

The Inevitability of Flammable Refrigerants

By David L. Handwork

The Montreal Protocol, finalized in 1987, was originally adopted for eliminating world-wide production and use of atmospheric ozone-depleting substances. It was successful in eliminating production of several chlorofluorocarbon (CFC) products commonly used in air-conditioning equipment. The success of CFC elimination can be seen in NASA's data on both the ozone layer increasing and the polar ozone hole decreasing in the last decade. The predictions made 30 years ago were not this optimistic for ozone recovery. Consequently the

ozone crisis has faded from the public media and political narratives.

In the late 1990s, the purpose for the Montreal Protocol started shifting from an ozone-layer crisis to the global-warming/climate-change agenda. The list of phased-out substances was modified to include those that may or may not affect the ozone, but were known to contribute to atmospheric greenhouse gases. This shift of application and policy has been a topic of fierce debate. Regardless of debate position, the United States and other world governments have adopted the elimination and phase-out of hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs), all which have high global-warming potential (GWP). The phase-out dates for HCFCs is certain, but the dates for HFCs in the United States could be subject to further debate and change.

THE CHALLENGE OF REPLACEMENT

The significant challenge with eliminating widely used refrigerants is their replacements. Moderate-to-high GWP refrigerants are widely used not only for their superior thermal characteristics, but also for their nonflammability. The alternatives with low GWP are generally flammable, which creates operational safety challenges not currently experienced with HFCs or HCFCs. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) is aggressively and ambitiously addressing this safety challenge. With U.S. Department of Energy and industry contributions, ASHRAE is funding and overseeing a \$5.8 million "moon-shot" research project to address safe and effective application of "Low GWP Flammable Refrigerants." This research began in late 2015, with completion planned for this year. The research outcome will provide modifications to ASHRAE Standard 15, "Safety Standard for Refrigeration



Systems,” and Standard 31, “Designation and Safety Classification of Refrigerants.”

These standards are written in code-friendly language for incorporation or adoption into existing model codes. The intent of the aggressive standards update is low-GWP refrigerant acceptance by federal policymakers and code entities. Adoption and acceptance could rapidly accelerate U.S. phase-out of HFC products. This includes refrigerants R134a and R4101a, which are very widely used in campus chillers and HVAC equipment.

THE DIRECT IMPACT ON FACILITIES MANAGERS

These phase-outs could have significant cost implications for education facilities within the next decade. Facilities managers will need to make strategic decisions on current HVAC equipment replacements with refrigerant products slated for obsolescence. Maintenance-technician training will be required for the regulations and standards coming with new refrigerants such as propane or ammonia. Procurement, storage, and handling of new refrigerants may radically change.

Mechanical rooms housing refrigeration equipment within buildings may require modifications related to safety, including new air monitoring and ventilation. Cost implications for new equipment are unknown. However, it's anticipated that manufacturers will incur significant development costs for new refrigerants that will be passed on to consumers.

Preparation and planning should begin at your facility, with discussion and understanding of this imminent change. To help prepare for the transition that is coming, Underwriters Laboratory hosted a free, four-part “Flammable Refrigerants Webinar Series,” and all four sessions were recorded and available for viewing at www.ul.com.

The APPA Standards and Codes Council will continue monitoring and membership reporting of refrigera-

tion policy developments. Federal phase-out policy updates are anticipated in 2018. ☞

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