One of two data centers Waste Management operates.

CASE STUDY

Data Center

Facility at a glance

Name
Waste Management Data Center

Location
Austin, TX USA

Facility size
40,385 ft² facility

Issue
Need for replacement air-cooled chiller plants

Solution
Efficient, redundant and reliable cooling with Daikin Pathfinder® air cooled chillers

Putting the "green" into Waste Management data center operations

Data centers continue to evolve and become more efficient. The need for efficient HVAC is essential to ensure cost-effective, reliable operation given servers generate significant amounts of heat. As part of a facility upgrade, Waste Management, headquartered in Houston, Texas, replaced its chiller plants to serve its production data center facility in Austin, one of two data centers the Fortune 250 Company operates.

Over time, it became clear that the two original air-cooled chiller plants in the 2002-built facility needed replacement. "The main thing we noticed is deterioration in the cooling coils of the chillers. Overall, we required more efficiency from the chillers and the pumps," says Brian Kirkpatrick, director of infrastructure operations at Waste Management.

Waste Management performed due diligence to examine HVAC solutions. To do this, they brought in Alcatex, Inc. of Dallas, a Data Center Design Build Specialist. The requirement called for a chiller replacement at N+N, also known as 2N redundancy, suitable to cover 10,250 ft² of raised-floor data center operations, plus office space and a mechanical, electrical and plumbing (MEP) service room. Including the data center space, Waste Management's operations span 40,385 ft² within the 250,000 ft² building.

Redundancy and efficiency

Ultimately, it was determined that Waste Management's requirement for a high level of energy efficiency and reliability in a cost-effective solution. Waste Management selected two Daikin 400-ton Pathfinder air-cooled chillers with the highest efficiency available at the premium level. In addition, the chiller plant includes variable frequency drives (VFD) that add a high power-factor rating without the use of capacitors.

"This solution met our specification for a redundant solution at the 2N level. Additionally, we have four pumps with VFDs to bring 2N+1 redundancy," says Vernon Williams, data center manager at Waste Management.

"The Daikin name stands for itself in reliability and efficiency. It's also important for us as a company that products are manufactured in the United States," Kirkpatrick says, noting that once Waste Management saw the estimates for the potential for energy savings and the performance of similar chillers at the plant in Jersey City, it realized the value it would receive for its investment. The project team's discovery also included visiting the factory in Staunton, Virginia to see the new Pathfinder chillers in the test mode.

When Waste Management was choosing a manufacturer and supplier for their chiller replacement project, Kirkpatrick relied heavily on his current partner; Alcatex. Alcatex was already familiar with Daikin Applied and its Service Group. Alcatex, along with Daikin, has supported the data center specialist's managed maintenance service contract with Waste Management at the both the Austin and Houston facilities since 2012 for maintenance of the old chillers, existing computer room air handlers (CRAH) and other HVAC-related equipment. "No other manufacturer could build the chillers as efficiently, "says Kirkpatrick

Planning, communication key

Replacement of such large chiller units requires heavy lifting — each Pathfinder weighs approximately 12 tons — and significant planning to keep the data center fully operational. "The level of risk to keep our production data center operational during the chiller plant replacement process meant contingency planning." Gautam Roy, VP of IT demanded.

During the hot Texas heat in summer 2014, installation of the chillers was phased to maintain complete functionality of the data center. Installation took place within two few-hour segments over weekends in June and July 2014. Pre-connections were made in advance so the actual hook-up of each chiller took hours. "During each installation, we made system pump replacements, adding new pumps with VFD drives as well." Additional plumbing and electrical work was completed within a few days following each chiller installation.

The chiller plants were lifted in and out by crane from the walled service yard which is dedicated to Waste Management's operations at the building. Overhead piping and other space constraints meant the first replacement to remove the old chiller and install the new units required that a segment of the concrete wall be cut out temporarily. "One of the existing chillers was kept running while we made the first replacement in addition to the installation of a temporary rental chiller," Williams explains.

A temporary rental 300-ton chiller which was used as a reserve chiller during the decommissioning of the first existing chiller. "Should something have happened during the replacement, we had the temporary chiller trailer-mounted with dual pumps available on site as a redundant system to bring back operations as quickly as possible," Williams says.

Redundant chilled water piping to the data room floor was also made in June. "If a loop failure in the supply pipe were to occur, there was no way to restore cooling so we added a secondary feed, a B loop in the data floor, which was requested by Waste Management for redundancy," Morgenroth says.

Each chiller replacement was a success. "The level of redundancy we had available during the change-out and the level of collaboration among all parties was remarkable. We didn't lose a single minute of downtime," Kirkpatrick says.

In addition, throughout the life of the Pathfinder chillers, Rapid Restore® technology and a fast loading option ensures uptime. "In the remote chance there is a power outage that's not handled by the back-up power supply, RapidRestore brings back the chiller to full performance within three to five minutes," Kirkpatrick says.

The Building Team

Director of Infrastructure: Brian Kirkpatrick
Facility Manager Houston: Vernon Williams
Facility Manager Austin: Robert Holmes
Project Manager: Carlton Griffis, Alcatex, Inc.
Daikin Applied Service Sales Rep: Kenneth Morgenroth

"No other manufacturer could build the chillers as efficiently as Daikin Applied could. We also chose Daikin Applied because of their Service Group. If you don't have a good service organization, you are dead in the water."

Brian Kirkpatrick, Waste Management Director

The tech refresh at the Austin data center also encompassed a major upgrade to the building automation system (BAS). "A number of control systems by different manufacturers were integrated into the existing infrastructure. We replaced the former chiller controls to the ASHRAE-standard BACnet® controllers on the Daikin Applied chillers." Says Kirkpatrik.

Kirkpatrick says upfront planning among all parties and pre-wiring prior to the first change-out of the old chiller before the first chiller went online kept the data center operational during the replacement process.

"We used the Tridium Niagara Framework as the software platform for integrating a number of systems on new Distech front-end BAS controls," Williams says, noting the chillers are controlled through the new BAS as well as access via wall-mounted master control panels.

The data center's existing Eaton Foreseer software that allows Waste Management to monitor its power and energy usage remains in place. Additionally, new CRAH units by Liebert also incorporate the manufacturer's Site Scan web centralized monitoring and control system.

Savings to bank on

Since the chiller replacement was completed in July and the pumps in August 2014, the energy savings have been dramatic. "We're seeing about a 100 kWh drop in monthly power utilization which is about a 10 percent reduction in our usage overall at the facility, attributable to the new chillers, pumps and CRAH units when compared to the former chillers," Williams says.

Waste Management predicts its annual savings on straight energy usage translates to approximately 11.3% or greater, along with a power factor correction savings, resulting in combined savings of more than 13.2% annually. "Our power factor was low at 0.75 and it has improved considerably to 0.88," Williams says.

Williams says the chiller plants at the Austin data center have also contributed to the facility's improvement of its Power Utilization Effectiveness (PUE) rate which is currently 1.54.

Growing with data center infrastructure

"The Daikin Applied VFD technology takes a lot of strain off the grid infrastructure at the Waste Management data center," concludes Kirkpatrick of WM. "We plan to apply more of their technology across the nation. I can't wait to see more of these online."

"We would like to express our appreciation for the collaboration between Waste Management and our vendors for a flawless project with zero downtime!"

Gautam Roy, Vice-President of IT

Award-winning "green" leadership

In 2011, Waste Management received a Green Technology World Leadership Award by publisher TMC for its environmentally-sustainable technology. The award recognized initiatives at its data centers that include making temperature and humidity level adjustments and use of low-consumption servers, network and storage devices. "As an IT strategy, every year we get better to build on that award," says Brian Kirkpatrick, director of infrastructure operations at Waste Management.

Each Daikin 400-ton chiller plant, with a premium performance configuration, contributes to low energy consumption and a greener environment with these features:

- Variable frequency drives (VFDs) to improve part-load energy efficiency and reduce demand on back-up systems
- Integrated Part load Value at 19.2 EER (Energy Efficiency Ratio) (confirmed for these units by HTS Engineering)
- Responsible refrigerant management

In addition, as an option for building owners, the Pathfinder chillers support points for Leadership in Energy and Environmental Design (LEED®) green building certification by the U.S. Green Building Council.