



First National Bank of Omaha

400 kW CHP System

Project Overview

In 1999, the First National Bank of Omaha, part of the largest privately owned banking company in the United States, began operating a combined heat and power (CHP) fuel cell at their main computing facility/data center in Omaha, Nebraska. In 2013, as the original system reached the end of its life, First National Bank was happy with their CHP system performance and decided replace the system with a new fuel cell-based CHP system.

The new cell provides the facility's critical electricity needs and recovers useful waste heat. The heat that is produced from the electricity generation is recovered in the form of hot water via a heat exchanger for space heating and melting snow during the winter months. The CHP system provides reliable power to the 195,000 square foot hardened facility where important bank functions are stored and accounted including check and credit card processing for large corporations.

Power Reliability through CHP

Data centers store sensitive, important information for various applications on hundreds of servers. This presents the need for high reliability. Data centers must have continuous operation even in the event of a power outage, and First National Bank of Omaha's data center is no exception. Due to the important information and bank processes stored at this facility, it is critical that the system receives continuous power. A reliability solution needed to be explored for First National's facility after it experienced two power outages prior to the 1999 CHP installation. The outages were detrimental to First National as well as their clients, losing millions of dollars.

When First National acquired their original system in 1999 they opted to purchase redundant capacity in order to insure against any system failure. With two 400 kW systems, one operated as the primary power supply while the second provided backup capacity in the case of the primary system going offline. However, the system was so reliable that when time came to order a replacement First National opted for only one

Quick Facts

LOCATION: Omaha, Nebraska
MARKET SECTOR: Computing Facility / Data Center
TOTAL CHP GENERATING CAPACITY: 400 kW
PRIME MOVER TYPE: Clear Edge PureCell 400 kW Fuel Cell
HEAT RECOVERY RATE: 1 MMBtu/hr hot water
FUEL TYPE: Natural Gas
CHP INSTALLATION COSTS:
 \$3 million
BEGAN OPERATION: Replacement system commissioned November 2013 [original system installed 1999]
FACILITY RELIABILITY FACTOR: 99.9999%
NUMBER OF POWER INTERRUPTIONS: No unscheduled downtime since June 1999



First National Bank of Omaha Computing Facility

PHOTO COURTESY OF First National Bank of Omaha

400 kW system. By reducing the need for backup generation, the increased reliability of fuel cell technology saved First National from purchasing an additional \$3 million unit.

The fuel cell CHP project made sense for the First National Bank of Omaha due to the increased reliability factor, alleviating the concerns of existing and future clientele of First National. When competing for clients, the power reliability of First National Bank is a great asset in the world of online banking and credit card processing.

The facility's power is also supported by two separate utility feeds and three 1,250 kW diesel generators. If one of the utilities were to have a power failure, two of the emergency diesel generators sync with the live utility feed to generate most of the non-critical loads of the facility while the fuel cell maintain power to the critical loads. The diesel generators have an N+1 configuration, meaning that two units are required to carry the electric load with one unit designated as back-up.

According to the most recent study the installed system with the multiple redundancies of power supply is 99.9999% reliable. Beginning with the original systems installed in 1999 and continuing with their newer system installed in 2013, the First National Bank of Omaha has not recorded any downtime due to a power failure.



First National Bank of Omaha's Fuel Cell Room
PHOTO COURTESY OF First National Bank of Omaha

Heat Recovery Integration

A CHP system is an integrated system that is installed at or near a facility, provides at least a portion of the facility's electrical load, and uses the thermal energy for use in the facility. The thermal energy recovered from the fuel cells at First National Bank of Omaha is recovered in the form of hot water via a heat exchanger and is utilized for space heating and snow melting during the winter months and for reheat as part of the dehumidification process during the summer months. The recycled heat during the winter months provides approximately 30% of the facility's space heating needs.



First National Bank of Omaha's Outdoor Courtyard Area Where Snow is Melted

PHOTO COURTESY OF First National Bank of Omaha

"We have had a great experience with the reliability afforded our data center operations since installing our first fuel cells in 1999"

- Brenda Dooley, President, First National Buildings

The waste heat recycled during the winter months that is used to melt snow is applied in a courtyard area and on walkways. Propylene glycol is heated through a heat exchanger and is transferred outdoors, under the concrete in a tubing system, heating the walkways and patio and melting the snow and ice. This snow melting infrastructure increases facility safety and decreases First National's insurance costs.

For More Information

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The Midwest CHP TAP is a U.S. DOE sponsored program managed by the Energy Resources Center located at the University of Illinois of Chicago.