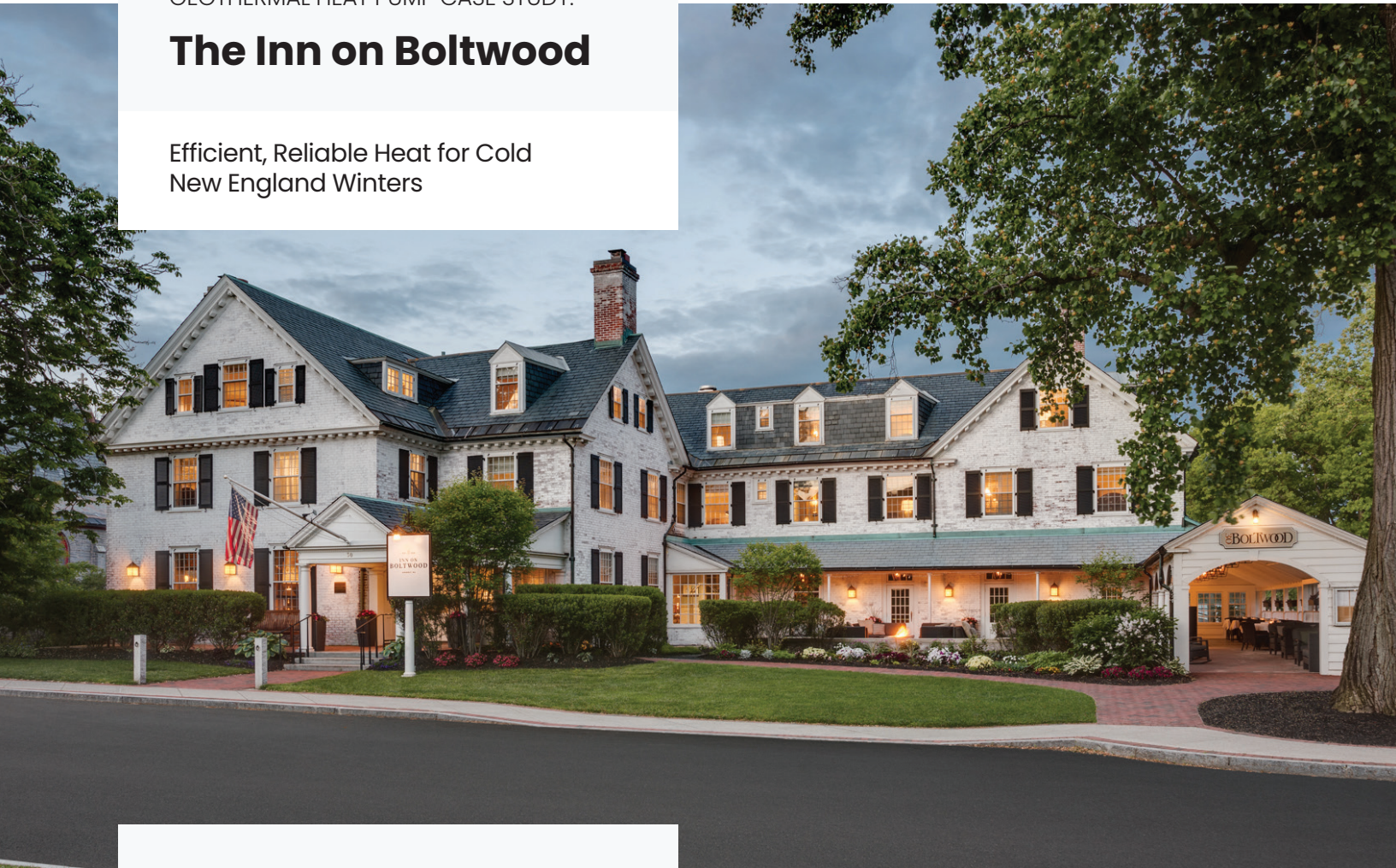




GEOTHERMAL HEAT PUMP CASE STUDY:

The Inn on Boltwood

Efficient, Reliable Heat for Cold
New England Winters



Name: Inn on Boltwood

Location: Amherst, Massachusetts

Year Installed: 2009

Size:

- 46,000 square feet of building space
- 47 boreholes, each 500 feet deep
- 5 heat pumps

Unique Features:

- The system's air handling heat exchangers were a new best practice at the time of the Inn's renovation

Energy Use: 132 Btu per square foot in 2023

The Inn on Boltwood, located in Amherst, Massachusetts, installed a geothermal system for heating and cooling in 2009. *Photo from the Inn on Boltwood*

A Modern Upgrade for a Historic Building

The Inn on Boltwood is a historic hotel located on Amherst's Town Common, and between 2009 and 2011 it underwent a major renovation. Built in 1926, the Inn was not nearly as old as other buildings in the neighborhood, some of which date back to the late 18th century, but by 2009, the Inn was over 80 years old and due for some upgrades.

These upgrades included replacing the Inn's boiler heating system with a closed-loop geothermal heat pump (GHP) system, which would not only heat the building more efficiently during cold New England winters but also make it easier to maintain and repair. The Inn installed 47 geothermal wells 500 feet deep throughout the property. These wells provide the Inn with hot water as well as heating and cooling of the Inn's 49 rooms and suites, along with 8,000 square feet of meeting and event space.



The Inn on Boltwood's geothermal heat pump system heats, cools, and provides hot water for the Inn's 49 guest rooms and 8,000 square feet of meeting and event space.

Photo from the Inn on Boltwood

Versatile Applications

The Inn uses its geothermal heat pump system for a variety of applications. Some heat pumps heat water for bathing and cleaning, while others use refrigerant in separate fan coil units to heat or cool the Inn's individual guest rooms. A final group of heat pumps make hot or cold water for air handling units to heat or cool the Inn's ballroom and other large areas.

As water flows through the system's boreholes, the ground absorbs heat when the water is warmer than the ground and adds heat when the water is cooler. Because the ground temperature at this location is always about 57°F, the Inn's geothermal system offers consistent heating and cooling throughout the year while reducing energy consumption and environmental impact.

Enhanced Resilience and Reliability

Apart from its fireplaces and gas lights, the Inn is now conditioned entirely by geothermal energy. The heat pumps provide a more resilient and reliable heating and cooling system for the Inn. Prior to the renovation, if the Inn's old gas-powered boiler failed, the Inn had no heat. With the Inn's current geothermal system, the heat pumps work in parallel with each other. If one heat pump needs to be turned off for repairs, the others keep operating.

An Inspiring Success Story


The Inn's transition proved to be a successful trial of geothermal energy. The Inn is associated with nearby Amherst College via ownership by the Amherst Inn Company. In 2023, Amherst College followed the Inn's example and began retrofitting its campus's heating and cooling systems from steam to a geothermal system.



Geothermal heat pump systems were already a mature technology when we began the Inn's renovation. As we considered our options, we realized such a system would work well for several reasons: We knew it would be more reliable, easier to maintain and repair, and more energy efficient. ”

Aaron Hayden, Campus Utilities Engineer and Project Manager, Amherst College

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 Visit the [Case Studies page](#) to see more examples of [geothermal heat pumps](#) in action.

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www.energy.gov/eere/geothermal/geothermal-heat-pumps

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