

NOVEMBER/DECEMBER 2013



Walmart Harvests Waste Heat at Chicago Superstore

The global retailer pilots a new mechanical system to turn waste heat into energy-efficient heating and cooling

By Matt Alderton

Chatham, a middle-class neighborhood on the South Side of Chicago, is now home to one of approximately three dozen “high-efficiency” Walmart stores nationwide. The superstore is a living laboratory in which the retail behemoth is testing a number of leading-edge sustainability efforts, the most notable of which is an integrated HVAC and refrigeration system that uses waste heat from refrigerated grocery cases to heat the facility.

“Walmart has always designed highly efficient buildings,” says Scott Webb, principal of MPW Engineering, the Tulsa, Oklahoma-based MEP engineering firm that designed the integrated system. “This particular store is even more energy-efficient than a typical store ... [thanks to] the heating, air-conditioning, and refrigeration system.”

According to Webb, the system uses a closed water loop to capture rejected heat from the refrigeration equipment in the store’s grocery cases and walk-in freezers and coolers. The process captures heat that is removed from products that are coming in to be cooled, then transfers that heat to be used in other parts of the store as space heating. “That cuts down drastically on the natural gas, electricity, and other fuel sources needed to heat and cool the store,” Webb says.

In addition to the closed water loop, the system features three 100-ton fluid coolers, three 5,000-cfm air-handling dehumidification units, and a factory-built house pump that contains three 15-HP pumps, plus all of the system controls. Swedish company Munters—whose DryCool commercial dehumidifiers use environmentally friendly R-410A refrigerant to conserve energy—provided and designed much of the store’s mechanical equipment. “If condensation starts forming on the refrigerated cases and freezers, defrost heaters have to burn in order to take that off,” Webb says. “So if you can keep the interior space of the store at a lower humidity, you can reduce the amount of energy consumed by defrost heaters.”

“With the number of stores and combined square footage, Walmart is one of the biggest private energy consumers in the world. When they make changes in their systems that lower energy consumption, it has a huge impact.”
SCOTT WEBB, MPW ENGINEERING

The Chatham store opened in January 2012, but it’s still too early to tell whether its integrated mechanical system is a winner for the rest of Walmart’s stores. “We test things and we pilot things,” says Don Moseley, Walmart’s director of sustainable facilities. “And when things show the type of return on investment we think we need and that our maintenance people are able to maintain them in a good, efficient manner, we incorporate them into our prototypical program. This store’s integrated mechanical and refrigeration system is still being studied and analyzed in order to determine if it’s the best business decision for us to put it in our new-store program going forward.”

When a new technology eventually does graduate from pilot to prototype, its environmental impact is significant due to Walmart’s enormous footprint. “With the number of stores and combined square footage, Walmart is one of the biggest private

energy consumers in the world,” Webb says. “When they make changes in their systems that lower energy consumption, it has a huge impact.”

Case in point: Walmart tested using LED lighting for its freezer and doored cases in 2005. The company made it part of the Walmart prototype a year later, and Moseley says that today a customer would be hard-pressed to find a case that had anything in it other than LED lights. In fact, today, all new Walmarts have refrigerated cases with LED lighting, including Chatham, which also boasts several other sustainable features. Inside, skylights provide natural lighting on the sales floor and in the stock room, such that the store often can dim, and sometimes altogether turn off, its artificial lighting system. It also has a green roof, which is 81 percent vegetated in compliance with a Chicago city ordinance requiring the roofs of all new buildings to be at least 50 percent vegetated.

Speaking of roofs, yet another green building highlight is the store’s internal roof drains. “When it rains, the water ... is collected into an internal piping system that routes it underground into the storm-water system,” Webb says. The roof drains rely on siphonic motion instead of gravity during peak rain periods, allowing associated piping to be much smaller. “In Chicago, you have to use cast-iron pipes for internal roof drains,” Webb continues. “The difference between a 6-inch and a 12-inch cast-iron pipe is almost three times the weight in metal. In sustainability, you want to minimize the amount of materials you use because somewhere down the line those materials are going to be disposed of.”

PRODUCTS & SYSTEMS

TECHNOLOGY

[+ Share This Story](#) | [f](#) [t](#) [e](#) [g](#) [+](#) [0](#)

MPW

Engineering
Solutions

A proven engineering
partner, with project
experience in every state.

Mechanical
Electrical
Plumbing
Fire Protection
Refrigeration
Architectural Lighting
Building Information
Modeling
Energy Modeling
Lightning Simulation
Life Cycle Cost Analysis
System Selection
LEED Administration
Code Review and
Compliance

www.mpwengineering.com