



**EMERSON**<sup>™</sup>  
Climate Technologies

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**GROCERY STORE  
CHAIN RUNNING CO2  
TRANSCRITICAL  
BOOSTER SYSTEM IN  
'HOTLANTA'**

— CASE STUDIES





## Grocery store chain running CO<sub>2</sub> transcritical booster system in 'HOTLANTA'

### INTRODUCTION

CO<sub>2</sub>-based refrigeration architectures are more common in cooler climates. CO<sub>2</sub> transcritical booster systems – which rely entirely on CO<sub>2</sub> – are not considered an obvious solution in places like Atlanta. However, with increasing regulations prompting a shift toward sustainable alternative refrigerants, retailers are looking more closely at CO<sub>2</sub> transcritical booster systems to anchor their refrigeration operations, even in warmer climates.

With more than 200 U.S. locations, Sprouts Farmers Market, a Phoenix-based grocery chain that offers fresh, natural and organic foods, is among the first retailers in North America to do just that. They opened their first store in suburban Atlanta in July 2014, and when they did, they set out to prove CO<sub>2</sub> transcritical booster systems aren't only for cool climates.

Changing their refrigeration philosophy and moving to a CO<sub>2</sub> transcritical system architecture was a giant step for Sprouts, especially for this store in the hot, humid climate of Atlanta. To pull this off, they turned to OEM partner Hillphoenix, whom the company partnered with to earn an EPA GreenChill platinum certification in 2011. And Hillphoenix, seeing the challenge presented by installing a CO<sub>2</sub> transcritical booster system in a warm climate, turned to Emerson Climate Technologies.

### ABOUT THE SYSTEM

A key enabling feature of the CO<sub>2</sub> transcritical booster system is an adiabatic condenser, which was designed to operate in high ambient temperatures. Adiabatic condenser cooling is the process of evaporating water into the air supply of an air-cooled condenser to pre-cool the air and improve refrigeration efficiency. The



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### ABOUT THE COMPANY

Emerson Climate Technologies, a business segment of Emerson (NYSE: EMR), is one of the world's leading providers of heating, air conditioning and refrigeration solutions for residential, industrial and commercial applications. The group combines best-in-class technology with proven engineering, design, distribution, educational and monitoring services to provide customized, integrated climate-control solutions for customers worldwide. The innovative solutions of Emerson Climate Technologies, which include industry-leading brands such as Copeland Scroll™ and White-Rodgers™, improve human comfort, safeguard food and protect the environment.

goal of this condenser technology is to keep the CO<sub>2</sub> below its critical point, thus maximizing system efficiencies.

Hillphoenix's rack refrigeration system featured four Copeland Transcritical CO<sub>2</sub> (semi-hermetic) compressors and three Copeland Scroll ZO compressors. Both models were designed for CO<sub>2</sub>'s high-pressure requirements and benefit from its thermal properties.

Emerson's E2 Facility Management System was installed to oversee the CO<sub>2</sub> transcritical booster system, manage nearly 50 electronic case control units and optimize the facility's overall energy management profile. E2 helps improve performance in multiple ways:

- » Controls the variable speed of the fans on the adiabatic condenser in response to operating conditions
- » Optimizes compressor coefficient of performance (COP) by regulating system discharge pressures via Emerson's high-pressure CO<sub>2</sub> controller
- » Provides complete oil management control of all CO<sub>2</sub> refrigeration compressors
- » Communicates with and captures information from individual case control units
- » Provides complete control of building HVAC and refrigeration systems, and supports the retailer's energy and maintenance reduction strategies

E2 also allows Sprouts operators to run diagnostics, monitor the system remotely through Emerson's ProAct™ Service Center and, if necessary, shut down the system components before failure.

A unique aspect of a booster system is that the heat and CO<sub>2</sub> refrigerant from the low-temperature portion of the system flows directly into the medium-temperature portion of the system. This "boosting" of the refrigerant from the low-temperature to the medium-temperature portion of the system is where the system gets its name.

The pilot CO<sub>2</sub> transcritical booster system designed for Sprouts' Atlanta store utilizes a multitude of other Emerson Climate Technologies components, including:

- » Copeland Scroll ZO Compressors — for low-temperature refrigeration requirements (freezers)
- » Copeland Transcritical CO<sub>2</sub> (semi-hermetic) Compressors — for medium-temperature refrigeration requirements (dairy, produce and meat cases); includes variable frequency drives to

prevent the compressors from cycling on and off too frequently

- » Emerson's E2 Facility Management System — provides complete CO<sub>2</sub> transcritical booster system optimization and facility-wide energy management
- » Discharge Air Controller — operates in unison with the E2 system and is capable of controlling heat and cool stages, fans, dehumidification devices and economizers using on-board I/O
- » High-pressure CO<sub>2</sub> Controller — optimizes high side pressures and liquid quality to the cases
- » XM Series Case Controls (pulse-width modulated) — integrates with the E2 system to maximize operating efficiencies through tighter temperature controls; present on nearly 50 cases
- » CoreSense™ Technology — advanced compressor diagnostics, protection and communications technology that allows technicians to make faster, more accurate decisions, resulting in improved compressor performance and reliability; present on all store compressors

## RESULTS

Energy data and cost savings were not provided as of this writing. However, Sprouts has had no issues operating their Atlanta-area store efficiently and effectively on the transcritical system.

## CONCLUSIONS

CO<sub>2</sub> transcritical booster systems have been used in Europe for nearly a decade. Adoption by the U.S. refrigeration industry has been slower due to a general apprehension about new (and, to many, unknown) technology.

It's understandable why stateside end users are hesitant to switch to CO<sub>2</sub> transcritical booster systems. Concerns over operating pressures, maintenance levels and energy have prompted careful and steady evaluations to understand the true cost of ownership for their enterprises.

Emerson technology helped ease those concerns for Sprouts, however. And if this case study shows anything, it shows that employing a CO<sub>2</sub> transcritical booster system in warm climates isn't only possible — it's effective.



Get in touch with shecco's Market Development team to learn more about the market for natural refrigerants in North America or find out how we can help you in gathering market intelligence and proactively building your business with our tailored market development services, to get your technology faster to market.

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