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Case Study

Renewable Energy & Recycling

Peppermill Resort Spa Casino Reno, Nevada



One of the Peppermill Resort Spa Casino's three geothermally heated pools. Photo from the Peppermill.

Gambling on Sustainability: Reno's Peppermill Heated with Geothermal Energy

With 1,640 hotel rooms, nine restaurants, three swimming pools, three outdoor spas and countless slot-machines, the 60-acre Peppermill Resort Spa Casino appears at first glance to be a landscape of excess and indulgence. Behind the scenes, however, Reno, Nevada's "Most Eco-Friendly Casino" is all about efficiency and savings, conserving both money and environmental resources through an impressive array of renewable

energy and recycling programs.

The Peppermill is the first and only resort in the United States to heat their entire facility with on-site geothermal wells – saving \$2.2 million dollars per year in natural gas expenses and reducing annual carbon emissions by 12,000 metric tons. Other environmentally friendly practices at the Peppermill include greywater recycling, LED lighting, food waste

KEY FINDINGS

- Use of geothermal heat can lead to significant savings in energy expenditures.
- The cost of constructing a \$9.7 million geothermal heating system was justified by a quick return on investment and long-term savings.
- Feasibility studies can help make the case for undertaking new projects.

BENEFITS

- 100% of heat energy for buildings, pools and hot water for rooms now provided by geothermal wells on property.
- \$2.2 million dollars per year in savings on natural gas consumption.
- Three to four year return-on-investment for recovery of drilling expenses.
- Reduced carbon footprint by 12,000 metric tons.
- Peppermill awarded "Most Eco-Friendly Casino" by *Reno News and Review* in 2012 and 2013.

recycling, cardboard recycling, artificial turf lawns and energy efficient vehicles. The main driver for these programs has been money savings, according to Dean Parker, Executive Facilities Director at the Peppermill. "I'll be honest with you, we weren't thinking about saving the environment when we were doing all this, but it went hand in hand," said Parker. In case after case, the Peppermill has successfully implemented programs in which efficiency and costs savings are coupled with environmental benefits. Sometimes, sustainability pays off.

A Geothermal Solution

The Peppermill opened as a coffee shop and lounge in 1971, and expanded to a small casino and motor lodge by 1980. During the early 1980s, the owners of the Peppermill heard about residential homes in the area that were being heated with shallow geothermal wells, and decided to experiment with geothermal at their resort. "They dug a shallow well – less than 1000 feet deep", explained Parker. "It was used to heat what we call the 'A&G' building and a small outside pool, so it wasn't really used to do much of anything."

By the mid-2000s, the Peppermill had expanded in size several times. During their largest expansion in 2007, the footprint of the buildings was doubled, increasing from 1 million to 2.1 million square feet. The Peppermill's utility bills doubled as well, and Parker began to look for ways to save money. They put \$1 million of improvements into their existing geothermal well and immediately saw a 30 percent reduction in boiler load, meeting their return on investment after only one year and six months, saving the Peppermill close to \$800,000 per year in natural gas. "That really got us going," said Parker.

Once convinced that geothermal energy was a feasible option for the Peppermill,



The Peppermill's production well #8 took 28 days to drill and reaches 4,421 feet deep, into 174°F water. Photo from the Peppermill.

How Does Geothermal Heating Work?

The Peppermill's geothermal system consists of nine wells, only two of which are currently in use. These wells reach deep down below the Peppermill into a geothermal aquifer, an underground layer of water that is warmed by the heat of the earth's mantle.

At the Peppermill, 174°F water is carried up from the aquifer by a 4,421 foot-deep production well. At the surface, this water runs through the Peppermill's geothermal heat exchanger, where heat is transferred. The cooled water is then sent back down to the aquifer at 156°F through a second well, called a reinjection well. Back in the aquifer, the water is quickly rewarmed by the heat of the earth's mantle.

The Peppermill's geothermal heating system is called a closed loop system, meaning that water brought up from the geothermal aquifer remains in pipes and never directly mixes with the drinking water or other water at the surface: only the heat is transferred.

ownership put Parker in charge of the construction of a new set of wells in 2010, including a deep production well. They drilled down 4,421 feet before hitting 174°F degree water – warm enough to meet their needs. The Peppermill began pumping this water to the surface, and using it to heat buildings, pools and hot water for rooms.

The Peppermill's four boilers were taken offline, and by 2013, the Peppermill's monthly natural gas bill had dropped from approximately \$250,000 to less than \$50,000 per month. Today, all of the mechanical and domestic heat on campus is derived from the geothermal wells, with a small amount of natural gas still used for fuel in the restaurant kitchens.



The Peppermill's four boilers once consumed \$2.2 million dollars per year in natural gas. Heating the Peppermill with geothermal energy reduces the Peppermill's CO₂ emissions by 12,000 metric tons per year. Photo from the Peppermill.

Green projects multiply

The success of the Peppermill's geothermal operation drew attention to a multitude of other opportunities for saving money through waste reduction and energy efficiency projects. From reducing water waste to recycling cardboard, guests can now find green projects all over the hotel.

- **Greywater Recycling**

"Big properties that have laundry should have greywater recycling. That's a no-brainer," said Parker. With 1,640 hotel rooms to service, the Peppermill's washing machines run 24 hours per day, processing 3,276 tons of dirty sheets and towels per year. To conserve water and reduce chemical pollution, the Peppermill introduced a laundry greywater recycling program in 2008. The recycling system captures and reuses grey wash water and cost \$185,000 to install. In 2012, the chemical and energy savings from the new system were \$130,208, and water and sewer savings was \$125,396 –

approximately a 7-month return on investment. In addition to savings of more than \$255,600 per year, the greywater laundry recycling system has environmental benefits such as an annual CO₂ emission reduction of 0.3 metric tons, annual wastewater reduction of 11,622,264 gallons, and, annual toxin discharge reduction of 5,808 pounds. Hotel guests are encouraged to participate in conservation efforts as well, by reusing towels and changing bed linens on a request-only basis during each stay.

- **Artificial Grass Turf**

The Peppermill replaced 40,000 square feet of lawn with artificial grass turf and removed 350 sprinkler heads. Not including the cost reductions in labor, fertilizer and lawn mowers required to maintain a grass lawn in Reno's high-desert environment, this change resulted in 4,704,000 gallons per year in water savings, an \$8,000 per year reduction in their water bill, savings of 6,821 kWh per

year in energy and reduction in CO₂ emissions of 4 metric tons

- **Parking Lot Light Replacement**

What could be easier than changing 247 light bulbs? In the Peppermill parking lots, hotel managers replaced 406-watt metal halide lights with 182-watt LED lights – a \$314,650 investment that keeps paying off. After a \$92,000 Sure Bet Incentive from NV Energy, the Peppermill met a 1.7 year return on investment, saving \$125,674 per year in electrical bills, 1,570,927 kWh in energy and reducing their carbon emissions by 515 metric tons per year. Lifetime electrical savings for the Peppermill as a result of LED light installation is estimated to be \$2,082,000, making energy-efficient lighting an easy cost to justify.

- **Soap and Shampoo Recycling**

Working with a program called *Clean the World*, the Peppermill began collecting used soap and shampoo bottles from guests in March of 2012. The program has collected over 41,349 bars of soap and 7,395 bottles of shampoo, which *Clean the World* recycles and distributes to children and families around the world, preventing acute respiratory infections and diarrheal disease. So far, the Peppermill's participation in this program has led to the recycling of 3,684 plastic bottles and the elimination of 15,148 pounds of landfill waste.

- **Electric Vehicles**

The Peppermill purchased three electric cars for the engineering department, which can travel 30-35 miles per hour and last approximately 8 hours per charge. Compared with an average car, electric cars use 600 less gallons of gasoline per year, and reduce CO₂ emissions by approximately 26 metric tons per year.

- **Cardboard Recycling Program**

The Peppermill recycles cardboard packaging and boxes, generating up to five bales of cardboard per week. At 500 pounds per bale, this program keeps a total of 130,000 pounds of cardboard waste out of the landfill each year. Their annual CO₂ reduction as a result of this program is 47 metric tons per year.

- **Food Waste Recycling**

To combat food waste in a hotel casino with 9 restaurants, the Peppermill implemented a food waste recycling program. Restaurants discard food waste into a three-yard dumpster, which is collected five days per week and taken to a facility for composting. Up to 780 cubic yards of food waste is recycled into fertilizer each year.

Awards and Recognition

The Peppermill's extensive sustainability efforts have not gone unnoticed. In the past several years, they have been awarded the "Green Company of the Year" Certificate of Senatorial Recognition from US Senator Dean Heller, and a Certificate of Accommodation from US Senator Harry Reid in recognition of receiving a 2012 Nevada Center for Entrepreneurship and Technology Award. The casino resort was awarded "GreenLeaders Gold Status" by TripAdvisor.com, "Most Eco-Friendly Casino" by the *Reno News and Review* (2012 and 2013), and "Best Eco-Spa" by the SpaFinder Wellness 365 Readers Choice Awards (2013).

Looking Forward

Renewable energy programs cost a lot of money to implement, so they have to make good financial sense from the perspective of the corporation, according to Parker. To decide which projects to implement, Parker does feasibility studies to determine the rate of return on investment, or ROI. "Anything with less

CARBON REDUCTIONS: SUMMARY

The Peppermill has reduced its carbon footprint significantly through renewable energy and recycling programs. Here is a summary of their accomplishments:

CO₂ Emissions Reductions (per year):

- Geothermal Energy: 26,455,473 pounds (12,000 metric tons)
- LED light replacement in parking lots: 1,135,380 pounds (515 metric tons)
- Cardboard recycling: 103,617 pounds (47 metric tons)
- Three electric cars: 34,920 pounds (16 metric tons)
- Artificial grass turf: 9,345 pounds (4 metric tons)
- Laundry greywater recycling system: 668 pounds (0.3 metric tons)

Total CO₂ emissions reduction, per year: 27,739,423 pounds (12,582 metric tons) of CO₂ – the equivalent of taking 2,649 cars off the road for one year!

than a five year ROI is something that we seriously look at," says Parker. "Anything under three years, we consider almost a no-brainer." Recently, they have been selling yellow grease (used cooking oil) to a biodiesel company, and traded out incandescent light bulbs for LED lighting inside their buildings. Ownership, according to Parker, has been extremely happy with the way that his sustainability projects have turned out.

What is next for the Peppermill? "I'm thinking about buying a portable biofuel trailer, and then instead of selling our yellow grease, we'll generate our own biofuel to feed our diesel equipment," said Parker. The Peppermill still has four steam boilers for kitchen dishwashing stations that require 220°F steam, which could be fueled by biodiesel instead of natural gas. The biodiesel could also be used to fuel their heavy snow removal equipment, which is run on diesel.

Parker's advice to other companies in Nevada is to investigate whether geothermal might work for them. Geothermal resources are found throughout the state, but Parker warns,

there can be significant financial risk involved in trying to find and utilize this energy source. There is, however, a 30 percent rebate from the government for geothermal energy projects right now. Of people who haven't yet given geothermal a try, "I don't know why they don't do it," Parker said. "Is it costly? Yes it is. But look at the benefits."

For more information, please contact:

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