U.S. Department of ENERGY | Office of Energy Efficiency & Renewable Energy
Geothermal Technologies Office

GEOTHERMAL HEAT PUMP CASE STUDY:

Colorado Mesa University

90% Geothermal Heated and Cooled

Name: Colorado Mesa University

Location: Grand Junction, Colorado

Size:

- 2.5 miles of central loop pipe
- 450 boreholes drilled 500 feet deep
- 1.2 million square feet of building space
- 16 connected buildings

Unique Features:

- One of the largest geothermal heat pump systems in North America
- The campus's Olympic-sized swimming pool and irrigation system serve as heat sinks for extra heat generated by the geothermal heat pump

Energy Use: 10 kWh per square foot per year

Sustainability Results:

- Reduces CMU's carbon footprint by nearly 18,000 metric tons of carbon dioxide per year
- Saves 14.86 million electric kWh per year
- Saves 705,986 therms per year

Cost Savings:

- $1.5 million in energy costs each year
- $15.9 million since 2008

Funding Sources:

- State of Colorado
- University capital construction

Photo from Colorado Mesa University

University Goes Green With Geothermal

In 2007, Colorado Mesa University (CMU) began planning Dominguez Hall, the university's first new academic building since 2002. To receive state capital construction funding, the building had to be healthy, highly energy efficient, and attain a green building certification.

Campus representatives met with their design teams and determined that the best way to achieve this was to install a geothermal heat pump (GHP) system to heat, ventilate, and cool the building.

From 1 to 16 Buildings and Counting

What started as one borehole field—500 feet beneath campus—connected to one campus building has become four fields connected to an 18-inch diameter pipe that runs from the south end to the north end of campus.

This central loop serves 1.2 million square feet across 16 buildings and connects additional drill fields and buildings.

Maximum Energy Efficiency and Year-Round Comfort

CMU's geothermal heat pump uses cold winters and hot summers to move heating and cooling among buildings and rooms within buildings, maximizing energy efficiency and maintaining year-round comfort.

Heat Beneath Their Feet

Hidden 500 feet beneath CMU's athletic field at the north end of the campus is a district geothermal system. One of the largest in North America, this geothermal heat pump system heats and cools 1.2 million square feet in 16 buildings and saves the university $1.5 million in energy costs each year.

Photo from CMU

If the central loop gets too warm, the extra heat is moved to the campus's Olympic-sized swimming pool and irrigation system, which act as heat sinks.

One of North America's Largest Geothermal Systems

CMU's is one of the largest geothermal heat pump systems in North America. It connects 16 buildings and provides 90% of the energy required to operate the campus.

Future funding will enable CMU to drill additional fields and connect the remaining campus buildings, comprising 800,000 square feet, to the central loop.

Committing to a Sustainable Future

Geothermal technology represents an important part of CMU's sustainability efforts. After the success of the first geothermal heat pump system at Dominguez Hall, the university president and staff made a commitment: Any campus building newly constructed will be connected to the geothermal system.

In another show of commitment to the future, CMU is passing along to students the cost savings resulting from the geothermal heat pump system by offering lower tuition rates and more student scholarships.

> We're at a point where lots of U.S. building HVAC systems need to be replaced. If all we do is tear out the old and put in new old stuff, we're going to kick this energy savings/carbon footprint thing down the road. So instead of buying a new furnace, buy a geothermal heat pump system that will never wear out. The additional upfront cost will be paid back forever and ever after.
>
> Kent Marsh, CMU Vice President for Capital Planning, Sustainability, and Campus Operations

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Visit the Case Studies page to see more examples of geothermal heat pumps in action.

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For more information, visit:
www.energy.gov/eere/geothermal/geothermal-heat-pump-case-studies

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