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# HYDROCARBONS: A DEVELOPING OPTION FOR SUPERMARKETS

Given their efficiency and negligible environmental impact, hydrocarbons have significant potential as a refrigerant in self-contained and microdistributed grocery cases

By Jim Armer

The Food Marketing Institute's Energy and Store Development Conference, held last month in San Diego, continues to offer valuable networking and educational opportunities for supermarket professionals. Following this conference, I enjoy sharing thoughts on the themes the industry is discussing. Sharing the technical fundamentals, lessons learned, and data about refrigeration applications with the industry can trim years off development, advancement, and adoption of standards for the entire industry.

One of the FMI presentations I found most beneficial was one of the general sessions called "A Provocative Look at the Future of Refrigeration and Store Design." One of the presenters, Paul Anderson of Target, shared his experience with propane (R290) as a refrigerant and its performance in self-contained applications. (See story, [page 32](#).) This sharing of real data and forward thinking about the future of refrigeration is something many appreciate. It is intriguing to consider what continued development and scalability of hydrocarbons could look like in supermarkets.

Hydrocarbons, especially propane, are getting some much-needed attention and consideration. A number of articles and webinars have reported on the many favorable characteristics of hydrocarbons, such as their efficiency, near-zero global warming potential (GWP), growing use in Europe, and acceptance by the Environmental Protection Agency's SNAP program for several applications. Versatile display-case solutions continue to be developed, demonstrating creative design techniques to reject heat from these systems.

Propane solutions have been generally deployed as self-contained or as microdistributed systems. In the self-contained configuration, the heat rejection from the systems interacts directly with the sales floor environment – a potentially

unwanted scenario. Alternatively, a water-cooled microdistributed solution (also called self-contained cases) has been designed whereby the heat rejection is directed to a water loop and then rejected outdoors. The latter configuration was discussed in 2015 in the GreenChill webinar "Supermarket Experiences with Micro-Distributed System Architecture" (<http://bit.ly/1jRKJ2i>). A potential drawback of this solution is the need for a chiller to lower the water-loop temperature.

## Charge obstacle

A common obstacle for scaling these solutions and further advancing development is refrigerant charge compliance. Currently, the EPA allows 150 grams of propane to be utilized in a system. This inherently produces a barrier to the kinds of display cases and configurations of walk-in coolers and freezers that can be utilized. In order to adhere to the charge limits, many display cases are fitted with doors, but this directly impacts the availability of bulk-produce display cases with misting systems.

Let's assume that the propane charge limits will one day be increased. There would be new safety requirements for larger propane charges, but many of the barriers to adoption that currently exist would be diminished. The quantity of required compressors would decrease, display-case options could increase, and opportunities to accommodate walk-in box loads should improve. Additionally, opportunities to use the refrigerant in an upper-cascade system could open up. Given propane's acceptance, efficiency, and negligible environmental impact, there would be growing interest in finding ways to further integrate and develop this refrigerant, especially for use in warmer climates.

Propane is clearly not the only solution; there is room for other natural refrigerants in supermarket applications. For countries like the

United States, where there are several distinct climate zones and many different store formats, having a variety of solutions available is of great value.

What does this mean for the supermarket industry? It gives retailers and service providers more options to consider when thinking about selecting a refrigerant solution. The playing field of acceptable synthetic refrigerants continues to narrow, and the long-term viability of the HFOs and blends that are entering the marketplace is not something that can be easily predicted. This provides greater opportunities for utilizing natural solutions. But if anyone is expecting a silver bullet refrigerant solution soon, you may be in for a long wait! @ JA



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