building's net-zero certification included daylighting and a 122-kW rooftop solar photovoltaic array. Passive strategies included solar shading and natural ventilation for cooling and thermal mass for heating. The high-performance building envelope reduces energy use by 20% and improves staff and visitor comfort.


Since opening, the Westwood Hills Nature Center has helped thousands of visitors learn about the woods, marsh, and prairie surrounding the Interpretive Center building that, at its heart, represents the City of St. Louis Park's dedication to caring for its residents and ecosystems.



Moving into this building, I thought we'd have to sacrifice some comfort to meet our energy goals, expecting it to be warmer in summer and cooler in winter. But surprisingly, it's been consistently comfortable year-round. ”

Mark Oestreich, Westwood Hills Nature Center Manager, City of St. Louis Park

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