

Hillphoenix

A DOVER COMPANY

2015

**CO₂ TECHNOLOGY
USED IN ICE RINKS
AND A STORE IN HIGH
AMBIENT CLIMATE**

— CASE STUDIES





First warm climate CO₂ transcritical store in southeast U.S.

INTRODUCTION

In 2014, Arizona-based grocer Sprouts Farmers Market entered the southeast United States in a big way. With one of its first stores in the metro-Atlanta area, the fast-growing healthy grocery store chain also brought the first CO₂-based, HFC-free supermarket refrigeration system to a warm weather market in North America.

Six years ago, Sprouts' corporate leadership set out to lead the industry in reducing its refrigeration-based carbon footprint. As part of that effort, Sprouts joined the EPA's GreenChill partnership in May 2010. GreenChill is an EPA partnership with food retailers to reduce refrigerant emissions and decrease their impact on the ozone layer and climate change. By April 2011, Sprouts had collaborated with Hillphoenix to earn Greenchill's highest award - platinum certification - for its Thousand Oaks, Calif. store. For its new Dunwoody, Ga. store, the grocer once again chose to work with Hillphoenix.

The transition to CO₂ as a sustainable alternative for supermarket refrigeration is booming in cool climate markets, with roughly 3,000 transcritical CO₂ systems operating worldwide in cool weather cities. Until now, the southernmost Hillphoenix Advansor transcritical CO₂ booster system in North America was located in Indianapolis. Sprouts and Hillphoenix set out to prove that transcritical CO₂ is a viable option for stores located in warm climates.



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ABOUT THE COMPANY

Hillphoenix designs and manufactures commercial refrigerated display cases and specialty products, refrigeration systems, integrated power distribution systems and walk-in coolers and freezers. Our environmental improvements in alternative refrigerants and energy efficiency have helped take more than 2 billion pounds of harmful emissions out of the atmosphere since 1996. Today, Hillphoenix leads the industry with its Second Nature line of alternative refrigeration systems, which includes glycol, CO₂ and ammonia-based systems.

ABOUT THE SYSTEM

The Dunwoody Sprouts location runs on an Advansor transcritical booster system that entirely eliminates the use of environmentally harmful hydrofluorocarbons (HFC), which was for years the refrigerant of choice in the supermarket industry. One pound of leaked HFC refrigerant can cause more global warming than 2,000-4,000 pounds of carbon dioxide. Increasingly, food retailers are moving toward more sustainable refrigeration methods which include natural refrigerants like CO₂.

“Central to Sprouts’ identity is a genuine commitment to responsible retailing,” said Ted Frumkin, senior vice president of business development, Sprouts Farmers Market. “This innovative partnership with Hillphoenix helps Sprouts reduce our environmental impact, which we know is important to our customers and our team members.”

Although a transcritical system will work in any climate, it runs more efficiently in a cooler climate and less efficiently in a warmer climate. This is because CO₂ has a critical point of 87°F. Above that temperature the hot CO₂ gas in the condenser will not change to liquid as it cools like a synthetic refrigerant (e.g., HFC) would. During that time the CO₂ system operates differently and the efficiency is lower because of it.

This particular project came together as a perfect opportunity for Sprouts and Hillphoenix to prove transcritical CO₂ could work in warm climates. With most Sprouts stores located in high-ambient temperatures, the company was prepared to invest in making transcritical CO₂ work outside of northern regions. Hillphoenix engineers had recently completed the design of a warm-weather transcritical refrigeration solution, and Sprouts was preparing to enter the metro-Atlanta market, less than an hour’s drive from Hillphoenix’s Conyers headquarters.

“Sprouts has been working with the engineers at Hillphoenix ever since CO₂, ammonia and other alternative refrigerants first came out,” said Jerry Stutler, vice president of construction and facility engineering for Sprouts. “Now we believe that they have come up with a viable transcritical system design, and they can continue to monitor the operation of the system along with us.”



RESULTS

Energy efficient, economical transcritical CO₂ refrigeration systems are normally limited to cooler climates due to the limitations of air-cooled gas coolers. The key to Sprouts’ new system is a TrilliumSeries™ hybrid adiabatic condenser designed for Hillphoenix by Baltimore Air Coil.

“We worked with Baltimore Air Coil to develop a new product that’s a hybrid adiabatic condenser adapted for use with CO₂,” said Scott Martin, director, sustainable technologies at Hillphoenix. “Adiabatic condensers offer energy savings by providing lower system condensing temperatures than conventional air-cooled condensing systems, and they do that without the degree of maintenance, water consumption, or water treatment required by traditional evaporative condensers.”

With its new Dunwoody store, Sprouts aims to change the industry’s preconceived notions about warm climate operation of transcritical CO₂ systems, demonstrating that it is a viable option for retailers seeking a more sustainable, energy-efficient refrigeration option. And having the ability to utilize Hillphoenix’s The AMS Group as a single-point, turnkey project management and engineering services team helped Sprouts meet project goals.



First U.S. ice rink to use sustainable CO₂ refrigeration

INTRODUCTION

HCFC-22 is frequently used as a refrigerant in ice rinks. However, as of January 1, 2020, production and importation of HCFC-22 in the U.S. will end; so ice rinks across North America will be looking for opportunities to “future proof” their facilities by moving to natural refrigerants.

Like many ice rinks around North America, the Harry J. McDonald recreational center in Anchorage, Alaska was built in the 1980s. Its aging Freon-based system was experiencing nagging refrigerant leaks, aging equipment and rising maintenance costs, necessitating a complete makeover of the facility as well as the refrigeration package and floor system.

ABOUT THE SYSTEM

The Advansor Direct Transcritical CO₂ system for ice rinks delivers superior performance – improved ice quality and pump power savings of up to 90% – compared to traditional systems. It’s also environmentally friendly. CO₂ is an entirely nontoxic, environmentally safe refrigerant with excellent heat-transfer capabilities. Plus, it’s a fraction of the price of traditional refrigerants.

The Hillphoenix Advansor system provides a much higher coefficient of performance (COP) than that of ammonia-calcium chloride systems. And the easily accessible heat recovery can be a heating source for the entire facility including indoor areas, locker rooms and utility water.



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RESULTS

The first U.S. ice rink to use sustainable CO₂ refrigeration is benefiting from lower operational costs and reduced environmental impact just two months after opening.

“We’re already seeing savings, and we’re anticipating energy savings of 25 percent to 40 percent when all the results are in,” said John Rodda, Parks & Recreation Director for Anchorage, Alaska.

The city operates the Harry J. McDonald recreational center, which reopened its ice rink to skaters and hockey teams in early January, following a nine-month renovation and installation of a carbon dioxide-based ice rink refrigeration system from Hillphoenix.

The energy-efficient CO₂ system has lowered the ice rink’s electric bills, and it also has greatly reduced spending on refrigerant. CO₂ refrigerant costs significantly less than Freon, which was used by the rink’s previous system. Equally important, moving to the newer refrigerant eliminated polluting emissions from Freon.

Rodda sees the McDonald Center ice rink as a proving ground for CO₂ as U.S. ice rinks begin to comply with upcoming federal requirements to phase out Freon. “We’ve got ice rinks calling us from all over the country to see how it’s going,” he said.

Anchorage’s early adoption of CO₂ was a well-studied decision. Parks & Recreation spent a year considering options. “We looked at all the potential non-Freon refrigerant solutions, but sooner or later, they all were likely to be affected by environmental concerns,” Rodda said. “We decided CO₂ had the most benefits.”

Parks & Recreation then considered vendors and settled on Hillphoenix because of its experience with CO₂; its reputation for stability and strong customer support; and the technology-enabled capabilities of its CO₂ refrigeration system, such as remote monitoring. Hillphoenix has installed CO₂ ice rinks in Canada and has worked with CO₂ refrigeration systems since 2005.

SUMMARY

“We are pleased to be partners with the Anchorage Parks & Recreation Department in its pioneering efforts to build more efficient and environmentally sustainable ice rinks using CO₂,” said Tim Henderson, Industrial Program Manager for Hillphoenix. “We anticipate public and private ice rinks around the country will follow Anchorage’s lead.”

The city has plans to upgrade three more ice rinks to CO₂ over the next few months, and Rodda expects those projects to yield similar results. “Trying something new was smart, environmentally friendly and efficient,” Rodda said. “From what I’ve seen in a short period of time, we made the right decision in choosing CO₂.”





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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