



**Minnesota**  
STATE COLLEGES  
& UNIVERSITIES

DISTRICT 8

PROJECT/REQUEST

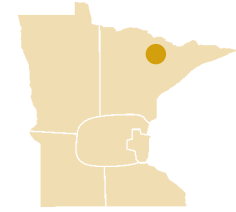
LOCATION

## Northeast Higher Education District

Geothermal Heating & Cooling System

## Vermilion Community College

\$3,400,000



Ely

### Project at a Glance

- Replacement of outdated fossil fuel burning system with a new geothermal heating and cooling system for the college and residential units
- Provide an efficient and less costly means of heating and cooling that fits Vermilion Community College's environmental mission
- Test bores support the installation of geothermal heating and cooling as a cost-effective alternative for replacement of the current heating, ventilation and air conditioning system of oil burners



*A geothermal heating and cooling system will dramatically reduce operating costs and reduce dependence on fossil fuels and escalating market costs for the Vermilion Community College campus.*

### Project Description

Vermilion Community College currently has three boilers. The primary boiler is a Hurst boiler installed in 1998 and burns #2 fuel oil. A small backup boiler, an Iron Fireman, was installed as original equipment in 1971 and also burns #2 fuel oil. A wood boiler was installed in 1985 but has been dormant since 2001; the boiler is inoperable and needs extensive repairs.

Due to the addition of campus building space, only the Hurst boiler has the capacity to meet the heating

load of the entire campus. The boiler is inadequately sized, which means that it operates in low-fire mode, or at less than its capacity, resulting in inadequate stack temperatures. Condensation backs up into the boiler and deteriorates the fire tubes. Last winter alone, 12 fire tubes needed replacement at a cost of more than \$10,000. As a result, this boiler proved unreliable, especially during extremely cold weather. The Iron Fireman boiler serves as a backup during these

incidents; however, it cannot keep up with the demands, resulting in no hot water and unreliable space temperatures.

The boilers are fed by two underground 10,000-gallon fuel oil storage tanks. In 2006, one of the tanks (original in 1971) began leaking and had to be abandoned in place. The remaining tank is five years newer but also is anticipated to have exceeded its life expectancy.

In 2007, Vermilion Community College hired an engineering firm to conduct

a campuswide boiler and HVAC upgrade predesign and review. The college requested as part of that review that the engineers determine the viability of a geothermal system so that the college could uphold its mission and end its reliance on expensive fossil fuels. A test bore drilled in summer 2007 indicated that the soil conductivity was extremely favorable for a geothermal system to provide an economic and environmental benefit to the college.

The costs to move to geothermal would involve:

- Drilling wells to provide the appropriate thermal conductivity: \$1,000,000
- Installing a high-efficiency LP-fired condensing booster boiler: \$700,000
- Installing an automated energy management system to control geothermal heating and cooling: \$300,000
- Expanded chilled water loop for cooling and to provide heat sync capabilities to the geothermal field: \$500,000

### Expected Outcomes:

- Two defined programs in sustainable building operations
- Eliminate almost completely the burning of more than 80,000 gallons of fossil fuel each year
- Reduction of the overall carbon footprint of the college
- Effective management of the heating and cooling of buildings and residence halls, including permitting immediate response to changes in occupancy and room loads
- Become a Minnesota State Colleges and Universities pilot project for renewable-energy buildings

### Participating Institution:

Northeast Higher Education District  
Vermilion Community College  
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### Project Contact:

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### Project Collaborators:

- U.S. Forest Service
- Minnesota Department of Natural Resources
- Wild Life Society, Minnesota Chapter
- International Wolf Center
- Outward Bound
- U.S. Geological Survey
- Society of American Foresters
- North American Wildlife
- Technician Association
- U.S. Border Control



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