

The Historic Kirkland Hotel



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Ulster County, Kingston, New York

Background

The Tudor-style Kirkland Hotel, in Kingston, New York, was built in 1899. While it was a landmark at the time, the hotel had been dormant and in disrepair since the 1980s. In 2006, the Rural Ulster Preservation Company (RUPCO) began restoration to return the hotel to its original grandeur.

The Challenge

How can the original charm of an old building, with its single-pane windows and both new and refurbished doors, be maintained while keeping interior temperatures comfortable and affordable? With no available ground space, how can this be done without using large condensers, fuel tanks, or individual, unsightly airconditioning units? The answer: a geothermal heat-pump system.

Geothermal technology has been used successfully for more than 50 years. Recent technology improvements have made geothermal systems more efficient design and installation. A geothermal system transfers energy between the steady temperature of the earth and a building to maintain building space conditions. The relatively constant temperature of the ground, approximately 55°F, makes the energy transfer efficient throughout the year, even during the coldest weather. Rather than creating heat by burning fuel, the geothermal system moves thermal energy between the ground and the building using heat-pump technology.

The Answer

Increasingly popular, geothermal ground-source systems provide energy-efficient heating and cooling. Domestic hot water is produced by individual electric water heaters in the apartments, by a gas-fired water heater for the restaurant, and by individual point-of-use water heaters in the office area restrooms. The innovative geothermal system of multiple closed-loop, ground-source wells was installed under the parking lot, with a permeable paver system to address storm water absorption and runoff. Building manager, Chuck Snyder notes that, “Geothermal is the perfect technology to address the past and future. Without it, this project would not have been economically viable.”

With assistance from NYSERDA’s New Construction Program, the installation of a geothermal heat-pump system for the 20,000 square-foot historical restoration eliminated the need for exterior chillers or condensing units. The project provided a cash incentive of \$36,800 and a loan rate that will save the Kirkland Hotel’s owners more than \$142,000 in interest over 10 years.



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The System

The geothermal system in the Kirkland Hotel is a closed-loop vertical bore ground heat exchanger. Water in the building loop piping is pumped through a heat exchanger in each heat pump. In the summer, the fluid absorbs heat from the refrigerant and carries it to the ground through the ground loop piping. In winter, it absorbs heat from the earth through the ground loop, and transfers that heat to the refrigerant. A total of 20 400-foot wells are managed by 20 heat pumps with two variable speed drive pumps. In warm weather, each heat pump brings in water at 60 degrees, and sends it back at 65 degrees. In colder weather, water comes in at 50 degrees and is sent back at 45 degrees.

The Savings

The Kirkland Hotel is being heated and cooled without the use of fossil fuels. For an individual apartment, total utilities cost \$65/month in the summer; heat is projected to cost even less as the heat exchanger becomes an air handler in the colder weather. Total costs to the building owner in the first six months of 2008 have averaged \$1,000/month. Total annual fuel savings are estimated to be \$18,000.

Incentives and Results

NYSERDA's cash incentive of \$36,800, as well as a **New York Energy Smart**SM loan of \$706,469, will help RUPCO defray a portion of the implementation cost of the efficiency improvements. With the 3.72% interest rate, these improvements will result in annual energy cost savings of \$142,000 in interest over the 10-year life of the loan.