



Copeland cold chain solutions helps Woolworths adapt to a sustainable and an environmentally friendly future with transcritical CO₂ systems

With a firm commitment to a greener future, Woolworths has been investing in discovering innovative ways to reduce emissions from its supermarkets over the last 15 years. This journey has seen the retailer evolve from conventional refrigerants to CO₂ cascade systems, and lead the local industry with transcritical CO₂ refrigeration technology.

At the same time, Woolworths transitioned its supermarkets from conventional Input Output (IO) refrigeration control systems to distributed digital control through its eSpecification initiative.

In both cases, Woolworths has relied on its close partnership with Copeland to deliver the technology, solutions, knowledge, and experience required to bring its ambitions to life not just for supermarkets, but for the benefit of the broader industry and the environment.

Challenges

In 2006, Woolworths' sustainability strategy committed to an ambitious 40% reduction in emissions by 2015, based on 2007 levels. Direct emissions were largely due to the refrigerants it used whereas indirect emissions were attributable to offsite power generation. The strategy would therefore require a transition away from high GWP refrigerants and major changes to energy efficiency across its refrigeration, air conditioning and lighting systems, which together accounted for around 90% of its total energy consumption.

With its emissions target set for the next eight years, Woolworths had the impetus it needed to drive energy efficiency with carbon dioxide (CO₂) natural refrigerants. In 2006 Woolworths introduced a Cascade CO₂ hybrid system combining both carbon dioxide and conventional synthetic refrigerants, before piloting its first 100% CO₂ system in 2017 with Copeland by its side.

"The shift to pure transcritical CO₂ refrigeration was exciting for Woolworths, but it wasn't without challenges. We faced a serious local skills gap when it came to delivering and supporting this type of system, particularly when compared to European markets," said Dario Ferlin, National Sustainable Engineering Manager, Format and Network Development, Woolworths Food Group.

Woolworths realised it would need to create a local CO₂ industry ecosystem to ensure its transcritical CO₂ investment would deliver on its goals for the long term, and it leaned on Copeland to provide the technology and expertise that would help accomplish that.

With the development of Connect+ cloud-based enterprise application in close cooperation with Copeland, Woolworths achieved the ability to closely monitor each store's transcritical CO₂ environment in real time, which was critical for introducing the new technology into stores.

"Connect+ enterprise application connects every Woolworths supermarket across the country, so regardless of where our support teams are located, we can interrogate and monitor the situation in individual stores. If we're piloting in a new technology, there's no longer a need to necessarily fly across the country to investigate an issue or check that our design specification is on track, or if the specification requires adjustment," explained Dario.

"Connect+ delivers exceptional value to us and is certainly one of the aces up Emerson's sleeve."

Woolworths' eSpecification initiative

The development of Emerson's refrigeration pack controller for transcritical applications was an important innovation for Woolworths' success in this space.

According to Dario, "Copeland was already supplying European customers with distributed control solutions, so it was easy to work with its team to develop a control solution for our eSpecification initiative."

As distributed control solutions for transcritical refrigeration was a relatively new concept in Australia, and, in particular, for Woolworths' refrigerated showcase manufacturers, installers and contractors, Woolworths needed to onboard its partners in a way that ensured good economies of scale and a consistent standard of quality across all supermarket installations.

"It's been three years since our first store went transcritical, and three years of weekly workshops with Copeland where we continue to work through the opportunities for improving the controller for transcritical applications."



From the Customer

Copeland has been a true technology partner in so many ways, and what we have already achieved together is a solid showcase for what is possible with Copeland products and solutions.

Outcomes

Despite making a public commitment to have 10 transcritical CO₂ refrigeration stores by 2020 as part of its sustainability strategy, Woolworths is on track to double its goal with 20 stores set to become transcritical by the end of 2020.

By driving energy efficiency and natural refrigerants from 2007 to 2015, Woolworths managed to abate its BAU trajectory based on 2007, by 40% by 2015, and is now aiming to reach a new target of reducing its 2015 emissions level by 63% by 2030. Woolworths plans to achieve this through a continued commitment to transcritical CO₂ refrigeration and exploring further opportunities to cut emissions.

"Our new target is ambitious and, as refrigeration systems typically account for about half of a store's energy consumption (therefore 50% of the indirect emissions) - and about 25% of a store's direct emissions - those refrigeration assets will remain the biggest opportunity for reducing emissions over the next decade," said Dario.

"Transcritical CO₂ will play a big part in our strategy. It's almost the holy grail of climate control. There are challenges, but there are also opportunities and we want to unlock its full potential across refrigeration, air conditioning and heating in all its guises - like integrating the refrigeration system with air conditioning and heating systems to reduce overall emissions. We're already investigating how a store's refrigeration waste heat can be best used to heat the store and we're seeing some solid energy saving potential."

Through its shift to transcritical and distributed control systems, Woolworths has also invested in building a cohesive technology partner ecosystem to support and 'futureproof' its systems, and invariably those of other food and grocery retailers.

"As a principal stakeholder in the commercial refrigeration industry we want to play our part in building world-class skills and capabilities locally. We remain passionate about learning and growing with local partners like Copeland to deliver the best possible solutions for our needs and improving technology for the broader industry in Australia," Dario explained.

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