

TECHNOLOGY & LOGISTICS

SN SPECIAL REPORT



Retooling Coolants

As food retailers, especially large ones, start replacing their old HCFC refrigerants, they will have to choose from a growing number of alternatives

By MICHAEL GARRY

With more than 30,000 supermarkets operating across the U.S., the food retail industry's stamp on the environment is undeniable and its involvement in environmental issues inescapable.

One of the more high-profile issues continues to be the need to replace ozone-depleting HCFC, or hydrochlorofluorocarbon, refrigerants used in low- and medium-temperature display cases with more environmentally benign HFC versions (which lack the chlorine). While not new (CFCs have already been retired), this issue acquires greater significance with the passage of time as federal deadlines regarding the production and importation of those refrigerants draw nearer.

Thus, refrigerant conversions and retrofits were front-and-center at Food Marketing Institute's 27th annual Energy & Technical Services Conference, Sept. 10-13 at the Wigwam Golf Resort & Spa, Phoenix. Retailers were frequently reminded of the timetable set

by the U.S. Environmental Protection Agency for the phaseout of HCFC refrigerants (in accordance with the Montreal Protocol agreement).

The next major deadline is 2010, when no production or importing of HCFC-22 (R-22) refrigerant — commonly used by U.S. retailers — will be allowed for new refrigeration equipment. In 2020, production and importing of R-22 will be completely halted in the U.S. At that point, the only source of R-22 will be old R-22.

While 2010 is just over three years away, the more onerous deadline of 2020 still seems fairly remote, especially for retailers grappling with day-to-day competition. So why worry about this now?

So far, a relatively small number of food retailers have begun to retrofit their refrigeration systems, replacing R-22 with HFC refrigerants, notably R-404A. These have tended to be medium to large companies like Raley's, Stop & Shop, Giant Eagle and Supervalu.

Continued on Page 58

Retooling Coolants

Continued From Page 57

“They look at the number of stores using R-22 and decide they’ve got to reduce their exposure,” said Kevin O’Shea, marketing manager,

North America, DuPont Fluorochemicals, Wilmington, Del. “So they pick a certain number of stores per year and start doing retrofits.”

In planning for retrofits,

retailers are finding a growing number of refrigerants from which to choose, including new HFC/HC blends such as R-422A and R-422D.

Another reason to get rid of HCFC refrigerants sooner than later is to be free from “the record-keeping burden of [ozone-depleting]

refrigerants and the risk of penalties by not being in compliance with government regulations,” observed Kenneth Welter, manager of refrigeration engineering, Stop & Shop, Quincy, Mass., in a presentation at the FMI Energy Conference.

In particular, under the

EPA’s Clean Air Act of 1990, operators of refrigeration equipment are required to repair, replace or retrofit their system within 30 days if they have an annual leak rate of 35% or more. FMI has been seeking to negotiate with EPA the terms by which the regulation is enforced. (See related story, this page.)

However, added Welter, retailers should not view HFCs as regulation-free. HFCs can’t be intentionally vented, and “the EPA might treat the failure to repair a leaking HFC system as a [violation].” Moreover, the EPA may eventually impose additional regulations on HFC equipment, so it behooves retailers to maintain “a rigorous refrigeration management program,” he said.

The reason for EPA’s concern about HFCs is that, though they don’t harm the ozone layer, they contribute more to global warming than HCFCs. “To my mind, it’s uncertain how far we’re really advancing the bar environmentally [with HFCs],” Welter said. “In the absence of a true environmentally friendly refrigerant, we need to find a better way to operate systems with a reduced refrigerant charge and system efficiency as good as we have today.”

EPA Negotiations Still on Hold

WASHINGTON — At last year’s Food Marketing Institute Energy & Technical Services Conference in Montreal, Deborah White, vice president and associate general counsel, regulatory affairs for FMI here, told attendees that FMI’s negotiations with the U.S. Environmental Protection Agency regarding refrigerant leak regulations were “on hold.”

The negotiations concerned provisions of the EPA’s Clean Air Act of 1990, under which retailers are required to repair, replace or retrofit their refrigeration system within 30 days if they have an annual leak rate of 35% or more. FMI was seeking to negotiate a voluntary industry partnership whereby the EPA would not pursue any past violations if a retailer took a more aggressive approach to refrigerant conversions. But EPA told FMI that it wanted to complete individual partnership discussions with at least two retailers before pursuing negotiations with the industry as a whole.

A year later, where do the negotiations stand? “At EPA’s request, discussions with the agency on an overall voluntary industry program continue to be on hold,” White told SN in an email communication. However, that doesn’t mean that no progress has been made.

At FMI’s Energy & Technical Services Conference in Phoenix Sept. 10-13, the EPA announced a new voluntary program called GreenChill. While not addressing leak regulations, the program,

through an alliance of the EPA, the supermarket industry and other stakeholders aims “to promote the adoption of new [refrigeration] technology and best practices that will lower the emission of ozone-depleting substances and greenhouse gases,” said Timothy Juliani, with the EPA’s Office of Air and Radiation.

With the advent of GreenChill, FMI’s negotiations with EPA have “in some respects, been superseded” by the program, White said. However, Juliani pointed out that participating in GreenChill “does not provide relief for violations of refrigerant regulations under the Clean Air Act.”

Under GreenChill, supermarket companies will be asked to anonymously report yearly corporatewide refrigeration emissions and develop a policy for reducing emissions within one year of joining the program. Companies with advanced refrigeration technology will also share operational and maintenance data with EPA.

The EPA also indicated at the conference that regulations regarding refrigerant leaks may change next year when the agency proposes revisions. The proposed changes include lowering the 35% leak rate maximum for retailers, said Julius Banks, with the EPA’s Stratospheric Protection Division. “FMI supports the rule-making and the clarity it is expected to provide,” White said. “FMI and FMI members intend to participate fully in the process.”

— M.G.

CLOCK IS TICKING

All things considered, Welter doesn’t think small retailers need to jump on the retrofit bandwagon immediately. Those operators, he suggested, “could wait for the best refrigeration and technology option before starting a retrofit program,” he said. Even after the 2020 phaseout, there should be enough R-22 available to service a small number of stores.

However, this approach does not apply to large food retailers, who, Welter believes, should embark on a refrigerant retrofit program right away. For example, a chain with 500 stores “can’t assume a sufficient quantity of R-22 after 2020,” he said. Moreover, with 159 months left until Jan. 1, 2020, that chain would need

to retrofit nine systems per month to be completely converted by that date. If the chain didn't start until 2010, it would require 12 retrofits per month; waiting until 2015 would call for 25 retrofits per month.

Thus, for large retailers, "the clock is ticking and if you wait too long you could find yourself in a scramble to get your company down to a manageable number of HCFC systems before the 2020 phaseout date," Welter said.

Stop & Shop has begun its retrofit program, which are mostly coordinated with store remodels, though Welter declined to indicate how many stores have been completed so far. All of the systems have been retrofitted with R-404A, an HFC blend refrigerant, with the exception of one store in Quincy, Mass., where R-422D, a newer, HFC/HC blend, was deployed last month to support produce cases.

Welter offered guidelines on how to go about a retrofit. Prior to the conversion, retailers should check for leaks and survey the complete system. He said identifying components with leaks — in his case elastomeric seals — "is far and away the No. 1 issue in refrigerant conversion."

For some refrigerants, such as R-404A, the mineral oil used with R-22 is not compatible, and so the mineral oil must be thoroughly flushed out of the system prior to the retrofit. That was not necessary for the R-422D conversion, because R-422D also works with mineral oil. Once R-22 refrigerant is removed from a system, it can be recycled in a chain's remaining R-22 systems.

In every one of Stop & Shop's retrofits, Welter employed what's called a mechanical subcooler, which can increase a refrigeration system's cooling capacity if necessary, such as during warm summer weather.

Its presence also means the system's existing expansion valves, which control the flow of refrigerant and thus the cooling process, can be retained with the new refrigerant.

"A subcooler is the key to

an easy retrofit," he said, "especially when you're doing a lot of conversions and you don't have time to turn each one into a research project. I see it as a kind of insurance policy." He hasn't had to switch on the subcooler

yet at the Quincy store's R-422D retrofit, but that could change next summer. Subcoolers cost around \$2,500.

So far, Welter said, the 422D retrofit "is pretty close to a drop-in" installation. "We installed

mechanical subcoolers, replaced Schrader cores and rebuilt solenoid valves because of the leak potential, but that's all we did." Other components, such as expansion valves and power

Continued on Page 60

Retooling Coolants

Continued From Page 59

heads, were left in place.

"We will monitor the system in the coming months but at this point I'd consider R-422D a good candidate for future systems," he said.

OTHER OPTIONS

Like Stop & Shop, Supervalu, Minneapolis, has embarked on a retrofit program, using R-404A in new construction and major remodels. Supervalu has also tried another new HFC/HC blend called R-422A, putting it in a Bigg's store in Florence, Ky., in March 2005. The R-422A is used to refrigerate a variety of cases, including reach-in ice cream, frozen food, dairy and deli. Two more R-422A conversions are planned.

R-422A is a good replacement for R-22 from a technical perspective (capacity, flow rate) and is also more

energy efficient, consuming 8.4% less energy, said George Ronn, manager, EPA compliance and system controls, Supervalu, who also spoke at the FMI Energy Conference. Moreover, R-422A has a 22% lower "global warming potential" than R-404A, works with mineral oil and does not require a complete replacement of expansion valves, just the power element.

Ronn said the total cost for the R-422A conversion was \$29,870, of which \$11,625 was the cost of refrigerant. The rest came from labor, refrigerant recovery and equipment. "It was about 32% less costly to perform than a similar R-404A conversion," he said. Most of the difference was the cost of polyolester oil needed for R-404A (\$75 per gallon) vs. the cost of mineral oil (\$16 per gallon).

A new breed of refrigeration systems — dubbed secondary loop systems — provide an alternative scenario whereby a secondary coolant



Kenneth Welter, Stop & Shop (left) and George Ronn, Supervalu.

is pumped to the sales floor rather than the HCFC or HFC varieties, which are still used in the back room. This secondary coolant is a substance such as carbon dioxide that is harmless to the environment, from both an ozone and global warming perspective.

Hill Phoenix, Conyers,

Ga., has marketed a secondary coolant system for medium temperature cases using a coolant consisting of water and propylene

sustainable technologies, Hill Phoenix. Hill Phoenix's carbon dioxide system, which has not been fully commercialized yet, will be tested next at a Food Lion Store later this year.

At the Sam's Club, "the utilization of carbon dioxide as a secondary heat transfer fluid allowed for 1,664 pounds [in savings] of installed copper and a reduced refrigerant charge and leak rate leading to carbon emissions savings of 6,448 tons over 10 years," said Martin, speaking at the FMI Energy Conference. It also uses less energy, which will result in an energy savings of 239,000 kilowatts per year.

glycol. For low temperature cases, the company has introduced a system employing carbon dioxide as the secondary coolant. A Sam's Club in Savannah, Ga., began using both types last month, with the carbon dioxide system the first of its kind in the U.S., according to Scott Martin, director,

As part of a new program called GreenChill, the EPA will be seeking data from retailers on the relative costs, leak rates and efficiency of advanced refrigeration systems such as secondary loop and distributed systems as well as traditional direct expansion systems.