Enhancing Efficiency through Subcooling

Subcooling Research Sneak Peek

Making the Case for Liquid Subcooling

European F-Gas regulation and the Kigali Amendment to the Montreal Protocol are driving the refrigeration industry to change how it considers and addresses environmental stewardship in many forms, including system energy efficiency.

On top of increased pressure to meet sustainability objectives, the pandemic has accelerated an increased trend towards grocery delivery and click and collect. Perishable, cold chain goods are stored before and after retail trading and can be processed or packaged in these areas.

This presents retailers with two significant challenges: meeting sustainability targets and maintaining operational performance that reduces the risk of spoilage and waste.

Low-GWP refrigerants are becoming widely adopted in a bid to meet new targets. However, recent studies* have shown that when using low-GWP refrigerants, total emissions from supermarket refrigeration systems are, in fact, much more heavily influenced by system energy efficiency than refrigerant emissions.

This is leading to an increased adoption of hydrofluoroolefin (HFO) solutions that offer both very low-GWP and high energy efficiency. This combination delivers a significantly lower 10-year total CO_2 equivalent emissions (TCO2e) at a total life cycle cost that are very similar to traditional direct expansion HFC systems.

Examining the evidence

To further explore these options, Chemours has commissioned a study into the use of low-GWP refrigerant blends in various Subcooling designs suitable for commercial refrigeration systems. These architectures, relatively simple to design and implement, further expand the potential of the traditional Direct Expansion designs in terms of system efficiency.

The full results will be published later this year; however, early results are providing fascinating insights into methods of further reducing energy consumption.

The whitepaper study draws on observations from:

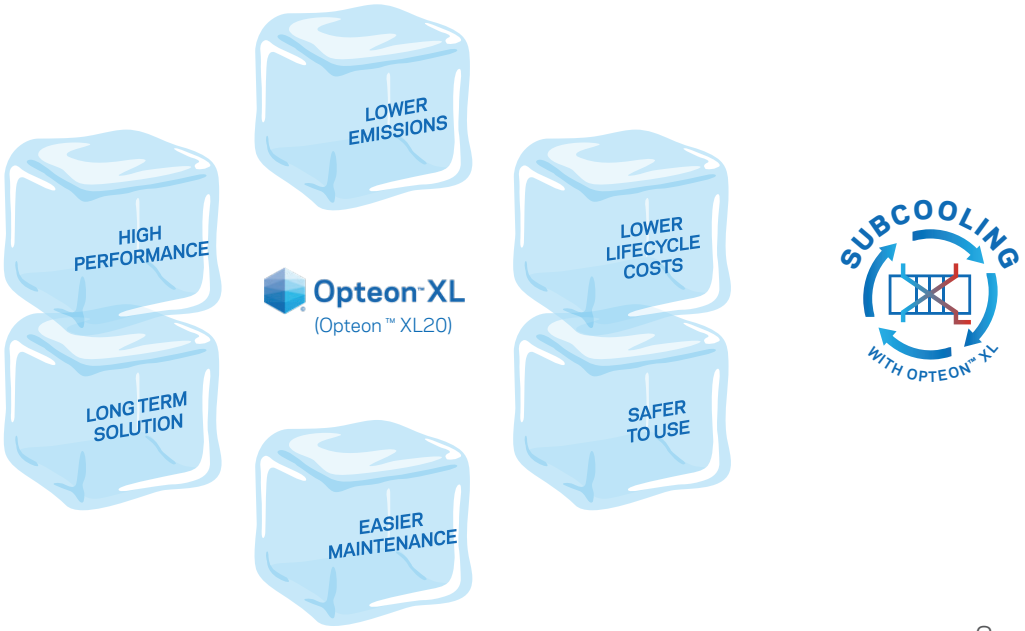
- Two locations with different climate environments to demonstrate different energy needs in seasonal weather conditions.
- Three different application scenarios - back of store cold rooms; retail area refrigeration; and central distribution centre (CDC) cold rooms.
- Comparisons of six different refrigeration technologies, using either R-744 (CO_2) or R-454C (Opteon™ XL20) and covering both medium and low temperature needs.

The study found that using liquid Subcooling technologies combined with Opteon™ XL20 was beneficial in terms of further reducing energy consumption compared to the use of independent DX systems. The level of energy savings is significant when comparing with CO_2 architectures - with the benefits even more noticeable in the warmer climates.

For all the scenarios considered, the non-boosted subcooler layout provided the highest potential energy savings. In conclusion, the research found that energy and lifecycle cost savings using low-GWP refrigerants such as Opteon™ XL20 should be significant enough for companies to give serious consideration to their adoption in order to maximize their contribution to sustainability and energy efficiency improvements.

*(Wave refrigeration 2019,2020)

Choose a solution which offers a wide range of key benefits



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