

NORTH AMERICAN EDITION #2, DECEMBER 2014 / JANUARY 2015

ACCELERATE

ADVANCING HVAC&R NATURALLY

MAGAZINE

KATHY LOFTUS
WHOLE FOODS MARKET

TAKING NATURAL REFRIGERANTS TO THE NEXT LEVEL



ATMOSPHERE AMERICA 2015 HEADS SOUTH TO ATLANTA p.26

METRO'S CO₂-ONLY GROCERY STORE p.19

RARE CO₂ ICE RINK p.20

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Editor's Note by Michael Garry



A WIDE NET

It is perhaps fitting that the cover story in this second issue of *Accelerate America* is devoted to Whole Foods Market. Whole Foods, of course, is the preeminent purveyor of natural foods in North America – just as we are dedicated to being the preeminent disseminator of information about natural-refrigerant-driven applications in North America.

Whole Foods is turning out to be a leading user of natural refrigerants as well. Its year-old, environmentally focused store in Brooklyn, N.Y., which I had the pleasure of visiting last month, has the rare distinction of being completely free of synthetic refrigerants, employing only naturals (carbon dioxide, water and, soon, propane).

We also have a story this month on a new Metro Plus supermarket with a transcritical CO₂ system, and profiles of Micro Thermo and Systemes LMP, major suppliers of refrigeration equipment to food retailers. And in our first issue we had several articles on grocery companies' use of CO₂ (Hannaford, Roundy's, Food Lion).

Yes, it's true that food retailers are important users of natural refrigerants, and *Accelerate America* will continue to cover them, including Target in February. But they are just the beginning. The magazine

intends to cast a wide net, investigating users of natural refrigerants across all HVAC&R-related industries, as you can see by perusing our 2015 editorial calendar on [page 44](#).

In this issue, for example, we have an article on a CO₂ refrigeration system employed by an ice rink in the Québec city of Dollard-des-Ormeaux. Starting in March, our cover subjects will range from foodservice and beverage manufacturers to industrial refrigeration and refrigerated transport, returning to supermarkets in September in time for the Food Marketing Institute's Energy and Store Development Conference. Other sectors to be covered within the magazine: HVAC (including heat pumps), wineries, server farms and residential systems, among others.

Another important focus will be entities and issues that impact the use of natural

refrigerants, such as energy utilities, training and servicing, and regulations. And each edition of *Accelerate America* will examine policy makers – such as the Montreal Protocol and the UNFCCC (United National Framework Convention on Climate Change) – as well as news from trade shows.

The diversity of our editorial is also reflected in the list of 2015 events, many of which we will be covering, on [pages 42 and 43](#).

Overall, *Accelerate America* is determined to be an invaluable resource year-round for users of natural refrigerants and those who plan to use – or may be thinking of using – these vital substances in their business while helping the environment.

And, of course, each issue will hold surprises that we won't want to reveal in advance. Stay tuned **MG**



Editor's Note by Janaina Topley Lira

DOMINO EFFECT



A technology change can have a domino effect across an entire industry. In the HVAC&R sector that technology change is the arrival of natural and green refrigerants, widely anticipated to be the catalyst for a dramatic transformation across the North American heating, cooling and refrigeration market.

The pieces are in place to make this change happen. For example, as 2014 comes to an end, limitations on certain hydrofluorocarbons (HFCs) seem more and more likely. The US-led amendment on an HFC phasedown within the Montreal Protocol is inching ever closer to becoming a reality. President Barack Obama and President Xi Jinping of China have set out a plan to cut greenhouse gases, including short-lived climate pollutants such as HFCs.

Nationally, a number of measures that would limit the use of high-GWP refrigerants are also being considered. The U.S. Environmental Protection Agency (EPA) has initiated discussion about decertification of some high-GWP HFCs in its Significant New Alternatives Policy (SNAP) program; the California Air Resources Board is considering measures that would limit the

use of high-GWP refrigerants; and Canada has published a notice of intent regarding regulating HFCs.

Natural refrigerants, on the other hand, are all approved under the SNAP program, subject to use conditions. The use of hydrocarbons could also soon be expanded to new applications.

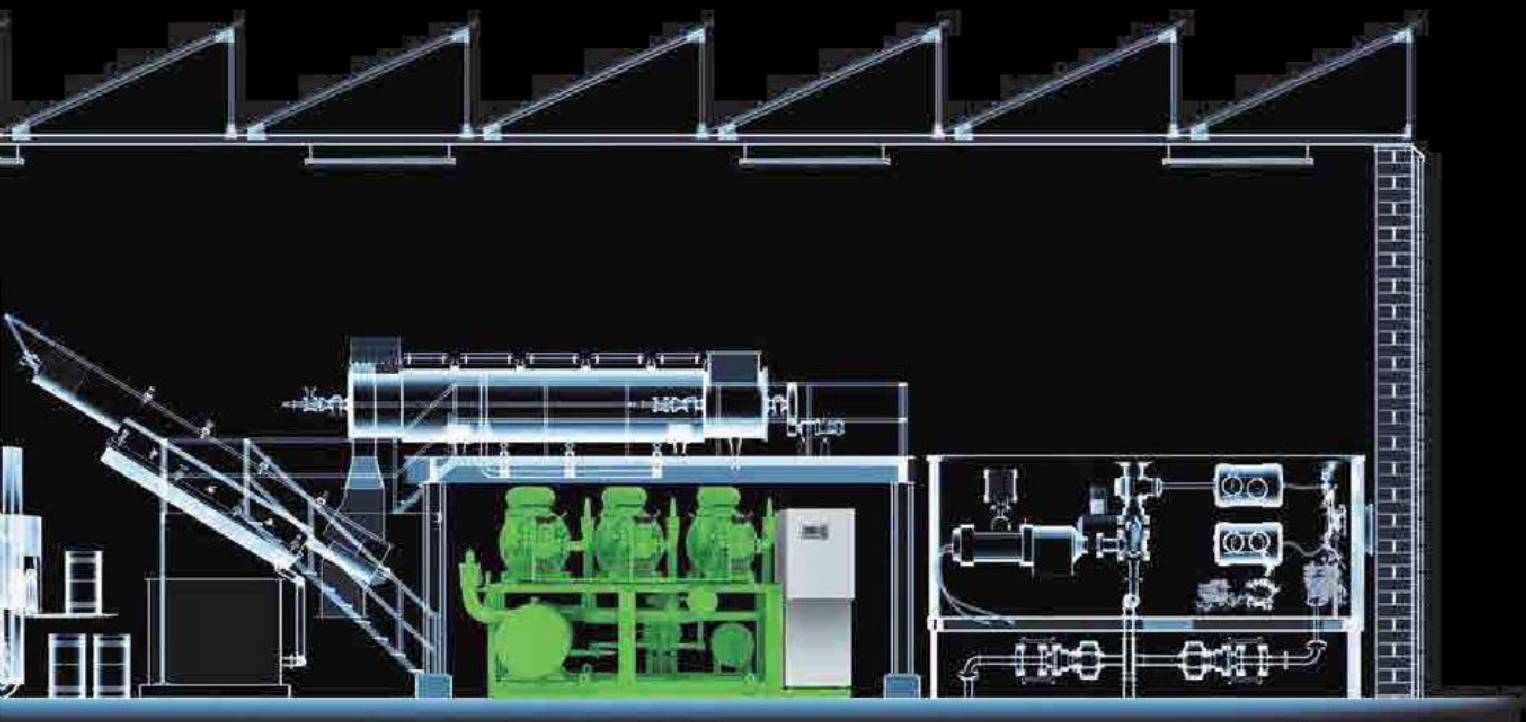
This shifting regulatory landscape is positively influencing the market demand for CO₂, hydrocarbons, ammonia and water as refrigerants, acting as a major driver for innovation in the US and Canadian HVAC&R sector.

As a result, what we are seeing in Europe and Japan — breakthroughs in the use of CO₂, hydrocarbons and ammonia in commercial and industrial refrigeration applications as well as CO₂ in heat pumps

— is being replicated in North America.

Coupled with this, transformative deals are being struck, consolidating the North American natural refrigerant industry. For example, leading transcritical CO₂ system manufacturer Advansor was acquired by US company Hillphoenix. The Hussmann Corporation reached an agreement with Canadian Systemes LMP to bring its CO₂ transcritical solutions to the US. Star refrigeration from the UK, established a US subsidiary to bring a low-charge ammonia refrigeration solution to North America.

The first domino has fallen. Will this set in motion a chain reaction? Many are waiting with baited breath to find out if natural refrigerants will become a standard technology across the North American HVAC&R sector. **JTL**



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Brought to you by shecco, the worldwide experts in natural refrigerant news, *Accelerate America* is the first monthly news magazine written for and about the most progressive business leaders working with natural refrigerant solutions in all HVAC&R sectors.

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Kathy Loftus from Whole Foods Market

Whole Foods' Journey to Natural Refrigerants

With three transcritical CO₂ stores and another that will test ammonia-CO₂, the natural/organic food retailer is exploring what is possible with natural fluids.



Editors' Notes

A Wide Net by Michael Garry

Domino Effect by Janaina Topley Lira



Metro Franchise Store Opt's for CO₂-Only System



CO₂ Scores Goal at Quebec Ice Rink



Natural Refrigerants Shine at Chillventa 2014



ATMOsphere America 2015 Heads South to Atlanta



A Global Agreement on HFCs by 2016?



US-China Climate Deal Could Boost Refrigerant Market



Short Takes

Chicago-Area Retailer Opens Multi-Purpose CO₂ Store.
Conn. Wholesaler Addresses Ammonia Risks at Warehouses.
ASHRAE Sees Greater Role for Ammonia.



Pushing the Boundaries of CO₂



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Events Planner

From January to December 2015



Editorial Calendar 2015

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WHOLE FOODS' JOURNEY TO NATURAL REFRIGERANTS

With three transcritical CO₂ stores and another that will test ammonia-CO₂, the natural/organic food retailer is exploring what is possible with natural fluids.



Brooklyn New York

by Michael Garry



Kathy Loftus, Whole Foods' Sustainability Leader

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YOU, WHO ARE ON THE ROAD, MUST HAVE A CODE THAT YOU CAN LIVE BY.

— Crosby, Stills & Nash

At the Whole Foods Market store in the Gowanus section of Brooklyn N.Y., a shopper is having lunch at a well-appointed second-floor restaurant called The Roof before picking up natural and organic foods on the main level.

Sitting down at one of the tables with his lager beer and grass-fed burger, the shopper notices on the wall next to him a large framed sign with a picture of two refrigeration compressors, above which were words in white block letters: "CO₂ REFRIGERANT."

Under the compressors, the explanatory text read, "This is first grocery store in the nation that uses all natural refrigerants by relying on a state-of-the-art transcritical CO₂ refrigeration system and chilled/hot water loops for heating and cooling the space and our products."

Not the standard wall décor for a dining room in an upscale retail establishment, but then the shopper already knows that this is hardly a typical grocery store. When he drove into the parking lot, he parked underneath one of six massive solar canopies (particularly handy on this rainy day). If he had arrived at night, overhead LED lights powered by wind and solar energy would have illuminated his path to the store. If he drove an electric car, he could have recharged it at one of two stations powered in part by a solar panel and a wind turbine.

The 56,000-square-foot Brooklyn store is Whole Foods' first in

the borough, and its most ambitious attempt at creating an environmentally friendly store that adheres to the highest green building design and construction standards. (Its application for LEED platinum status is pending.)

But perhaps the most radical step taken at the store is its commitment to being completely free of HFC (hydrofluorocarbon) refrigerants, not just in its main refrigeration system – the transcritical CO₂-only unit – but in every other cooling element, from air conditioning to the juice bar. This accomplishment earned the store platinum certification from the Environmental Protection Agency's GreenChill Partnership.



Whole Foods had more latitude at the Brooklyn store to experiment with environmental features because it owns most of the land upon which it sits. The land was a brownfield site that Whole Foods rehabilitated, and sits adjacent to

the Gowanus Canal, a highly polluted Superfund site being cleaned up by the Environmental Protection Agency. To help with financing, the chain received support from NYSERDA (New York State Energy, Research and Development Authority).

With its transcritical and other cooling systems, the Brooklyn store marks Whole Foods' biggest push yet into natural refrigerants, and certainly not its last.

Whole Foods, which operates close to 400 stores and plans to have as many as 1,200, is on a journey to discover the optimal refrigerant and refrigeration system for its stores from both an operational and environmental perspective. The chain's current prototype remains a DX (direct exchange) system using R-407A as well as R-134A for medium temperature applications. But it has its eyes firmly focused on naturals as a potential solution – if they pass muster in store pilots.

"Since we still don't know the optimal conditions and geographies for these [natural refrigerant] systems, we are piloting several and measuring them, and looking to our peers and sharing information, so we can develop a strategy," said Kathy Loftus, Whole Foods' global leader of

sustainable facilities, and the person most responsible for its environmental direction. She spoke to *Accelerate America* at her office last month.

Another person responsible for driving Whole Foods' implementation of natural refrigerant stores is Tristram Coffin, the energy and maintenance project manager for the chain's Northern California Region, a position he has held since 2012. Coffin spearheaded the Brooklyn's store's HFC-free refrigerant program as well as its many other environmental features in his previous four-year stint as Whole Foods' green mission specialist in the company's Northeast Region.

"I was responsible for the beast of a store that is Brooklyn," he said during an interview last month, adding that he is still involved with that store and is helping with its final commissioning. He is now overseeing three new California stores using or planning to use natural refrigerants.

STARTING WITH SECONDARY

Like some other U.S. food retailers, Whole Foods began its natural refrigerant journey, in 2009, with installations of secondary CO₂ and cascade CO₂ refrigeration systems, which have lower levels of HFCs than DX systems. The chain has

those of a conventional store.

In addition, cascade and secondary systems require less maintenance and have easier installations than traditional systems. "They are reliable and are performing well," Loftus said.

Loftus's corporate colleague, Mike Ellinger, Whole Foods' global maintenance and refrigeration coordinator, is bullish on cascade systems. "It's not an overly complicated system and most [technicians] can maintain it," said Ellinger, who is based in the Boulder, Colo., a suburb of Thornton. "I'd like us to move more in that direction."

Last year, Whole Foods branched out into transcritical technology at the Brooklyn location. The store's transcritical refrigeration system, supplied by Hillphoenix, Conyers, Ga., is the second one to be installed in a U.S. supermarket, following a Carnot system that went live at a Hannaford supermarket in July 2013. (See "Does CO₂ Refrigeration Deliver," Nov. 2014, *Accelerate America*.)

But as the restaurant sign noted, the Brooklyn store is the first in the nation to be entirely HFC-free. Moreover, last month Whole Foods became the first U.S. grocer to open a second store with a transcritical system, in Berkeley, Calif., and this month the retailer debuted a third such store, in San Jose, Calif. These two new stores will not be completely HFC-free, making them a more manageable project than the HFC-free Brooklyn store.

In addition, Whole Foods wanted to test transcritical in a more moderate climate where summer temperatures would not push the transcritical system into less-efficient supercritical mode. "The ambient temperatures in Berkeley tend to be a lot more comfortable throughout the year than in Brooklyn, so installing

"IT'S NOT AN OVERLY COMPLICATED SYSTEM AND MOST CAN MAINTAIN IT"

three secondary pumped-CO₂ locations (Dedham, Mass., Boulder, Colo., and Salt Lake City) and six low-temperature cascade CO₂ stores (three in Northern California and three in the Northeast). One cascade store in San Francisco's Castro district uses CO₂ cooling for both medium and low-temp cases.

These systems were all installed in new outlets, except for one store in Sacramento, Calif., where an HFC-based DX system was converted to a low-temp cascade unit. Whole Foods plans to expand the number of stores with secondary and cascade systems – though they currently have higher first-costs than conventional systems – and continue to analyze their suitability as a refrigeration standard.

To date the results have been largely positive. From submetering, Whole Foods has determined that secondary systems that use glycol run higher energy costs. On the other hand, in stores with cascade systems, like the one in San Francisco's Castro district, energy costs were on a par with



Juice bar,
Whole Foods/Brooklyn

Parking lot light,
powered by solar panel and wind turbine,
in front of solar canopies,
Whole Foods/Brooklyn



Rooftop hydroponic greenhouse,
Whole Foods/Brooklyn



→ a transcritical system was a no-brainer," said Coffin. Unlike the Brooklyn store, the Berkeley store does not require subcooling to help keep the transcritical system running efficiently.

The new store in San Jose is similar to Brooklyn in that it also employs a CHP system, albeit in a different configuration and from a different supplier (Unison Energy). It will help keep the transcritical system from going into supercritical range.

Though Hillphoenix has been the provider of Whole Foods' transcritical systems so far, the retailer is open to purchasing systems from other vendors, as with the CHP technology. For control systems, it used Danfoss's product in Brooklyn and Parker Sporlan's in Berkeley. "We're manufacturer agnostic," said Loftus.

Further cementing its place as the U.S. grocer with the most far-reaching natural refrigerants program, Whole Foods plans to open a store next May in Dublin, Calif., that will feature an ammonia-CO₂ cascade refrigeration system, supplied by Zero Zone. This will be only the second ammonia-CO₂ system installed in a U.S. supermarket, coming three years after Supervalu installed the first such system in an Albertsons store in Carpinteria, Calif., now owned by Albertsons LLC.)

GREEN CODE

Though Whole Foods has its headquarters in Austin, Texas, it is split up into 12 regional divisions (which includes Canada and the U.K.) that are allowed to operate with a great deal of autonomy in order to deliver customized service. A division like the Northern California Region, which employs someone as knowledgeable about natural refrigerants and other environmental factors as Coffin, can proceed with transcritical and ammonia-CO₂ test stores with minimal input from corporate. Coffin played that same galvanizing role when he was stationed in the Northeast Region.

But Whole Foods' corporate sustainability function, led by Loftus and supported by Ellinger, is responsible for maintaining the company's overarching environmental and engineering standards that the regions are expected to follow. Loftus and Ellinger also work with the regions, especially the less environmentally savvy ones, on developing stores that are more environmentally benign. They have monthly calls and annual meetings with the regions on sustainability, maintenance and refrigeration.

Coffin sees the ammonia-CO₂ store as "an opportunity to test another technology in an area where we do get very high temperatures and wasn't necessarily right for transcritical." He is a strong believer that transcritical should not at this point be regarded as "the silver bullet" for supermarket refrigeration.

Ammonia, Coffin pointed out, is an extremely efficient refrigerant, albeit one "that has a certain level of fear attached to it" due to its odor and toxicity in high concentrations.

Loftus estimated that over time between 10% and 20% of Whole Foods' many new stores could have natural refrigerant systems. "That number could grow depending on the analysis. Early indications are it's looking good."

"We're testing to see what works, what technicians can handle and what we can afford to do," added Ellinger.

But absent utility incentives, the high first-cost of natural refrigerant systems remains a concern for Loftus. "Natural refrigerants are a focus but if we tried to do a natural refrigerant design for every store in development now, it would be cost prohibitive," she said.

Coffin, besides managing his own region, is a member of the company's Global Green Mission Leadership Team, and collaborates with Loftus and Ellinger on refrigeration and waste-diversion goals for Whole Foods as a whole.

Loftus works out of Whole Foods' North Atlantic Region headquarters in Cambridge, Mass., where employees have access to a ping-pong table for recreation.

Though she said she doesn't play ping pong, Loftus is fully engaged in the back-and-forth consensus-building and negotiations necessary to advance Whole Foods' sustainability agenda with a variety of stakeholders, including Whole Foods' Leadership Network and regions, as well as technology vendors, utilities, consulting engineers and architects.

"That's a lot," she said. "There's so much to do, and a whole lot left to do."

AN ABUNDANCE OF GREEN

Besides operating a transcritical CO₂-only refrigeration system, Whole Food Market's HFC-free store in Brooklyn, N.Y., features a host of other environmental systems that make it one of the greenest supermarkets in the U.S.:

- » A 157-kilowatt Elite Energy CHP (combined heat and power) system encompasses a natural-gas-powered cogeneration unit that produces electricity and waste heat. The heat is captured in engine-jacket water that is channeled through hydronic loops for building heat and domestic hot water. In addition, the system includes a 250-kilowatt parallel backup generator.
- » Two Broad absorption chillers are pre-heated by hot water and exhaust gas from the CHP to produce additional hot water for building heat and domestic hot water when needed. In cooling mode, the chillers generate cold water for building air conditioning as well as for subcooling at the CO₂ gas cooler. The chillers are backed up by natural gas burners.
- » Glycol chillers use CO₂ from the transcritical system to cool glycol, which circulates to the beer tap, juice bar and berries bin.
- » Six solar canopies (300 kilowatt) in the parking lot generate 20% of the power used at the store.
- » Eighteen LED parking-lot lights (35-feet tall) are off the grid, each powered by a connected solar panel and vertical-axis wind turbine with small pinwheel-like blades. Most in-store lights are LED.
- » Two free electric-car charging stations are each partly powered by a solar panel and a 1.5-kilowatt vertical-axis wind turbine with pinwheel-like blades.
- » All 250,000 bricks in the interior and exterior of the building were reclaimed from a demolished Westinghouse building in Newark, N.J.
- » The store's interior Brazilian Ipe wood was salvaged from a boardwalk in nearby Coney Island that was damaged by Superstorm Sandy in 2012.
- » Instead of asphalt, the parking lot ground is made of permeable pavers that allow rainwater to be absorbed into the earth, preventing run-off.
- » Grey water and rainwater from the top of the solar canopies and the building roof are collected and treated before being recycled to flush toilets and irrigate property, significantly reducing potable water use on site.
- » Brooklyn-based Gotham Greens runs a 20,000-square-foot hydroponic greenhouse on the roof. It grows a variety of leafy greens, lettuces and herbs that are packaged in clear plastic containers and sold at the store as well as other local Whole Foods locations and some restaurants. The produce is stored in two walk-in coolers that are refrigerated by the transcritical refrigeration system.

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SPECIAL EDITION, JANUARY 2015

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M A G A Z I N E

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Transcritical rack,
Whole Foods/Brooklyn

System Specs

Whole Food Market's Advansor transcritical CO₂ system in Brooklyn, N.Y., from Hillphoenix, has the following features:

- Four racks (A,B,C,D) encompassing 12 medium-temperature compressors and eight low-temperature compressors.
- Racks A, B and D: Each has a medium-temperature capacity of 351 BTUs/hour at +18 degrees F. Rack C has a medium-temperature capacity of 353 BTUs/hour at +18 degrees F.
- Racks A,B and D: Each has a low-temperature capacity of 50 BTUs/hour at -22 degrees F. Rack C has a low-temperature capacity of 57 BTUs/hour at -22 degrees F.
- Luvata gas cooler, equipped with subcooling heat exchanger.
- Danfoss control system.
- No heat reclaim.
- Electric defrost.
- LED-lit cases.

→ A nine-year veteran at Whole Foods, she brought an ideal background to her current role, including eight years as director of energy and environmental management at Shaw's Supermarkets (now owned by Albertsons LLC), and stints at EnerNoc, a consulting firm where she focused on demand response and energy optimization, as well as at an electric utility and at an engineering consulting firm.

Loftus, a mechanical engineer by training, worked with Ellinger, and engineering consultant Mike Guldenstern (owner of e2s), to develop Whole Foods' "Engineering Design Principles," a set of standards and best practices – in effect, a green code – that the regions as well as consulting engineers can apply to store infrastructure systems such as refrigeration. The principles were introduced in 2007 and 2008, and updated in 2011, when they were formally introduced to all regions and consulting partners. The principles have led to "good improvements" in stores, Loftus said.

Though the regions retain their autonomy, most will work with Loftus's team "because they know we can help ensure that the right guidelines are being met," she said.

Under refrigeration, the design principles aim to "minimize the use of refrigerants and [their] global warming potential while keeping an eye on installation costs (copper costs have escalated) and lifecycle operating costs." At the same time, the principles say, Whole Foods welcomes "innovative approaches to refrigeration design in the form of newer secondary systems, alternative refrigerants such as CO₂ and NH₃ (ammonia), and the assembly of integrated water-cooled refrigeration and HVAC and distributed systems." The Brooklyn

store is an example of where CO₂ refrigeration and HVAC have been integrated.

As a guide to Whole Foods' regions, which bear the cost of innovative technology, the engineering design principles emphasize that sustainability projects like natural refrigerant systems can be justified based on lifecycle costing, not just first costs. "It shows that there's a bigger picture out there and there are reasons to do these things," said Loftus.

Thus an innovator like Coffin can pursue transcritical and ammonia-CO₂ store projects "as long as the lifecycle costing makes sense for us," she said. Normally, an energy project would need to meet a three-year payback, but, given the uncertainties associated with advanced refrigeration, the ROI could be stretched to five or six years. In addition, Whole Foods makes funds available to the regions if a project's energy efficiency exceeds regional energy code standards, and tries to secure utility rebates. Of course, stores like Brooklyn that experience robust sales are more capable of affording natural refrigerant projects.

While exploring natural refrigerants, Whole Foods is doing its best to reduce leaks and charges in conventional stores as a founding member of the GreenChill Partnership. "Our strategy now is to design the simplest, most cost-effective refrigeration system with the lowest GWP," said Loftus. "We put in the best leak detection systems and guidelines for monitoring systems so we don't leak gas."

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→ Loftus acknowledged that it can be harder to get store operators to focus on making refrigeration part of Whole Foods' "green mission" because, unlike "tangible" benefits like improving food or saving energy, refrigeration is "more ethereal, if you will, and definitely more technical," she said. "So to get that focus is not always as easy."

But Ellinger believes that the ongoing store pilots will bring clarity to the refrigeration discussion. "That's why we have the [transcritical] and ammonia stores. To try it and see what happens." In effect, with its various tests of natural refrigerants, Whole Foods is creating a toolbox of natural refrigerant options that regions can consider regardless of location or climate.

A MOUNTAIN TO MOVE

Why are Ellinger and Loftus so committed to exploring natural refrigerants? For Ellinger, who has two young children, it's simply because "it's the right thing to do." Loftus shares that sentiment. "That's why I'm still here. We have a little bit of a mountain to move. But my personal motivation is the same as Mike's, and it has been since my days at Shaw's and even before then."

Loftus believes that the food industry "better reduce our impact on the environment, especially as an industry that is so heavily impactful" in terms of energy and refrigeration.

Loftus is looking for natural refrigerant system manufacturers to "pledge to build enough of these systems so that the cost comes down." She would also like to see manufacturers make their systems less complex and more modular, with components that can be individually monitored. And she urges the engineering community to "stop taking the path of least resistance in their designs."

Installation and service contractors have a tendency to boost their costs when dealing with natural refrigerant systems with which they are unfamiliar; this occurred at the Brooklyn store. To counter that, Whole Foods is training contractors to increase their comfort level with the systems, and is looking for help from manufacturers as well as government agencies (EPA and the Department of Energy), utilities and industry groups (the Food Marketing Institute).

Coffin remains hopeful that natural refrigerants will prove to be the ultimate answer for Whole Foods. "It's a matter of changing a paradigm that's been in place for a very long time," he said. "But speaking personally for the stores I have immediate control over, I'm going to do everything in my power to make sure natural refrigerants are being used."

NOT A SINGLE DROP OF HFCs

At its year-old store in Brooklyn, N.Y., Whole Foods Market is making its first attempt to measure the effectiveness of a transcritical CO₂-only system.

But it is doing so in the midst of many other environmental measures that combine to make the store HFC (hydrofluorocarbon)-free, from the HVAC systems to break-room refrigerators to juice and beer dispensers. The store also leverages solar panels in the parking lot as well as a CHP (combined heat and power) system to generate, at optimal efficiency, as much as 90% of the building's energy. (The store is 60% more energy efficient than the building code requires, Whole Foods said.)

In creating an HFC-free store, Whole Foods wanted to "push the envelope and create a model for what could be done," said Tristam Coffin, the energy and maintenance project manager for the chain's Northern California Region, who was responsible for the environmental components of the Brooklyn store in his previous role as Whole Foods' green mission specialist in the company's Northeast Region. "We're not going to have a single drop of synthetic refrigerant in the store."

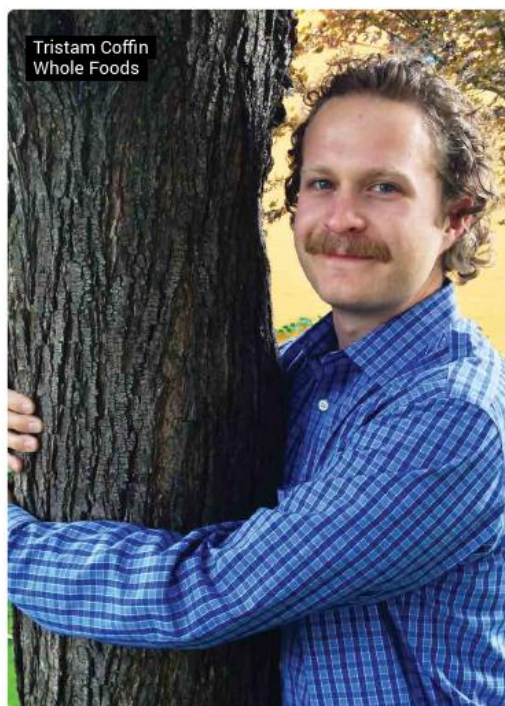
He acknowledges this is no small challenge. "We're always trying to avoid bringing cases with HFCs into the Brooklyn store." Whole Foods is still seeking UL approval for an ice cube maker that uses propane rather than HFCs.

Coffin would like self-contained unit manufacturers to "get their act together" so that natural refrigerant-based equipment can clear UL or EPA requirements and become usable in the U.S.

So far, the transcritical system, an Advansor model from Hillphoenix, has been running "extremely efficiently from a maintenance perspective," said Coffin. "Down times have been minimal; it's been a super reliable system." Once they get over "their initial fear," technicians trained on maintaining the system recognize that it's not that different from traditional systems, he added. Hillphoenix provided on-site training during installation and commissioning – support that Coffin considers invaluable.

In terms of energy usage, Coffin said, Whole Foods "is seeing some spikes, which were expected" as the ambient temperature rises in the summer and the system goes into supercritical mode, working at higher rack pressures (which have not been an issue) to condense the CO₂ gas. (Subcooling at the gas cooler also helps this process.) He noted that the additional energy is supplied by the solar panels, which absorb more sunlight during the summer.

According to Denis Boyle, Whole Foods' project manager, New York City stores, the low-temperature rack pressures rise from about 750 psi to more than 1,000 in the summer as the temperature rises above 85 degrees Fahrenheit. The system works harder, with the condenser fans "running flat out," he said.



Tristam Coffin
Whole Foods

On the other hand, Coffin said, during the month of November, 2014, with its cooler temperatures, the percentage of the Brooklyn store's peak energy demand taken up by the transcritical system was about 30%, as compared with a DX system at a comparable location that accounted for 50% of peak demand. Thus, the transcritical system's lower energy usage in a cooler month helps to compensate for its higher consumption during the summer.

The Brooklyn store opened on Dec. 17, 2013, but because of complications with the CHP system, it took several months before "we got it to where it was operating the way it was designed to," said Mike Ellinger, Whole Foods' global maintenance and refrigeration coordinator. The retailer wants to measure the energy performance of the store in this optimal condition for a year – combining peak energy usage during the summer with offsetting usage during the winter – before sharing energy data with the industry at large, he said.

As for installation and first costs for the transcritical system, the Brooklyn unit is not considered a good reflection of market prices due to the complexity of the store. On the other hand, at Whole Foods' more recent, less complicated transcritical installations at two stores in Northern California (as well as at its HFC-CO₂ and ammonia-CO₂ cascade stores), the increase in installation/first-costs was "very little, if at all, over traditional DX rack systems," Coffin said.

For Ellinger, his biggest concern regarding the Brooklyn store remains maintaining what is a very complicated interplay of CHP, absorption chillers and the transcritical CO₂ system. "It was a challenge to get up and running," he said. "So it will be challenging to take care of it over time" **MG**

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METRO FRANCHISE STORE OPTS FOR CO₂-ONLY SYSTEM

— By Janaina Topley Lira

Third-generation retailer wants to use refrigerant that doesn't harm the environment.

In late October, Metro Plus Marquis became the latest Canadian food retailer to open a store with a transcritical refrigeration system that uses only carbon dioxide as its refrigerant.



It's among the first such stores under the Metro banner. Fellow Canadians Sobeys, Loblaw and Overwaitea have also installed transcritical systems.

Metro Plus Marquis is a 12-store franchised operator owned by the Marquis family, which has been active in the food business for three generations, and supplied by Montreal-based Metro, Canada's third-largest chain. The new, 45,000-square-foot store, which received a \$25 million investment, opened on October 30, 2014, in L'Assomption, a suburb of Montreal.

Owner Jean-Paul Marquis, whose son Kévin Marquis will co-run the store, explained that driving the decision to switch to CO₂ refrigeration was the knowledge that current fluorinated refrigerants are environmentally damaging and on the road to being phased out.

Metro Plus Marquis has always considered itself to be at the vanguard of the retail sector when it comes to employing new technologies. The decision to invest in a state-of-the-art "green" refrigeration technology was therefore a logical step for them. Already, the retailer had invested in energy-efficient LED lighting, replacing the standard fluorescent indoor lighting used in the sales area.

With the general public ever more knowledgeable about ecological issues, Marquis believes that Metro's environmental impact is important to its customers. "This decision is win-win for everyone," he said.

And while perhaps it does not consider CO₂ technology to have fully matured, Metro Plus Marquis is proud to be at the forefront of commercial refrigeration trends. Marquis said that despite making a few mistakes along the way, the results of playing a leadership role have in general been positive.

Interestingly, Metro's European namesake, Metro AG, a German retail and wholesale/cash and carry group, is much more reticent with regards to CO₂ refrigeration.

ENVIRONMENTAL BENEFITS HIGHLIGHTED

At the store opening, and in the accompanying press release, Metro Plus Marquis was keen to highlight the environmental benefits of the CO₂ refrigeration system, which replaces standard refrigerants whose effect is 2,000 to 4,000 times greater on global warming than CO₂.

Thanks in part to electronic controls that offer full optimization, the CO₂ transcritical system also provides greater energy performance than standard systems, according to Metro Plus Marquis. And although the CO₂ refrigeration plant is not connected to the HVAC system in an "integrated" system – a new trend in Europe – the system's design allows waste heat from the compressors to be recovered and used to heat the store.

Marquis initially looked at standard refrigeration units for the store. But then Normand Bruneau,

from commercial refrigeration contractor Techo Ref4 Inc., introduced him to the idea of using a CO₂ Hillphoenix system. Comparing the different refrigeration options, in the end Marquis felt more confident going with the CO₂ solution proposed by his longtime contractor – despite having no guarantees that the Metro Plus Marquis store would receive any subsidies for this project.

Talking about future technologies, Bruneau said the greener the technology, the more inclined he would be to opt for it – as long as its efficiency is equivalent to what is already available and the upfront costs are not vastly different.

Energy efficiency and carbon reduction results are not yet in, but Marquis is convinced that in future renovations, he will certainly consider CO₂ refrigeration. So far, so good: the refrigeration system's start-up went smoothly.

The only thing that concerns Marquis is that in the case of a blackout lasting more the half an hour, and in the event that the back-up generator fails, the system would empty itself and the store would lose its refrigerant charge.

However, if everything goes well, the Metro Plus Marquis store will almost certainly become a reference for others to follow, and Marquis expects to invite other storeowners to visit the supermarket to learn about the refrigeration system. "One is always more confident with the second or third store, but we will undoubtedly already be a showcase for CO₂ transcritical refrigeration," he said. **JTL**

— By Michael Garry and Marc Chasserot

CO₂ SCORES GOAL AT QUEBEC ICE RINK

Dollard-des-Ormeaux's Civic Center has cut energy costs with a CO₂-only transcritical refrigeration system, just the second in North America.

Dollard-des-Ormeaux
Québec



Érick Laliberté,
City of Dollard-des-Ormeaux

In Canada, there are about 2,500 indoor ice rinks, most of them owned and operated by municipalities, according to the Canadian Recreation Facilities Council's most recent National Arena Census (CRFC).

In that survey (conducted in 2005), CRFC found that almost half of the ice rinks for which data was collected were built before 1980, and were at the point in their lifecycle where major investments needed to be made to maintain their infrastructure.

The study also determined that 65% of the ice rinks used ammonia as the primary refrigerant, 25% used Freon and 10% have natural ice. Carbon dioxide was not mentioned at all.

But CO₂'s time would come. Five years later, Arena Marcel-Dutil in Quebec, about 20 miles north of the Maine border, became the first ice rink in the world to use CO₂ as its only refrigerant, using a system from CSC.

Two years after that, in 2012, the city of Dollard-des-Ormeaux, located next to Montreal, undertook a major renovation of the refrigeration equipment at its 300,000-square-foot Civic Center, which includes three ice rinks, two indoor

pools and a library. Its chosen refrigerant: CO₂, in a transcritical system supplied by nearby Carnot Refrigeration – just the second CO₂ refrigeration system installed in Canada.

The success of the Civic Center's transcritical unit opens the door to the installation of CO₂-only refrigeration systems in other ice rinks in Canada and the U.S. However, there is currently some uncertainty for end users interested in this application, as Toronto-based Cimco Refrigeration, which says it owns patents on using CO₂ refrigeration for ice rinks, has been facing legal challenges to the validity of the patents. (This did not affect the installation of the transcritical system at the Civic Center.) *Accelerate America* will cover the patent issue as it plays out in the coming year.

Meanwhile Dollard-des-Ormeaux's 50,000 residents are enjoying the fruits of its CO₂ refrigeration system.

WHY CO₂?

In redesigning the Civic Center's refrigeration system, the engineering firm for Dollard-des-Ormeaux considered using ammonia, Canada's predominant refrigerant for ice rinks, or CO₂, an outlier that was employed at just one other facility, Arena Marcel-Dutil. "It was a tough decision to make," said Erick Laliberté, a junior engineer, foreman and project manager for the city of Dollard-des-Ormeaux. "We did a lot of research." In the end, CO₂ was selected "because the potential of saving energy was bigger with CO₂ than ammonia."

The Civic Center has, in fact, saved a considerable amount of energy using CO₂. By itself, the new system consumes less energy than the original R-22 arrangement – 250 to 500 kilowatts compared with 400 to 600 kilowatts, said Laliberté.

On top of that, the transcritical system has delivered ample heat reclamation – what Laliberté calls heat recuperation. For example, the system provides all of the heat used in the locker rooms, saving 100 kilowatts of electricity during the winter. In addition, most of the energy used to heat the two pools comes from heat reclaim, saving 400 kilowatts, which he termed "free energy."

The total annual energy savings came to 4.5 million kilowatt-hours. "On a bill of \$1 million, we're saving \$250,000 to

\$275,000, compared to the previous system," Laliberté said. In exchange for cutting energy usage, the city of Dollard-des-Ormeaux has received support from the utility Hydro Quebec.

Even with the energy savings, the return on investment is seven to eight years, noted Laliberté. But he does not think that is a long time given the size of the project and the longevity of the system – 30 to 40 years.

Another advantage of the transcritical system is that it has saved space. Previously, the Center's 38-year-old refrigeration system used R-22 in nine racks (pucks in Canada), with two compressors in each rack for a total of 18. Currently that many compressors are in two racks. Besides taking up a lot of space, the old system was prone to leaks, requiring the compressors to be refilled once every week or two.

Laliberté acknowledged that the Civic Center's library is still using R-22 in its chiller, though it should be replaced in the next two years with a natural-refrigerant-based system, probably ammonia. Other units in the building using R-22, which is being phased out in Canada per the Montreal Protocol, are being converted to R-422 or replaced.

continued on p.22 →



Erick Laliberté,
City of Dollard-des-Ormeaux

Marc-André Lesmerises
Carnot Refrigeration

→ LONG OPTIMIZATION PERIOD

As one of the first users of a transcritical CO₂ system in an ice rink, the Civic Center spent a year-and-a-half optimizing the system. "We were starting from scratch," Laliberté noted. The worst issue was faulty pumps, which resulted in leaks on the ice, but this has been addressed. The racks also had to be adjusted as many parameters, including pressures, were "a bit off," allowing some liquid to come back to the compressors, he said.

But the Civic Center has been helped by Carnot's nearby location, just an hour-and-a-half drive away, making it easy to get after-market service, said Laliberté.

For Laliberté, the transcritical system was a learning experience, all the more reason he is "proud of what we did here" as one of the pioneers of CO₂ refrigeration for ice rinks.

He would like the knowledge gained from installing a transcritical system at the Civic Center to be shared with

engineering firms involved in building arenas.

Laliberté, a recent engineering graduate, is also pleased that the CO₂ system will "reduce the impact on the environment for my generation." He added that replacing a high-GWP (global warming impact) working fluid like R-22 with CO₂ is "something that's supposed to be done. It's part of what we learned and what we need to apply."

He recommends that other municipalities or private owners consider using a CO₂ system for an ice rink. "At the end of the year, you can save as an investor and as a public picture everybody's going to say, 'the arena is green.'" The municipality helps spread the green message by displaying the four awards it won for the CO₂ system at monthly city council meetings attended by the public. "People are calling us to get information on the technology," he said. **MG + MC**

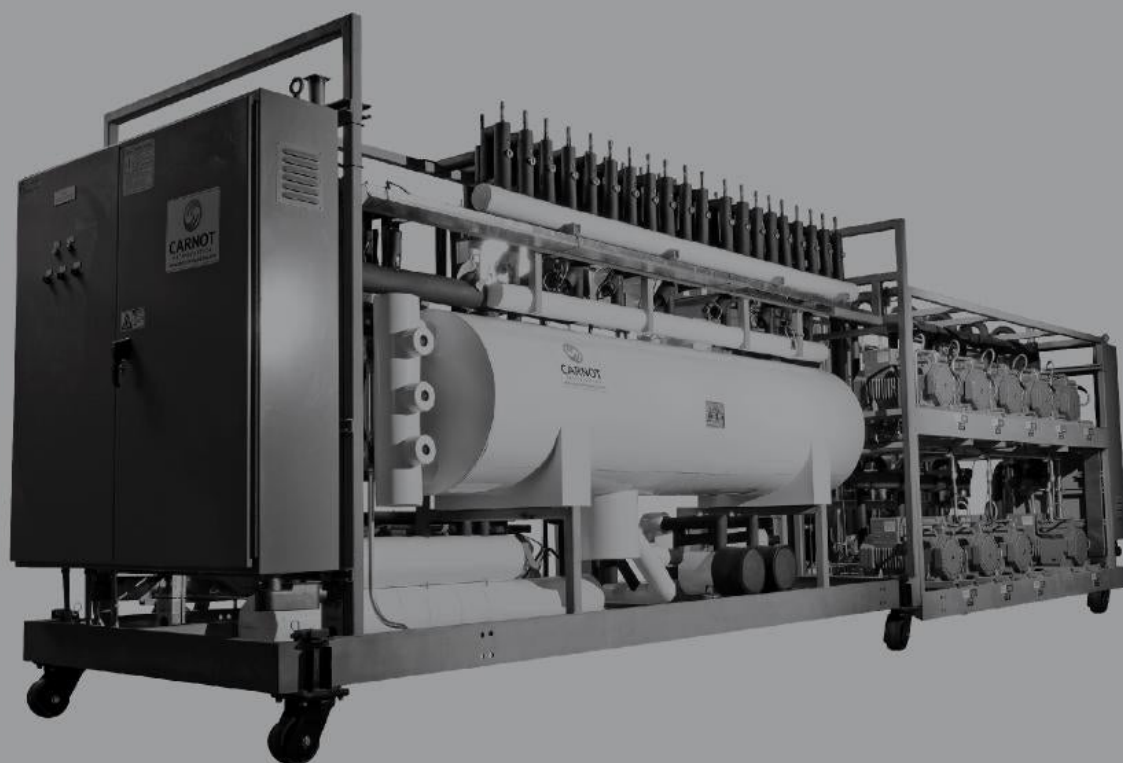


System Specs

The transcritical CO₂ system being used by the Dollard-des-Ormeaux Civic Center, supplied by Carnot Refrigeration, consists of the following:

- Compressor and Desuperheater: The heat generated by the refrigerant's compression is sent to the desuperheater to warm the hot water closed loop.
- Direct heat recovery: Unused heat from the desuperheater is sent to the arena's heat recovery units.
- Domestic hot water exchanger: This is used to preheat domestic hot water.
- Liquid CO₂ tank: This controls the level of the liquid refrigerant, and feeds the exchanger with CO₂/glycol or brine.
- CO₂/glycol or brine exchanger: At this stage, the heat transfer fluid is cooled to maintain the quality of the ice.
- Glycol/brine circulation pumps: The transcritical system can be used with existing circulation pumps, or new ones can be installed.
- Distribution system slab and subfloor: The existing distribution system for the slab and subfloor can be kept and re-used. To protect against corrosion, the transcritical system can be equipped with water treatment.

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CARNOT
REFRIGERATION

NATURAL REFRIGERANTS SHINE AT CHILLVENTA 2014

— By Janaina Topley Lira

Europe's leading trade show for refrigeration, air conditioning, ventilation and heat pumps set a new record this year as the world's largest showcase for natural refrigerant products.



Out of the 984 exhibitors at the Chillventa 2014 trade show in October, over 125 companies displayed natural refrigerant products. This was one of the largest collections of HVAC&R technologies using ammonia, CO₂, hydrocarbons and water as refrigerants under one roof - evidence that, more than ever, trade show participants want to promote environmentally friendly and energy-efficient heating and cooling solutions.

It appears that the European cooling industry is making plans to move quickly to refrigerants with lower GWPs (global warming potentials), including natural refrigerants, in anticipation of the impact of the cuts in HFC (hydrofluorocarbon) quotas envisaged by the revised EU F-Gas Regulation.

Held from October 14 to 16 at its traditional Nuremberg venue in Germany, Chillventa 2014 attracted over 30,000 visitors and saw several important natural-refrigerant product launches. Considered together with the high number of components, systems and services on display, the European market for natural refrigerants can only be described as buoyant.

Natural working fluids, specifically ammonia, have been promoted in industrial applications for decades. But for smaller applications, such as commercial refrigeration, it is only at the last

Chillventa show that visitors have been able to discover natural refrigerant technologies for all types of applications and markets, with astounding energy efficiencies and unmatched environmental advantages.

Ten years ago there were very few natural refrigerant components available. Only prototypes for parts such as valves and exchangers could be found, said Nicola Pignatelli, SCM Frigo S.p.A. sales director, in an interview for a special shecco Chillventa Guide all about natural refrigerants. Moreover, not all the players really believed in CO₂'s growth potential. This was what he calls the "development phase."

Subsequently, a strong increase in demand for more efficient compressors that could work with environmentally benign, "future-proof" refrigerants led many key manufacturers to increase their compressor range. Chillventa

2012 marked a turning point: 90% of compressor manufacturers had products on display for CO₂ or other natural working fluids, and most of the breaking news at the trade fair related to CO₂, ammonia or propane. For Pignatelli this was when the components market fully matured, and system producers entered the "optimization phase".

To help trade show visitors connect with companies offering natural refrigerants at Chillventa 2014, market development company shecco distributed a "Guide to Natural Refrigerants at Chillventa." The free publication, showing the location of all the relevant natural-refrigerant companies, was designed as a simple tool to enable visitors to navigate their way around the seven halls, and quickly locate booths of interest. shecco plans a similar publication for the 2015 AHR Show, which will be distributed as a free supplement to *Accelerate America*.

Besides the trade fair itself, Chillventa 2014 also featured a congress "for experts by experts," including presentations by international speakers on the latest developments in heating, cooling and refrigeration. Natural refrigerants were discussed most widely in a session dedicated to heat pumps, which revealed that globally the technology has in some cases increased its market share by up to 18%.

Speaking about North America, Gerald Groff of Groff Associates explained that in 2013 sales of heat pumps experienced a 15% increase and captured an 18% market share, with gas and oil boilers sales declining. Groff said that he believes the North American market, though mature, will continue to grow as policy standards and environmental concerns drive technology developments.

Several presenters, including Phillip Nelissen from Emerson Climate Technologies GmbH and

Eric Delforge from Mayekawa, also emphasized the potential of heat pump applications to revolutionize the energy market. Accordingly, legislators need to be made aware of the benefits of this technology, in order to consider it more fully in their environmental law making.

Industrial ammonia heat pumps in particular can provide significant energy savings through combined heating, cooling and heating recovery. Kenneth Hoffman from GEA, who presented on optimizing heat recovery in industrial processes by using heat pumps with a 200 to 15,000 kW heating capacity, said ammonia systems should be the preferred option in industrial applications.

In addition to the Chillventa presentations, eurammon, a European initiative for natural refrigerants, organized an event called "Natural Refrigerants Throughout the World – Country Situation, Applications and Experiences." Experts from the United Arab Emirates, Kazakhstan, Turkey and the U.S. showed to what extent operators in these countries are already using natural refrigerants.

Dave Rule, president of the International Institute of Ammonia Refrigeration (IIAR), was optimistic about the role of ammonia in the U.S., where he sees an increased focus on safety and the environment. He believes the U.S. could spearhead an increased use of ammonia across the rest of the world, and that ammonia refrigeration is an ideal technology for meeting the demands of the rapidly increasing global cold chain.

Rule said that as safety concerns are addressed with advanced controls, communication technologies and reliable automated monitoring, previous anxieties are dissipating and ammonia is increasingly becoming the refrigerant of choice for a variety of refrigeration, heating and cooling applications. **JTL**



CHILLVENTA PRODUCT LAUNCHES

German company **Efficient Energy** launched what it calls the world's first production-scale eChiller using water as refrigerant, generating significant buzz at Chillventa. It is claimed that the eChiller could save up to 50% in energy over conventional chillers in its class. The first model has a refrigeration capacity of 45 kW. Units with 20 kW and 90 kW capacities will follow soon.

Tecumseh Products Company, a maker of compressors and condensing units, debuted its new AJ2 series compressor suitable for hydrocarbon refrigerant R-290 (propane) in commercial refrigeration applications.

Galileo TP presented the latest addition to its line of charging units, the KION C11, designed for domestic and commercial refrigerator and freezer production lines with a charge speed up to 40 g/s. Galileo TP's unique systems, have been widely accepted by local AHJ (Authorities Having Jurisdiction) and insurance company safety compliance underwriters, for their high reliability and documented compatibility with local norms, the company said.

On display at the **EVAPCO** booth was the new hybrid condenser, the ATC-DC, which connects two heat exchangers in series, to combine the advantages of an air-cooled unit with an evaporative cooled unit. The hybrid condenser can operate in dry mode at lower ambient outlet temperatures and in evaporative mode during the warm season.

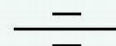
BITZER presented a new, eye-catching open-drive screw compressor in the OS series, the OS.A95. The model is based on the tried-and-tested construction of the OS series and is designed for use with NH₃ (ammonia) in medium- and low-temperature applications.

GEA Refrigeration Technologies introduced a new water-cooled ammonia chiller, the GEA Grasso BluGenium series, based on piston compressors from the GEA Grasso V series. GEA Grasso BluGenium chillers enable brine inlet temperatures of approx. -15 °C to +15 °C. This makes them effective for industrial applications, process cooling, building climate control, and many additional areas. The chillers are available in five model sizes, with maximum cooling duty ranging from 280 to 1210 kW.

Another of the natural refrigerant product launches was the new **Alfa Laval** Arctigo range of industrial air coolers – a versatile product that can be configured for a wide variety of applications. The modular design, combined with a comprehensive selection software, allows customers to choose an exact configuration that will be optimized for their application.

Italian company **Enex** showcased their CO₂ refrigeration units for supermarkets and cold rooms with ejector liquid overfeeding. The unit can operate efficiently even at high outdoor air temperatures.

ATMOSPHERE AMERICA 2015 HEADS SOUTH TO ATLANTA



After two successful conferences in Washington, D.C., and a third annual event in San Francisco this year, in 2015 ATMOSphere America is heading south for its fourth edition on June 25th and 26th in Atlanta, Georgia. ATMOSphere Events Manager Clémence Girard-Reydet gives a sneak peak at what to expect from the 2015 conference, including exclusive training sessions, site visits and workshops with leading manufacturers and end users.



Atlanta Georgia

Clemence Girard-Reydet,
ATMOSphere events manager

continued on p.28 →

The background of the advertisement features a stunning photograph of an aurora borealis (northern lights) in shades of green and blue, dancing over a rugged, snow-covered landscape with rocky terrain and distant mountains. The sky transitions from a deep blue at the top to a bright green where the aurora is most intense.

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→ “As the market for natural refrigerant technologies continues to grow in North America, the ATMOsphere conferences expand with it,” said Girard-Reydet. “For ATMOsphere America 2015, we are expecting a record breaking 300 to 350 participants.” This is partly due to the new location in Atlanta, Georgia, home to a number of leading HVAC&R manufacturers, but also because environmental sustainability has become an important and pressing topic in the HVAC&R industry and, according to Girard-Reydet, “ATMOsphere America is the only forum in North America specifically focused on all five natural refrigerants that features targeted discussions on market, policy and technology trends with all relevant industry stakeholders.”

The new location in Atlanta, Georgia, is not the only novel highlight ATMOsphere America 2015 has to offer. One of the most exciting additions to the program are specialized, end-user sponsored workshops.

“As natural refrigerant technologies continue to gain popularity in North America, we have seen a strong surge of interest in the ATMOsphere events from several new end users,” said Girard-Reydet. “This means we will have many more representatives from supermarkets and consumer goods brands attending the event than ever before. Accordingly, the conference will offer more relevant content for end users and provide additional opportunities for interactions among participants. With ATMOsphere America’s reputation as the best networking forum for natural refrigerant topics in North America, several key end users have stated that, in addition to using the conference as a forum for sharing experiences and gathering information, they will use ATMOsphere America 2015 as a platform to network and interact with suppliers, government representatives and other industry stakeholders.”

Headquartered in Atlanta, Georgia, The Coca Cola Company will be a key player at the conference. Not only is there a Coca-Cola tour in the program, but the company is also likely to sponsor a dedicated “Coca-Cola Light Commercial Refrigeration Workshop.” The workshop will feature presentations from leading end users speaking about their experiences using natural refrigerant technologies and their plans for the future, as well as technology case study presentations from manufacturers for light commercial applications.

The McDonald’s Corporation has also expressed interest in organizing a Foodservice Workshop that will also bring together foodservice end users and system and component suppliers to discuss the progress and challenges within that sector. In addition, ATMOsphere America is planning to

have a Food Retail Workshop and an Industrial Refrigeration Workshop along the same style, sponsored by leading supermarket and consumer goods brands.

“We are thrilled at the prospect of working together with globally recognized brands like The Coca Cola Company and McDonald’s, who will use the ATMOsphere America platform to communicate with their suppliers and peers. This broadens the mix of participants and allows us to deliver specialized workshops geared towards addressing the market’s technology demands in each sector,” added Girard-Reydet.

SITE VISITS AND TRAINING

ATMOsphere America 2015 participants will also have the option to participate in additional site visits and training sessions on the days before and after the event. “Moving to Atlanta, one of the central hubs of the refrigeration industry, has opened up opportunities to broaden the conference program from the traditional set up of market trend and regulatory sessions, end user and supplier panels, workshops and technology case study presentations. We are collaborating with several manufacturers based near Atlanta to organize tours of their facilities and put together specialized training sessions,” said Girard-Reydet. Specifics about these additional tours and sessions will be announced over the coming months on www.ATMO.org/america2015

One of the most highly praised aspects of the ATMOsphere conferences has always been the networking opportunities these meetings provide. “After a long day of formal presentations and discussions, we want to offer our participants the chance to unwind a bit, while still being able to network with their peers in an informal and laid back environment,” explained Girard-Reydet. “We are extremely excited to announce that we will be hosting the main networking reception,

sponsored by Platinum Sponsor Hillphoenix, at the Georgia Aquarium on the evening of the first conference day [June 25th]. Attendees will enjoy the backdrop of the largest aquarium viewing window in North America, filled with tens of thousands of fish, as well as a close-up view of the chilly unknown of the arctic with the Georgia Aquarium’s renowned Beluga Whale exhibit.”

For the fourth consecutive year, ATMOsphere America is pleased to have the support of Georgia-based Hillphoenix as the Platinum Sponsor. The conference also increased its maximum number of Gold Sponsors to include six slots for the 2015 event. Within less than a month of announcing the conference, all Gold Sponsor spots were filled by leading system and component suppliers: Emerson Climate Technologies, BITZER, Heatcraft Worldwide Refrigeration, Carnot Refrigeration, Hussmann and Mayekawa.

“We were very excited to see the top-level sponsorships fill up so quickly” said Girard-Reydet. “I think we can view this as an affirmation that we are delivering a great event and that companies see the value in not only attending, but in using the conference as a platform for increasing the visibility of their natural refrigerant products and for connecting with customers.”

Sponsorship packages are still available for Silver and Bronze levels. In addition to free conference passes and company visibility, sponsors can also benefit from on-site exhibition space, access to private meeting rooms at the event and a number of other benefits.

Registration for ATMOsphere America 2015 will officially kick off in late December 2014 with a limited-time Early Bird Special. The ATMOsphere Review Board will also be issuing a Call for Case Studies in January 2015. Detailed information and updates about the conference can be found at www.ATMO.org/america2015 **JT**

A GLOBAL AGREEMENT ON HFCs BY 2016?

There were high expectations about moving forward on the global phasedown of HFCs (hydrofluorocarbons) under the Montreal Protocol at the Meeting of the Parties (MOP) held in Paris November 17-21, 2014.

While those expectations weren't met, the meeting did produce some progress for those who would like to see the Montreal Protocol phase down production of potent climate-warming HFCs as it has for ozone-depleting CFCs and HCFCs (chlorofluorocarbons and hydrochlorofluorocarbons).





Given the increasing pressure exerted by proponents of an HFC phasedown amendment (US, Canada, Mexico, and the Federated States of Micronesia), along with the European Union's important role in facilitating the debate, and broad support from a majority of developed and developing countries, it is considered likely that an agreement on a global HFC phasedown will be struck in 2015, or at the latest in 2016.

At the meeting, however, countries were unable to discuss the issue formally, mainly as a result of resistance by the Gulf countries and Pakistan. But close to 200 countries did manage to hold structured, informal discussions on HFCs, and an agreement was made to hold an extraordinary Meeting in April 2015 to discuss HFCs prior to the mid-year meeting of the Parties to the Montreal Protocol. In addition, proposals for amending the Montreal Protocol to cover HFCs were submitted by the North American countries and the Federated States of Micronesia for the sixth consecutive year.

On the last day of the meeting, the EU's new Climate Commissioner, Miguel Arias Cañete, announced that the EU is considering submitting a formal proposal to amend the Montreal Protocol in 2015, ahead of talks on a global climate deal at the United Nation's 21st Climate Change Conference of the Parties (CoP21) in Paris in December 2015.

FUND REPLENISHED

Many developing countries have been hesitant to support discussions on HFCs due to lack of financial assurances and uncertainty on how the management of HFCs would be funded. Today, developing countries may be encouraged to support the HFC amendment following the agreement in November on the replenishment of the Multilateral Fund for 2015-2017, fixed at \$507.5 million. This is higher than replenishments agreed for previous trienniums. The Multilateral Fund is a dedicated fund under the Montreal Protocol providing financial resources to developing countries to assist them in

phasing down ozone-depleting substances.

Since demonstration projects are often seen as the most effective way to showcase low-GWP (global warming potential) technology in developing countries, a funding window of \$10 million was approved earlier this year for projects with low-GWP alternatives to ODS (ozone-depleting substances). These projects will be considered and approved in 2015.

With the North American and Micronesian amendment proposals during the last six years failing to overcome the opposition of some of the developing countries, the EU has taken a slightly different approach, which has sparked new interest in the HFC talks. In the discussion paper submitted prior to the meeting, the EU has taken account of some of the concerns raised, which indicated a willingness to openly discuss mechanisms for reducing HFC production and consumption while taking account of the existing obligations to phase out HCFCs. According to the EU, developed countries should follow an ambitious HFC phasedown, while developing countries would combine their existing obligations for HCFC phaseout with an HFC phasedown over a longer-term horizon.

In previous years, the discussions on a potential global phasedown of HFCs were blocked mainly by the two biggest developing economies, India and China. But China has loosened its opposition at recent meetings, and India for the first time did not oppose the inclusion of HFC amendment proposals in this year's agenda, which raised a lot of optimism at the beginning of the meeting.

→ In its statements, China noted that it is open to working towards a multilateral agreement on HFCs, using the experience and institutions of the Montreal Protocol. China hopes that the international community will be able to address the legal issues concerning the Kyoto Protocol and the Montreal Protocol and reach a consensus. The countries opposing the inclusion of HFCs under the Montreal Protocol argue that these gases are already being dealt with under the Kyoto Protocol's United Nations Framework Convention on Climate Change (UNFCCC) and bringing them under the Montreal Protocol would be in conflict with international law. Moreover, opponents of the amendment claim that the Montreal Protocol only has a mandate to regulate ozone-depleting substances, while others argue that its mandate is more flexible and it is because of the phasing out of ODS that there has been such a strong growth in climate-potent HFCs.

The presence of Prakash Javadekar, India's Environment Minister, was a clear sign of the country's changing stance regarding HFCs. During the discussion in the high-level panel he indicated that if there is enough time and if there is consensus, the international community will be able to successfully deal with HFCs. Moreover, by making concrete suggestions on next steps, such as joint collaborative research on alternatives or an extraordinary session to solve technology and finance questions, he indicated India's interest in moving the issue forward.

TEMPERATURE CONCERNS

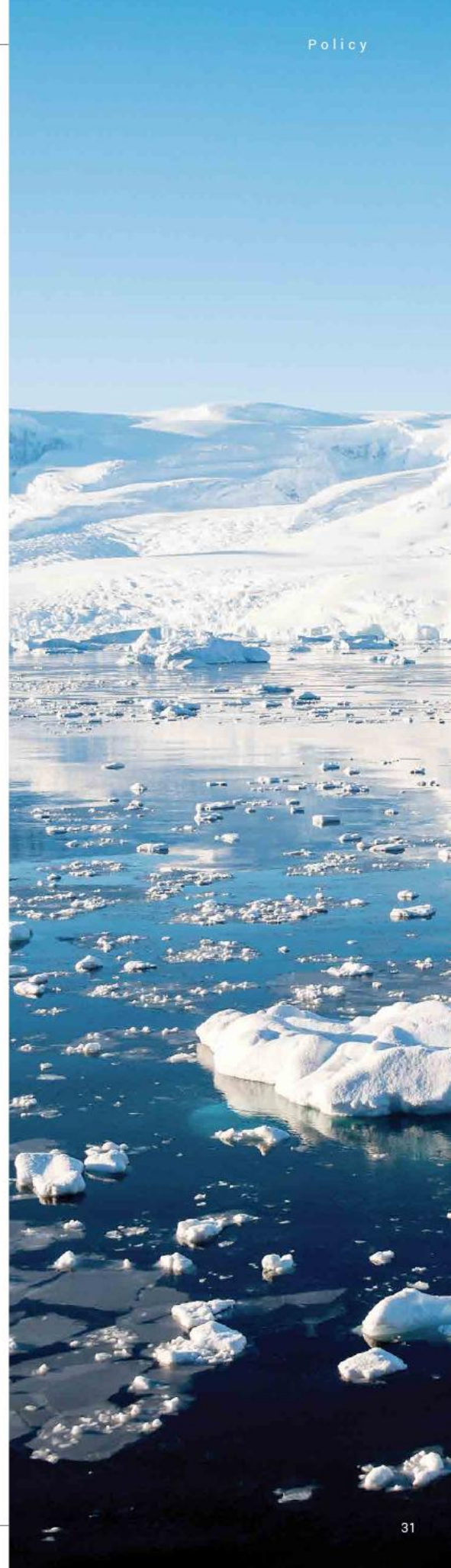
The Gulf countries put a brake on the HFC discussions throughout the meeting and opposed formal discussion on the topic. Their main argument was that low-GWP alternative solutions for HCFCs and high-GWP HFCs are not available for countries with ambient temperatures reaching over 52°C. This is an issue that has been repeatedly raised. Despite HFC-free technologies being readily available for certain sectors in very high ambient temperatures, these are often neglected in the negotiations, and Gulf countries argue that they will not commit to new obligations until alternatives for all sectors, especially air conditioning, are available, safe, and cost efficient.

In spite of the intense discussions among delegates inside of the meeting room and in the corridors, the last-minute efforts of the U.S. to seal a deal on a mandate for a formal discussion group on HFCs hit significant opposition from Pakistan and Iran.

In order to address the concerns of developing countries, the Parties requested that the Technology and Economic Assessment Panel (TEAP) provide additional information on alternatives to ODS with a focus on high-ambient-temperature regions. Moreover, the report that will be presented to the Parties in July 2015, and updated for a Meeting of the Parties in November 2015, needs to identify alternatives that are commercially available, technically proven, environmentally sound, economically viable and cost effective, as well as safe to use in areas with high urban densities and taking into consideration flammability and toxicity issues.

The TEAP has been providing sector-by-sector information on alternatives to ODS, including natural refrigerants, for the last few years. While the reports are generally considered to be a helpful tool for assessing the availability of low-GWP solutions, the feedback received by a number of countries indicates that the large number of new chemical substances that are not commercially available or technically proven, but listed in the report, creates a lot of confusion and uncertainty.

Companies working with CO₂, hydrocarbons, ammonia or water as refrigerants are generally underrepresented at the Montreal Protocol meetings, as opposed to the chemical refrigerant manufacturers. An increased involvement of the natural refrigerant industry at the international level would indeed help to raise awareness of commercially available, energy-efficient technologies among international climate negotiators, which could then open up new opportunities for natural refrigerants globally. **KS**



US-CHINA CLIMATE DEAL COULD BOOST REFRIGERANT MARKET

After months of talks, the presidents of the United States and China have reached agreement on an ambitious joint plan to curb carbon emissions. But what does this pact entail for the future of natural refrigerants?

— By Elke Milner



On November 12th, 2014, leaders of the world's number one and two carbon polluters, President Barack Obama and President Xi Jinping of China, found common ground on the threat posed by climate change and set out a plan to cut greenhouse gases with the hope of inciting other nations around the globe to follow suit. The deal includes new targets for carbon emissions reductions by the United States, upping the goal to between 26% and 28% below 2005 levels by 2025, and an unprecedented commitment by China to cap carbon emissions by 2030 in addition to obtaining 20% of its energy from non-fossil fuels by 2030.

The newly agreed climate deal's future is not yet certain, but could certainly prove to be a step in the right direction for the fight against climate change worldwide.

The pledge ups the ante for international negotiations on climate action. Both nations, as the world's largest emitters, have displayed political will and initiative, possibly breaking the lethargy that has largely clouded climate summits. In conjunction with the EU's already standing goal to cut emissions by 40% of 1990 levels, multilateral action on climate change is likely shifting to a much more dynamic

environment. In addition, the agreement should serve as wake up call that mitigating and reversing climate change is urgent and should be taken seriously.

CALL FOR HFC CUTS

For the HVAC&R industry, the deal also has important ramifications since, besides taking steps to cut and manage CO₂ emissions, it calls for fast action to cut short-lived climate pollutants, namely HFCs (hydrofluorocarbons).

The importance placed on cutting HFCs will likely mean an increased focus on developing and using HVAC&R technologies with working fluids that do not contribute to global warming or depletion of the ozone. If this agreement is taken seriously and includes increased governmental support of climate friendly technologies, it will put wind in the sails of the natural refrigerants market, particularly outside of Europe.

In the US, the natural refrigerant market has great potential and is steadily growing. Ammonia, hydrocarbons, and CO₂ are all approved under the EPA's (Environmental Protection Agency's) Significant New

Alternative Policy (SNAP Program), subject to use conditions, and hydrocarbons could soon be expanded to new applications. Complementing this, the California Air Resources Board currently is considering a number of measures that would limit the use of high-GWP refrigerants.

In China, the national government is offering subsidies to incentivize the implementation of R-290 air conditioning systems as part of the country's "Room Air Conditioning Industry HCFC Phase-out Management Action Plan." The government is also supporting the use of CO₂/ammonia cascade systems in industrial applications as well as promoting heat pumps as an efficient and environmentally friendly technology, which could open up opportunities for CO₂ heat pumps. These have gained significant ground in Japan already.

China's renewables pledge is also far from negligible. As the workshop of the world, experiencing rapid industrial growth, China burns more fossil fuels than any other nation. A 20% reduction in the energy used by such a vast industrial economy is significant. Already China has invested a considerable amount into renewable energy sources, more than the entire European Union combined.

The climate deal has come at an interesting time in the United States, with Republicans having recently gained control of Congress. The deal is already receiving negative feedback. Some right-wing US politicians claim that the agreement puts too much strain on the American economy, and new Senate Majority Leader Mitch McConnell has said it "requires the Chinese to do nothing at all for 16 years." But President Obama continues trying to advance the climate issue using his executive powers and through the EPA, as well as through international agreements. **SEM**

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CHICAGO-AREA RETAILER OPENS MULTI-PURPOSE CO₂ STORE

CAROL STREAM, ILL. — by Pilar Aleu



Angelo Caputo's Fresh Market, an eight-store food retailer, opened a 300,000-square-foot combined warehouse, commissary and retail store in this Chicago suburb in late October that includes a CO₂ transcritical refrigeration system, one of only a handful in the U.S. grocery industry.

The transcritical system, from Hillphoenix, provides cooling for food preparation, the warehouse and the 100,000-square-foot supermarket, distinguishing it from transcritical installations in conventional grocery outlets.

Three of the transcritical system's racks were installed in the warehouse and commissary space at the end of 2013 while a fourth was installed in the retail store in 2014.

In Caputo's Northern Illinois location, which has an average annual temperature of 49° F, transcritical systems can operate 5% to 10% more efficiently than DX (direct expansion) systems using HFC (hydrofluorocarbon) refrigerants, said Hillphoenix. However, the upfront cost of the transcritical system is about 20% to 30% higher than a traditional DX.

Prior to this installation, Hillphoenix had equipped another Caputo's store with a CO₂ cascade system to chill frozen cases. **PA**

ASHRAE SEES GREATER ROLE FOR AMMONIA

ATLANTA — by Caixa Mao

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) here updated its "Position Document on Ammonia as a Refrigerant" in July, emphasizing the role that ammonia can play as an alternative to synthetic refrigerants.

ASHRAE considers that the continued use of ammonia is necessary for food preservation and air conditioning, and that ammonia will likely find additional applications, according to the document.

The organization plans to promote ammonia through seminars and publications, as well as continue research on ammonia-related topics. It will also continue to develop voluntary standards and guidelines for the practical and safe application of ammonia and to provide advice to government and code officials.

The paper suggests that the application of Process Safety Management (PSM) and Risk Management Programs (RMP) must be refined and tailored to avoid imposing unreasonable and overly burdensome barriers on new and existing ammonia refrigeration systems. **CM**

CONN. WHOLESALE ADDRESSES AMMONIA RISKS AT WAREHOUSES

BOSTON — by Michael Garry

The Environmental Protection Agency announced in mid-November that Bozzuto's, a grocery wholesaler based in Cheshire, Conn., has agreed to update safety standards for ammonia at its cold storage warehouse in North Haven, Conn.

Bozzuto's has also agreed to pay \$124,181 to settle claims it violated the federal Clean Air Act's chemical release prevention requirements. The settlement stems from an October 2012 inspection of Bozzuto's handling of anhydrous ammonia and its adherence to the Risk Management Plan (RMP) regulations of the Clean Air Act.

To address EPA's claims, Bozzuto's has spent over \$500,000 to bring both its North Haven and Cheshire facilities into compliance with Clean Air Act chemical safety standards. The wholesaler installed an ammonia detection system with more detection points than required by the regulations and deployed a computerized automatic shut-down control system.

"It is very important for ammonia refrigeration facilities to understand the risks associated with their use of this hazardous chemical and maintain a safe operation," said Curt Spalding, regional administrator of EPA's New England office, in a statement. "It is a matter of public safety that ammonia refrigeration facilities carefully adhere to regulations designed to ensure that these companies manage their systems more safely."

Facilities operating systems with more than 10,000 pounds of anhydrous ammonia are subject to the RMP regulations, while smaller refrigeration systems are subject to the more general "General Duty Clause" of Clean Air Act Section 112(r)(1). **MG**

PUSHING THE BOUNDARIES OF CO₂

— By Elke Milner

Systemes LMP is doing its homework on CO₂ refrigeration with a lab dedicated to testing and teaching.



Xavier Marle
North American sales representative
Systemes LMP

Back in 2000, Systemes LMP, based in Laval, Quebec, decided to create a lab at its headquarters to test ice slurry applications.

The lab evolved in 2005 to test the efficacy of cascade refrigeration incorporating carbon dioxide as a refrigerant. The evolution continued in 2007, when the company, a subsidiary of Lesage, began testing transcritical CO₂ systems.

Then in 2009, Systemes LMP expanded the lab to its current incarnation, which includes a partnership with Micro Thermo, Arneg and Refplus. The testing and teaching lab now allows other non-competing refrigeration companies to evaluate their own products – something that Howe and Copeland have done.

The lab's focus on CO₂ came about because "[Systemes LMP] wanted to jump on the CO₂ bandwagon," explained Xavier Marle, Systemes LMP's North American sales representative. Systemes LMP's president Gaetan Lesage, he added, had a vision to bring quality and assurance to the North American CO₂ refrigeration market, and he wanted to do it right.

"Systemes LMP had already been building systems for many years," Marle continued, "and we knew there would be obstacles, but we didn't want to build a system and then use the customer as a guinea pig, so we decided to build our own lab, here, at our facilities, where we are able to test systems and invite other manufacturers to test their CO₂ products."

The conversation with Marle made three things very clear: Systemes LMP is dedicated to pushing the boundaries of CO₂, offering high quality products, and making the transition to CO₂ as smooth as possible for end users.

TAKING IT TO THE LIMIT

The CO₂ testing and teaching lab has offered the opportunity for Systemes LMP to test and develop their systems long before they even enter a store.

Systemes LMP has thus been able to not only create reliable CO₂ refrigeration systems through testing and validation of oil management and defrost systems, among other factors, but also to develop transcritical subcooling technology to expand the boundaries of CO₂ refrigeration.

The Mason-Dixon Line, which has played a significant role in United States history, still serves as a boundary between north and south, but in a very different area; today it marks the "CO₂ equator," the line below which CO₂ transcritical refrigeration was until recently considered inefficient.

"Usually anything south of the Mason-Dixon Line is a no-go because of higher ambient temperatures year-round," explained Marle.

Systemes LMP's transcritical CO₂ subcooling technology is able to achieve much higher efficiency levels, which opens up the opportunity for the company to pack up and move south with their CO₂ installations, despite sometimes very high ambient temperatures. Marle noted that in the Canadian commercial refrigeration market CO₂ transcritical refrigeration is catching on quite quickly. The numbers of new installations in the US are also increasing every year. "Eventually we want to offer solutions not only to northern states, but also to southern states," he said.

continued on p.36

→ Marle chuckled as he remembered another boundary-pushing exercise carried out on the company's defrosting system for freezer door cases, "Well, we bought a machine that injects a huge amount of humidity into the case. We let it roll in there for about half an hour."

He continued that this was not a humidity level that one would ever see in a store, but the company wanted to test the limits of its defrosting technology. "It passed with flying colors!" he laughed, and then added more seriously, "it proved very efficient."

QUALITY OVER QUANTITY

According to Marle, building the CO₂ test lab was an experience in which the company worked with an extraordinary team of not only engineers, but also technicians. He was firm when he said the company would do it again. Indeed, the project required a substantial amount of resources, but in his opinion to test in-house and put out a product that will operate properly and of which a company can be proud is the best way to go about doing business.

There is no denying CO₂ transcritical refrigeration solutions have higher initial costs than traditional HFC systems; when asked if the test lab has allowed Systemes LMP to optimize systems so that manufacturing costs could be reduced, Marle mentioned the variety of components the company has tested in the lab, and bluntly concluded, "We pride ourselves in using only the best components; we like to sleep at night. We don't want to hear that one of our systems has failed." The company clearly will not use lower-quality products that come at a cheaper price.

Which leaves just one other method by which the costs for CO₂ racks could be reduced: mass production, driven by higher demand. This will allow companies to buy more of the same parts at a less expensive price.

Anyone in the natural refrigerant business knows CO₂ racks aren't mass-produced – they're typically tailored to the specific needs of an end user. But Marle suggested that prices of CO₂ transcritical rack systems will drop as demand increases, which is already happening. "We've started seeing this already in compressors and other components," he added.

NOT LIKE BUYING A SCARF

For Marle, Systemes LMP is pretty late to the CO₂ transcritical refrigeration game, even in North America. But that's because it did its homework.

"The testing took a long time, which is why it took us so long to come up with our CO₂ solution, but now we can rest easy." Marle noted that many people still have a lot of questions about CO₂ refrigeration in North America. Some customers expected to stick to HFC systems, but are starting to realize

the opportunities of CO₂, especially with the reassurance of the testing facility. Deciding on a refrigeration system "is not like choosing a new scarf or coat," Marle said, "you don't change them every fall; it's something you want to be efficient and to last many years."

Systemes LMP's CO₂ transcritical test lab was born out of the idea that system testing and development should be complete before it ever reaches a supermarket. Once a system is installed, there is the possibility that it could cause loss of sales or product if it fails.

In terms of design, Systemes LMP is also working to keep things simple for technicians. CO₂ transcritical systems from Systemes LMP are designed with nearly the same cases as traditional HFC systems. Granted, there are different components in them, but the cases are similar to those with which end users and technicians are accustomed to working, with the hope of reducing the initial shock that might come from servicing a new type of system for the first time. Marle said his company works hard to build systems that are physically compact and that look very similar to traditional systems because he feels that technicians called out to service a system for the first time will be much more comfortable with a system to which he or she can relate, and will become familiar with the technology more quickly.

"That's half the battle of understanding, especially for customers new to CO₂," explained Marle.

At the moment, Systemes LMP is testing a number of control strategies, insisting that offering more than just one will aid in putting end users and technicians at ease when it comes to working on a CO₂ rack. Marle suggested that different companies prefer different control systems. Systemes LMP understands the value of offering more variety to fit a wider range of needs and comfort levels. Offering the same brand of products in CO₂ racks that customers are already used to means they will already be familiar with the programming.

When asked why this is important, Marle responded, "It's all for the sake of improving different CO₂ solutions."

Teaching is an integral part of the CO₂ transcritical test lab as well. Systemes LMP works closely with the installation crew, and regardless of location, insists on a "one-on-one" meeting with the team to reassure it. The company also ensures the installation teams have a training session prior to installation, as well as a training session after the installation is completed. The second session is important because it is imperative the service and installing contractor is aware of all the components on the rack and how to maintain the system.

As for the future of the test lab, Marle believes it depends on how the market transforms. If interest in other refrigerants such as hydrocarbons or ammonia continues to increase, Systemes LMP will evaluate the possibility of expanding its expertise **EM**

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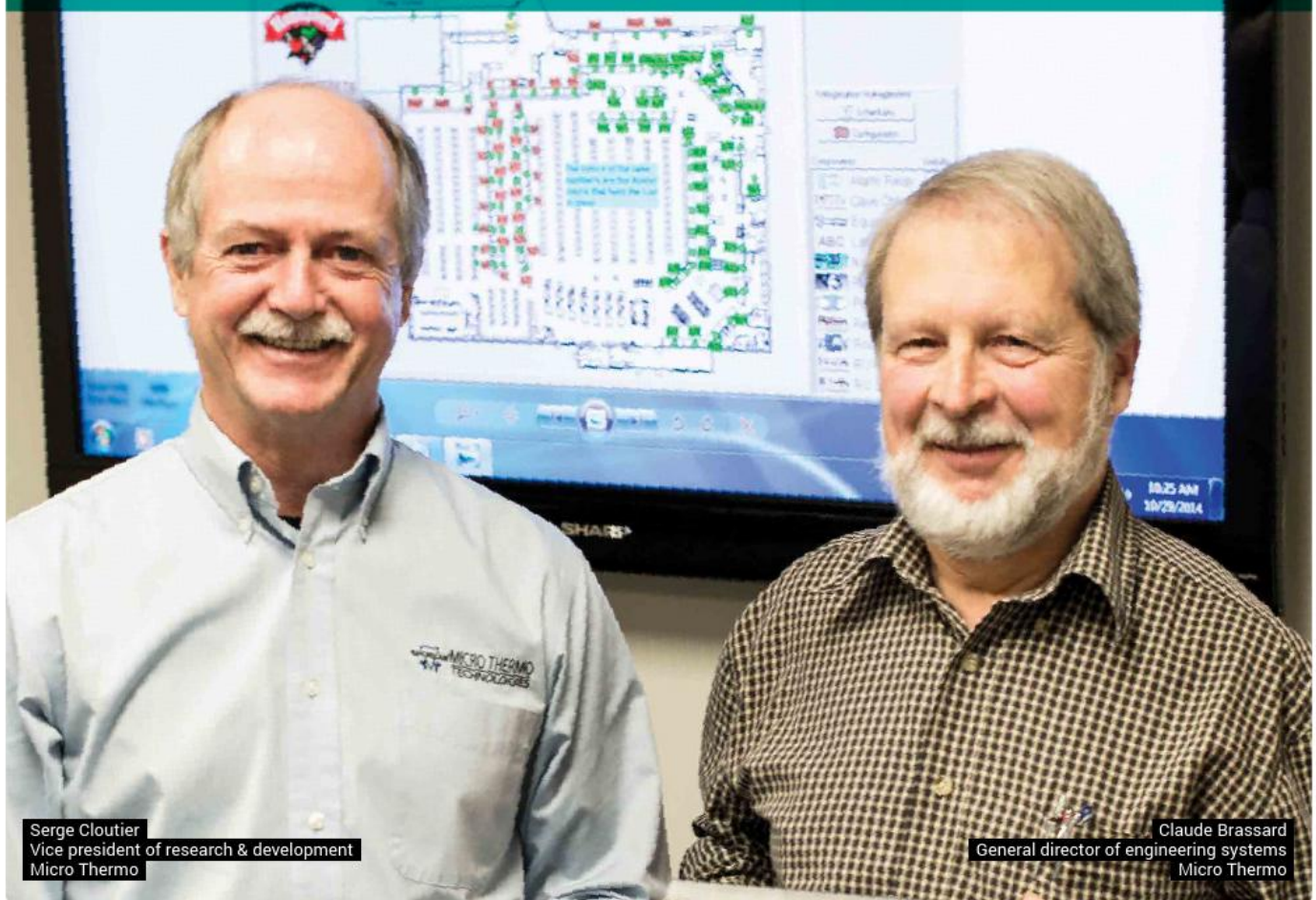
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FOR MICRO THERMO, CO₂ IS THE FUTURE

— By Michael Garry and Marc Chasserot —



Serge Cloutier
Vice president of research & development
Micro Thermo

Claude Brassard
General director of engineering systems
Micro Thermo

The system controls manufacturer supports transcritical CO₂ installations at supermarkets in Canada and the U.S.

In the early days of refrigeration, carbon dioxide was a popular refrigerant, until it was replaced by CFCs (chlorofluorocarbons) in the 1930s. However, CO₂ has been making a comeback in recent years in Europe, and is starting to be used in supermarket refrigeration in North America.

Which is where Micro Thermo Technologies comes in.

Based in Mirabel, Quebec, a suburb of Montreal, Micro Thermo, is a dominant supplier of refrigeration control systems to Canadian supermarkets. Originally an independent family-owned business, it was acquired in 2001 by Carrier Corp., which sold it to Parker Hannifin in 2010; it became part of Parker's Sporlan division.

Mirabel
Québec



As a component supplier, Micro Thermo is poised to help retailers and other business users of refrigeration in North America make the transition from synthetic refrigerant like R-22 and HFCs (hydrofluorocarbons) to CO₂. "There's no doubt in our minds that CO₂ is the way to go for the future," said Claude Brassard, general director of engineering systems for Micro Thermo. "It's like CO₂ was made for this."

For a transcritical CO₂ system, Micro Thermo provides rack controls, case controllers, condenser controls, and temperature and pressure monitoring, as well as software that monitors and collects data from all of the subsystems.

"THERE'S NO DOUBT IN OUR MINDS THAT CO₂ IS THE WAY TO GO FOR THE FUTURE"

When Micro Thermo started working on transcritical systems, it decided to design a controller that was different from that used with standard HFC-based systems. "What we need to do now is merge those two [designs]," said Brassard.

Micro Thermo has already supplied controls to Sobeys stores in Canada that have installed transcritical CO₂ systems. In the U.S., the company's controls are part of two transcritical installations – at a Hannaford supermarket in Turner, Maine, and a Pick 'n Save store in Menomonee Falls, Wis. (See Accelerate America, Nov. 2014 issue.)

For start-up of the Hannaford store, Micro Thermo employees spent "a week at that store sleeping in the mechanical room to make sure it was right," said Serge Cloutier, vice president of research and development for Micro Thermo, adding, "We're part of a big company but we still run it like a small company."

continued on p.41 →



Claude Brassard & Serge Cloutier
Micro Thermo

TWO BROTHERS TRANSFORM FAMILY BUSINESS

When Gaetan Desmarais, the founder of Micro Thermo Technologies, died in 1997 of a heart attack while cross country skiing at the age of 55, the 11-year-old business he founded had just achieved \$1 million in annual sales for the first time.

Since then, under the direction of Desmarais' two sons, Micro Thermo has grown exponentially. A supplier of control and energy management systems for supermarket applications, including refrigeration systems, the company has installed its technology in more than 2,500 stores throughout North America.

"My father trained us; he was the best entrepreneur we ever saw," said Serge Desmarais, business unit manager for Micro Thermo, which has been a unit of Parker Hannifin's Sporlan division since 2010. Before that, he was president of the company while it was owned by Carrier Corp. (from 2001 to 2010) and while it was independently owned. His brother, Patrick, is operations manager of the company.

Micro Thermo originally focused on temperature alarms for supermarkets. "When my father died, we were doing just monitoring, not any controls," said Desmarais. "The day that he died we decided to do controls." Over the next four years, the company grew to such a degree that "Carrier came to our door and made an offer to me and Patrick we could not refuse."

Micro Thermo's control systems initially complemented Carrier's HVAC, refrigeration manufacturing (under Tyler) and compressor (under Carlyle) businesses. But after Carrier sold Tyler's assets to Hillphoenix, the relationship lost its synergy, Desmarais said, and Micro Thermo was ultimately acquired by Parker Hannifin.

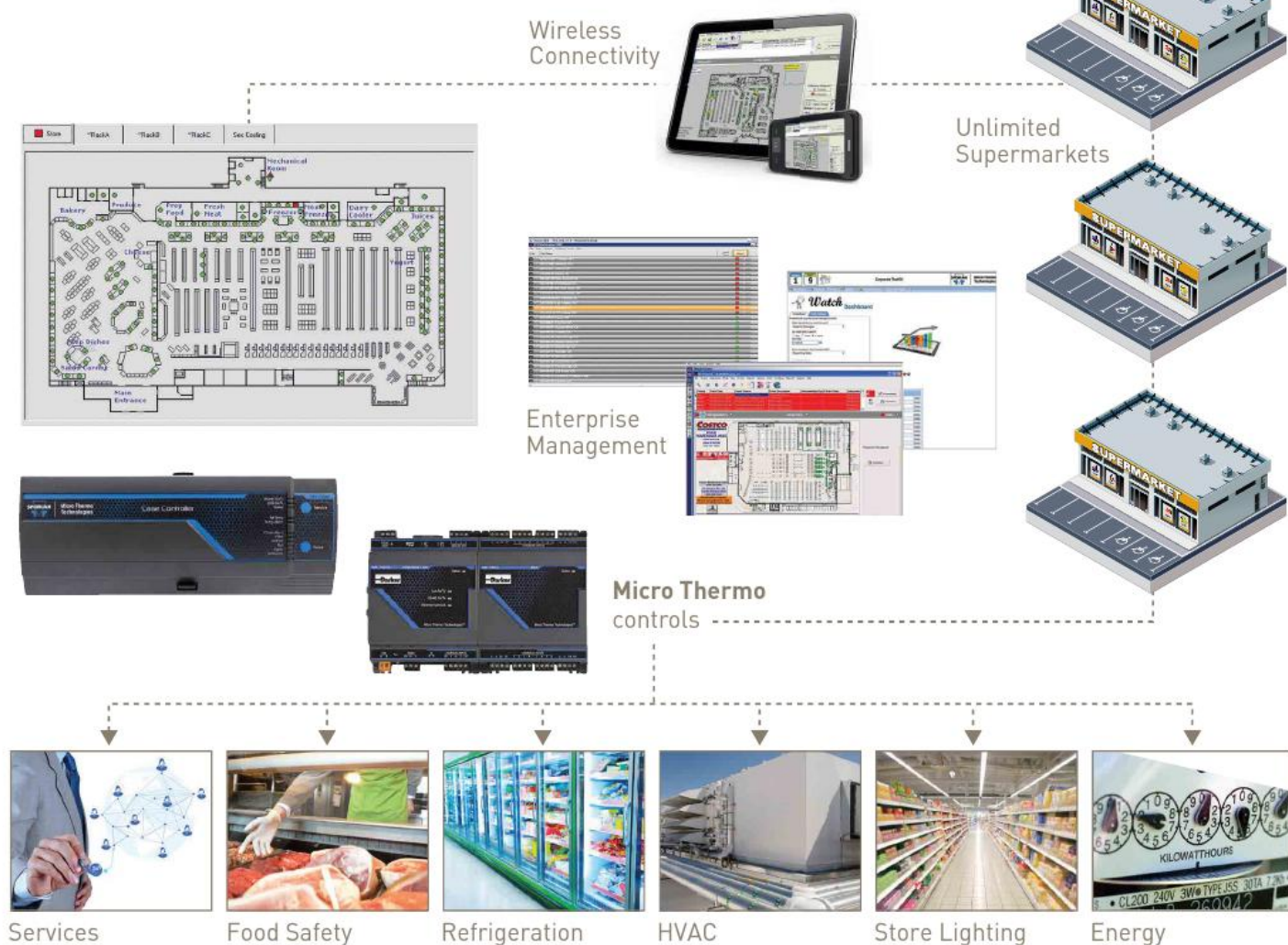
Micro Thermo built its business in Canada and has expanded within the United States. Over the next year, it plans to enter the Asian and European markets, said Desmarais.

Along with his business goals, Desmarais wants Micro Thermo to be a positive force for the environment. "We're saving energy to save the planet. We're [working with] CO₂ to save the planet." He also pointed out that the company's temperature monitoring systems help prevent food poisoning.

And he thinks about the future for his two children and his brother's four children.

But Desmarais, 48, has set a tentative goal of retiring when he reaches 55, the age his father died. "We don't have many years to work, me and Patrick. So there's not many years left to pass it on to the next generation."

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→ At the Pick 'n Save store, the Micro Thermo case controllers provided very detailed information, said Kevin Christopherson, energy program manager, Roundy's Supermarkets, Milwaukee, Wis., which owns the Pick 'n Save banner. "It's incredible what control they give you over the cases, with the ability to fine-tune the system."

LED BY SOBEYS

Micro Thermo began designing controls for CO₂ systems because its customers, especially Sobeys, were headed in that direction, motivated by environmental concerns. "First of all, there's the green part of CO₂," said Cloutier. "Natural refrigerants are a good thing for humanity. So the food industry went there – you have to go there."

By that time, the European market was already headlong into CO₂ refrigeration. "So the risky part was done in Europe," said Cloutier.

Brassard is convinced that CO₂ is the refrigerant of the future, not just as a replacement for HFCs but because "it's a really nice refrigerant to work with."

Refrigeration system OEMs (original equipment manufacturers) are beginning to share this view, Brassard said. "At the beginning, they said, 'OK, we'll do CO₂' because the customer wanted it or for whatever reason. But the more they started working with CO₂ the more they liked it. Now they're hooked on it because they believe CO₂ is the best refrigerant."

Moreover, Cloutier sees the "cost delta" between CO₂ systems and conventional DX (direct expansion) systems coming down.

Taking a view contrary to many, Cloutier and Brassard believe, that the higher pressures associated with CO₂ represent an advantage in the long run because it has resulted in smaller piping. "Everything is smaller as a matter of fact," said Brassard. The only issue at the beginning was the equipment's lack of availability in North America. "But we could see that in the long run, not only would higher pressure equipment become available but it would become much cheaper," he said.

Meanwhile, adoption of transcritical CO₂ systems in U.S. supermarkets remains limited to a handful of stores. Case controls also do not have significant adoption in the U.S.

Cost is certainly an issue as factory-installed case controls boost case costs by at least \$30,000. "But we're working hard to convince customers that there are huge paybacks," said Clay Rohrer, business unit manager for Parker Sporlan, Micro Thermo's parent division. These include not having to extend wires to controllers in the machine room, as well as savings in service, commissioning and energy.

Rohrer is starting to see adoption of case controls in northern parts of the U.S. at stores with transcritical systems (such as Pick 'n Save and Hannaford). To support its sales efforts, he added, the company is running tests on conventional systems to show that case controls also reduce costs on those systems – while helping with the transition to CO₂. **MG + MC**

INTELLIGENT CONTROLS

Carbon dioxide has very advantageous refrigeration properties, but early 20th century systems were not equipped to fully capitalize on them. That's no longer the case today.

"CO₂ is not such a good refrigerant for mechanical controls," said Claude Brassard, general director of engineering systems for Micro Thermo Technologies. "But it's the perfect refrigerant when you have good electronic controls and good software."

What is especially exciting to Brassard is the impact that sophisticated control software – ultimately taking the form of artificial intelligence (AI) – will have on refrigeration systems. The AI system will be "very simple to install; you don't have to enter a lot of parameters into it," he said. "It will recognize what is happening around it and be able to adapt."

For example, in controlling a case, the AI system would be able to determine the thermal load and how it changes with outside temperature and time, and automatically make the necessary adjustments, without manual intervention. Micro Thermo is not far from having such a system, now that it has developed a platform with 20 times as much memory as the controllers it used in the past.

Meanwhile, Micro Thermo's systems monitor and control all store systems – refrigeration, lighting and HVAC – not only at the store level, but also at the enterprise level across multiple stores. "At the end of the day, what's important is how much [energy] cost is in the whole installation, not just the rack," said Brassard. In addition, its Web Energy Logger provides energy monitoring, demand response load shedding and real-time pricing services.

Micro Thermo has designed its control systems to work with any refrigeration system, regardless of manufacturer. "We work closely with the OEMs to understand what they are doing," said Serge Cloutier, vice president of research and development for Micro Thermo.

EVENTS PLANNER 2015

NATURAL-REFRIGERANTS-RELATED EVENTS IN THE COMING YEAR

JANUARY

January 21-23 — Washington, DC

SAE Government/Industry Meeting

www.sae.org/events/gim

January 22-23 — Urbana, IL

Symposium on Latest Technology Trends in Low-charge Hydrocarbon Refrigeration

www.creativethermalsolutions.com/bulletin.html

January 24-28 — Chicago IL

2015 ASHRAE Winter Conference

www.ashraem.confex.com/ashraem/w15/cfp.cgi

January 25-28 — Orlando, FL

StorePoint 2015

www.storepointevent.com

January 26-28 — Chicago, IL

2015 AHR Expo

www.ahrexpo.com

January 27-29 — Atlanta, GA

International Production & Processing Expo

www.ippexpo.org

FEBRUARY

February 5-7 — Orlando, FL

MACS 2015 Training Event and Trade Show

www.macsw.org

February 7-11 — Atlanta, GA

WFLO Institute

www.gcca.org/wflo-institute-cold-chain-education-training/

February 8-11 — Las Vegas, NV

NGA Show

www.nationalgrocers.org/the-nga-show/the-nga-show--home/

February 16-20 — Charlotte, NC

Industrial Refrigeration Workshop

www.dce.k-state.edu/conf/industrialrefrig

February 19-21 — Anaheim, CA

The NAFEM Show 2015

www.thenafemshow.org

February 23-26 — Montreal, QC

13th Annual Cold Chain GDP & Temperature Management Logistics Global Forum

www.coldchainpharm.com

MARCH

March 15-17 — Boston, MA

Seafood Expo North America/ Seafood Processing North America 2015

www.seafoodexpo.com/north-america

March 16-19 — Grapevine, TX

ACCA Conference & IE3 Expo

www.acca.org/education/conference

March 22-25 — San Diego, CA

2015 IIAR Industrial Refrigeration Conference & Exhibition

www.iiar.org/IIAR/WCM

APRIL

April 13-14 — Vancouver, BC

Grocery Showcase West 2015

www.cfig.ca/page.asp?id=43

April 21-23 — Detroit, MI

SAE 2015 World Congress & Exhibition

www.sae.org/congress

April 22-24 — Las Vegas, NV

2015 NAMA OneShow

www.namaoneshow.org



April 25-29 — Orlando, FL
124th IARW-WFLO Convention & Expo
www.qcca.org/events/124th-iarw-wflo-convention-expo/

April 26-29 — San Antonio, TX
BuildPoint 2015
www.buildpointevent.com

MAY

May 16-19 — Chicago, IL
NRA Show 2015
www.show.restaurant.org

May 26-28 — Boston, MA
2015 Ice Arena Conference & Trade Show
www.skateisi.com/site/sub_cfm?content=ice_arena_conference_and_tradeshow

JUNE / JULY

June 8-11 — Chicago, IL
FMI Connect
www.fmiconnect.net

June 24-26 — New York, NY
The Global Summit 2015
<http://tcgfsommit.com>

June 25-26 — Atlanta, GA
ATMOsphere America 2015
www.atmo.org/america2015

June 27 - July 1 — Atlanta, GA
2015 ASHRAE Annual Conference
<http://ashraem.confex.com/ashraem/s15/cfp.cgi>

AUGUST / SEPTEMBER

August 30 - September 1 — Boston, MA
60th Annual Safety in Ammonia Plants and Related Facilities Symposium
www.aiche.org/conferences/annual-safety-ammonia-plants-and-related-facilities-symposium/2015

September 15-18 — St. Louis, MO
COMFORTECH 2015
www.comfortechshow.com

September 20-22 — Ft. Lauderdale, FL
IANA Intermodal Expo 2015
www.intermodalexpo.com

September 27-30 — San Diego, CA
FMI Energy & Store Development Conference
www.fmi.org/events

September 28-29 — Toronto, ON
Grocery Innovations Canada 2015
www.groceryinnovations.com

OCTOBER

October 14-17 — Rosemont, IL
78th Annual RSES Conference and HVACR Technology Expo
www.rses.org/conference.aspx

October 20-22 — Guadalajara, Mexico
2015 AHR Expo-Mexico
www.ahrexpomexico.com

NOVEMBER

November 18-20 — Washington, DC
Greenbuild International Conference and Expo
www.greenbuildexpo.com

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M A G A Z I N E

EDITORIAL CALENDAR 2015*

Issue #3 February (to be published mid Jan)

Special Issue: AHR Expo

Supplement: GUIDE AHR EXPO

Format: Digital + Print of Guide AHR Expo (@ AHR Expo)

Ad submission deadline: January 7

Issue #4 March (to be published early March)

Special Issue: Foodservice (NAFEM coverage)

Format: Digital

Ad submission deadline: February 23

Issue #5 April (to be published mid April)

Special Issue: Industrial Refrigeration (Food Processing / Food Storage)

Format: Digital + Print (@ IARW)

Ad submission deadline: April 3

Issue #6 May (to be published mid May)

Special Issue: Energy Utilities (Programs, Research, Rebates)

Format: Digital

Ad submission deadline: May 4

Issue #7 June (to be published mid June)

Special Issue: Ice Rinks + Trade Show Coverage

Format: Digital

Ad submission deadline: June 5

Issue #8 July / August (to be published end of July)

Special Issue: ATMO America + Accelerate Awards (incl. Person of the Year)

Supplement: ATMO Summary Report

Format: Digital + Print (@ FMI Energy)

Ad submission deadline: July 17

Format: Digital + Print (@ FMI Energy)

Issue #9 September (to be published early Sept)

Special Issue: FMI Energy Conference

Format: Digital + Print (@ FMI Energy)

Ad submission deadline: August 17

Issue #10 October (to be published early Oct)

Special Issue: Intermodal / Transport Refrigeration

Format: Digital

Ad submission deadline: September 18

Issue #11 November (to be published early Nov)

Special Issue: Training + Servicing (RSES + Expo Coverage)

Format: Digital

Ad submission deadline: October 19

Issue #12 December / January (to be published early Dec)

Special Issue: Regulatory Issue (US + International Policies, Standards,

Codes Update)

Format: Digital

Ad submission deadline: November 20

Additional topics:

HVAC + Heat Pumps

Wineries

Servers (IT)

Research

* Publisher reserves the right to modify the calendar.