

Operation Green

Sustainable practices in refrigeration, store lighting and HVAC are on the increase.

By Bob Ingram

Green concerns are becoming the new normal in supermarket operations equipment, judging by what suppliers are observing. “Consumer awareness and government regulations and pressure are two key drivers pushing for more green considerations,” says Mitch Knapke, director of food retail marketing at St. Louis-based Emerson Climate Technologies.

According to Knapke, sustainable supermarket refrigeration has made significant strides related to carbon emissions, both from direct refrigerant leakage and energy usage. “Lower refrigerant charge systems have become the standard,” he notes, “and refrigerants with high global warming potential, like R-404A, are now the minority in new systems.”

Knapke adds that several trials have been completed with natural refrigerants like carbon dioxide, propane and ammonia, but higher equipment costs, safety concerns and a lack of service knowledge have prevented the industry from pushing for them to become mainstream.

Additionally, he says, “A large number of high ozone-depleting systems, or R-22 systems, have been retrofitted to zero ozone-depleting systems.”

With the refrigeration systems of existing supermarkets degrading over time, Emerson’s ProAct Service Center provides remote monitoring that actively watches key parameters and notifies store

personnel when an issue arises.

“The future challenge for retailers, manufacturers and service providers will be to make net-zero energy locations economically feasible for an entire enterprise,” Knapke says.

Starting the Conversation

At Hussmann Corp., in Bridgeton, Mo., Refrigeration Product Manager Quentin Crowe says, “When it comes to sustainable supermarket refrigeration, there are several conversation starters with food retailers, such as refrigerant loss potential from a system, refrigerant choices — HFCs [hydrofluorocarbons] versus natural refrigerants — and legislative actions around global warming.”

Crowe further points out that, according to a 2014 “Shopper Trends Report,” 49 percent of shoppers indicated that a store’s sustainability efforts are very or somewhat important in their selection of a primary supermarket.

Still, as HFCs are being phased out, Crowe says that manufacturers haven’t developed a sustainable alternative, thus opening the door to multiple natural refrigerant alternatives. “But they will also require huge investments by food retailers to change over or manage multiple refrigerant types across their business,” he cautions.

He sees the current issues around green refrigeration as “fixed pressures” like cost, energy use, toxicity, GWP (global-warming potential), flammability

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**IT'S CURTAINS**

Nortek's air curtains over loading docks stop heat loss.

and compressor discharge temperature, as well as “variable pressures” like technical support, availability, perceived safety, climate and region, state of the economy, and DOE/EPA regulations that influence the right decision for each retailer.

“We believe there are four important areas that can have an impact on sustainable refrigeration systems: sustainability, flexibility, total cost and energy efficiency, and the importance of any of these areas changes depending on the retailer, their location and business goals. Our expectations are that as much as 15 percent to 20 percent of the industry will utilize natural refrigeration options in the next 10 years,” Crowe notes.

According to Dustan Atkinson, sales manager, supermarket systems at Stone Mountain, Ga.-based Heatcraft/Kysor Warren: “Much of the work currently going into improving operations is focused directly on refrigeration. This is true because refrigeration systems represent a large portion of both energy use and direct emissions.”

His company is investing heavily in advanced, HFC-free systems, Atkinson says, but one major issue that has arisen with the introduction of new technologies is the need to provide education on all-new system designs. “Kysor Warren is creating a comprehensive education program that will ensure that all pertinent parties are educated on these new systems,” he observes.

With most refrigeration systems still based on HFC refrigerants, Kysor Warren is developing next-generation indoor racks through extensive testing, computer modeling and quality processes. “During this initiative,” Atkinson says, “we also aggressively eliminated leak opportunities through the use of pre-bent tubing, improved components, and improved system design and accessibility.”

He anticipates the industry moving toward HFC-free system designs that will eliminate future regulatory risk while providing significant improvements in energy, emissions and general sustainability.

**MAKING UP**

This Reznor makeup air unit from Nortek replaces the air from exhaust vent hoods.

**HVAC Advances**

“Being green — low energy cost, sustainable and reduced carbon footprint — with respect to supermarket HVAC has received some attention,” says Jim Vannan, Southeast regional engineering manager at Anaheim, Calif.-based Source Refrigeration & HVAC, a provider of energy and sustainability makeovers focused on improving underperforming systems that may have had design flaws, or are experiencing end-of-life replacement decisions. “In Southern California, for example, incentives exist for commercial customers to mitigate cost of early retirement of systems, and to provide preventive maintenance over a three-year period.”

Vannan explains that the aim of these incentives is to emphasize the connection between proper maintenance and energy use, and to encourage the retirement of older, less efficient equipment.

He adds this caveat, however: “From our vantage point, there don’t appear to be many green considerations in many supermarket remodel capital expenditure programs.” The reason for this, he notes, is that there’s no “sales lift” with green HVAC, and with limited capital set aside for each remodel, green HVAC is most likely not on the list.

The green strides he sees in HVAC have been centered on fresh-air intake and humidity control with “dual-path” or “dessicant” systems, in which fresh air is conditioned — dehumidified, in most instances — before entering the AC cooling coils.

Another advance Vannan points to is the incorporation of motorized dampers where fresh-air intake is eliminated or reduced at times when it isn’t needed, like at night or during “normal” carbon dioxide levels.

Among the remaining HVAC issues he’s observed are adoption of high-efficiency package HVAC systems, HVAC and exhaust/makeup air



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system-focused preventive maintenance programs, and proper treatment of outside air for bakery and cooking exhaust systems.

“Cold stores are the No. 1 complaint that I’ve received over the years, regarding supermarket HVAC systems,” Vannan relates, adding that in most cases, this complaint can be linked to refrigerated cases without doors. In the future, with doors on the cases, the refrigerated air will remain within the case for most of the day.

He also sees upcoming automated fault detection of HVAC components in which computers pull and crunch data from many controllers at once, as well as the adoption of lower-GWP (global warming potential) refrigerants for HVAC use.

John McKissack, engineered product manager at O’Fallon, Mo.-based Nortek Global HVAC, lists ventilation air among the top HVAC needs for supermarkets, which by code must have at least 15 cubic feet of outside air every minute for each person in the building. Additionally, this air must be conditioned — cooled or heated.

“Demand base ventilation air systems can adjust,” he says. This means increasing or decreasing outside air, depending on the number of people in the store.

Another supermarket HVAC need is makeup air, meaning that in-store delis and bakeries require exhaust vent hoods to remove smoke and cooking odors, and outside air is needed to “make up” the exhaust air.

Dehumidification is also a need. McKissack notes that during a humid week in St. Louis, for example, a single Nortek Reznor dehumidification unit can remove more than 3,000 gallons of water from the outside, air-conditioned air.

Spot heating for loading docks is more efficient than heating the entire area, according to McKissack, who observes that Reznor gas-fired radiant heaters provide spot heating to certain zones. Since the air isn’t heated, there’s no heat loss with open doors. Further, air curtains over loading dock doors save energy by providing an invisible wall of heated air in the winter and impeding dust and insects in the summer, he adds.

Sustainable supermarket HVAC has been advanced, McKissack says, by the U.S. Green Building Council (USGBC), which has set standards for Leadership in Energy and Environmental Design (LEED), which assigns points for applicants to qualify at Silver, Gold or Platinum levels.

“Another sign of sustainable buildings to come,” he continues, “is the Net Zero Building Certification, [under which] the building is certified to harness energy from the sun, wind or earth.

“Our engineers are working to soon provide a geothermal system for heating,” he divulges. “This system will use the warmth of the earth to heat buildings.”

More Light on the Subject

Store lighting is yet another area of growing sustainability. David Etzler, CEO of Charleston, S.C.-based SIB Lighting, notes that most cooler/freezer lights are on 24/7 and use a considerable amount of energy. “By replacing older, inefficient lights with LED,” he says, “not only will you save money, but you will enhance the look of the products in the cooler, and the ability to control LED lights is much easier, giving you the ability to put in motion sensors and other controls to reduce energy use.”

Etzler says that any store lighting fixture can be controlled wirelessly and schedules set up to dim lights upon closing, and further dim or shut off other fixtures later in the night. “We can highlight certain areas by providing more light levels in those spots,” he adds. “The possibilities are endless.”

“Efficacy” is the term for the amount of lumens



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— a measure of light — per watt, and Etzler says that in the past year there have been great strides in the efficacy of light fixtures. “That means we can use much less energy to produce the same amount of light, compared to a couple of years ago,” he explains.

In terms of longevity, he says that while there are more than 500,000 LED products on the market, there’s a growing minority of highly engineered, quality products showing tremendous longevity results. “If the correct products are installed,” he notes, “we can expect life spans of 10 to 20 years with no maintenance.”

To defray the high upfront costs of LED solutions, SIB has created a model called Lighting as a Service (LAS), in which there are zero upfront costs and the customer pays through a percentage of savings.

“We see the future as a fully controlled store that has the ability to automatically adjust the lighting environment based on the current conditions,” Etzler concludes.

Pat Treadway, director of product management-controls and new technology at West Caldwell, N.J.-based MaxLite, asserts that lighting accounts for 20 percent of a store’s electricity use, and that advances in LED technology are making it possible to provide better illumination at lower wattages, along with the ability to adapt to smart controls.

Treadway says that hardwired infrastructures must give way to modular wireless systems, to enable retrofitting as technology advances, as well as more flexibility.

“Adding intelligence and connecting devices that were previously stand-alone is making it possible to tailor lighting for tasks, comfort and energy savings, and even engage shoppers with special offers on their handheld devices,” Treadway observes.

Replacing freezer lighting with LED solutions featuring occupancy sensors, says Keith Pierce, vertical sales manager at Danvers, Mass.-based Osram Sylvania, was a first step for many grocers, which are now looking at other ways to incorporate green LED lighting, like highlighting displays in the produce or bakery section, as well as for general illumination.

According to Pierce, the new long-life Sylvania Ultra Glass PAR (parabolic aluminized reflector) LED Lamps feature a glass-body full optic that retains the look and feel of a traditional halogen PAR, while achieving the energy-saving advantages of LED. “This makes them ideal for retrofit projects involving transition to more efficient LED technology, while still maintaining a consistent look throughout the installation,” he explains.

Completely replacing lighting with LED products results in more materials for landfills, Pierce notes, but retrofitting can both save energy and reduce waste.

“The future of sustainable supermarket lighting is adding a layer of controls whereby grocers can save an additional 50 percent in energy savings by incorporating occupancy sensors and daylighting strategies,” Pierce believes.

Indeed, throughout the store, green is now the color of supermarket operations — and savings. **PG**

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