Refindustry
REFRIGERATION INDUSTRY MAGAZINE

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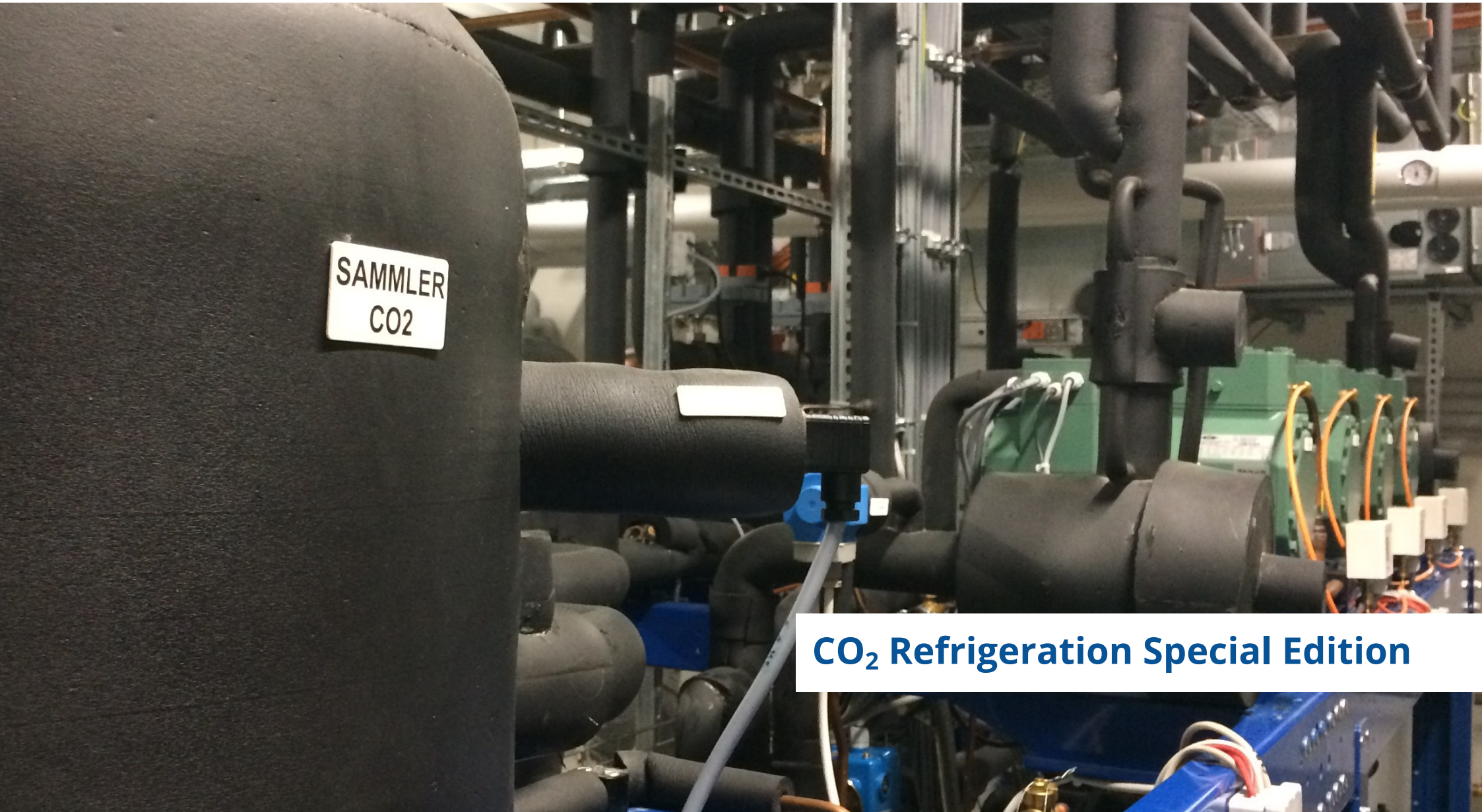

CO_2 Refrigeration Special Edition

Introducing the magazine “Refrigeration Industry”

Welcome to the sixth issue of our magazine!

We’re excited to present this special edition focused on CO_2 refrigeration technologies, featuring real-world application cases from across the industry—including retail, logistics, transport, and innovative heating and cooling solutions like CO_2-based heat pumps.

Thank you for your continued interest and support!

If you'd like to learn more, share feedback, or contribute your insights, please don’t hesitate to reach out to us by email—or contact me directly on LinkedIn.

Warm regards, Editor-in-chief

Sergei Mukminov.

The concept of the new magazine:

1. In today’s fast-paced world, staying updated with the latest developments in the refrigeration industry can be challenging. Our mission is to simplify this by providing the most critical news and insights in a single quarterly issue.
2. The magazine is published exclusively in digital format, with pages designed in a landscape orientation for optimal readability on screens.
3. Our magazine is interactive, allowing you to follow internal content links, as well as external links to detailed articles on our website and advertisements.
4. All news featured in the magazine can also be easily found on our website by title.
5. The magazine is released once every quarter.

The magazine issue plan

- N 2025 / 3 — July: Ammonia Refrigeration
- N 2025 / 4 — October: Heat Pumps
- N 2026 / 1 — January: Propane Refrigeration

Learn more about the opportunities for refrigeration equipment suppliers in this magazine and on refindustry.com.

Contact us today

CO2 Refrigeration Special Edition

Innovations and Challenges in CO2 Refrigeration: Insights from Chillventa with Andre Patenaude

Register now: Industrial Refrigeration Network Conference (IRN) 2025

Natural Refrigerants Conference 2025

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We recommend reading in a PDF viewer's full-screen mode.
Links may not work in a browser.

News Products

Carrier Introduces R-290 High Temperature Heat Pump for Sustainable Heating

Carrier has launched a new high-temperature air-to-water heat pump using the natural refrigerant R-290, targeting residential and light commercial buildings. The unit delivers water temperatures up to 75°C, making it suitable for traditional radiator systems and domestic hot water supply.

Designed for new buildings and retrofits, the system provides energy-efficient heating with a low global warming potential.

It operates effectively in colder climates and supports integration with photovoltaic systems for improved sustainability. The compact outdoor unit design allows for flexible installation in urban environments.

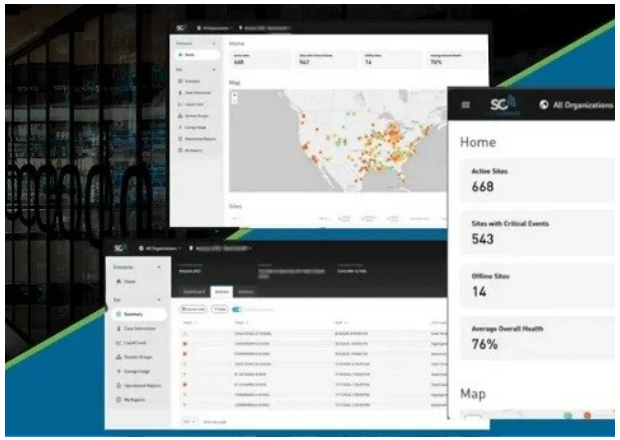
Daikin Unveils Modular Air-to-Water Heat Pump with R-290 Refrigerant

Daikin has introduced a modular air-to-water heat pump using R-290 refrigerant for commercial, industrial, and multi-family residential applications.

The system provides hot water up to 70°C and is suitable for various heating needs, including radiators, underfloor heating, and domestic hot water.

Its modular design allows scalable capacity through cascade installation, offering flexibility for both small and large projects.

Hussmann and Phoenix Energy Technologies Partner to Launch AI-Powered Refrigeration Leak Detection



Hussmann and Phoenix Energy Technologies have collaborated to introduce an AI-powered leak detection system for commercial refrigeration.

The solution leverages data analytics and machine learning to detect refrigerant leaks early, reducing environmental impact and operational costs.

Search for news by title on our website to read the full article.

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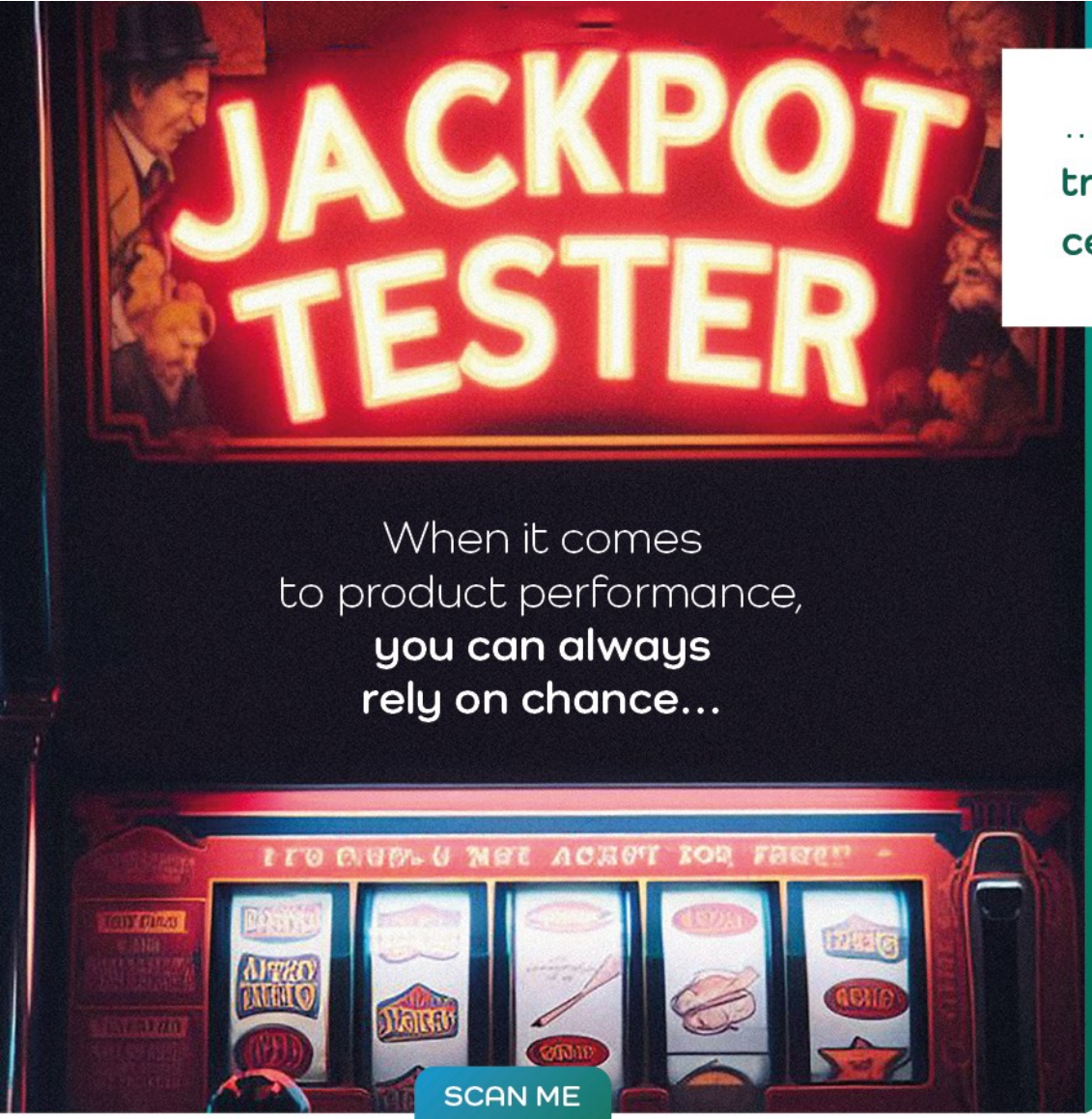

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rely on chance...

...But to be sure,
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With Eurovent certification, you can be sure you're making an eco-friendly choice for reliable, sustainable HVAC-R products.

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SCAN ME

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Eurovent Certita Certification is recognised as a world leader in third-party product performance certification in the Heating, Ventilation, Air Conditioning, and Refrigeration fields.

It continuously monitors refrigeration system performance and identifies anomalies before they lead to major issues or compliance violations.

The technology is designed for integration into retail store operations, offering real-time alerts and historical diagnostics.

Mayekawa Introduces New mCHILLER TAKA, a High-Efficiency, Low-Charge Ammonia Chiller

Mayekawa has launched the mCHILLER TAKA, a compact and energy-efficient ammonia chiller designed for process cooling and industrial applications. The system features a low refrigerant charge and uses natural refrigerant NH3, supporting environmental compliance and safety. Its modular configuration allows for easy transport, installation, and maintenance.

The mCHILLER TAKA offers stable performance across a wide range of operating conditions and is particularly suited for temperature-sensitive manufacturing and cold storage environments.

Star Refrigeration Launches Azanechiller 3.0 with Enhanced Efficiency and Sustainability

Star Refrigeration has released the Azanechiller 3.0, the latest evolution of its ammonia-based air-cooled chiller line. This third-generation model features improved energy efficiency and reduced total cost of ownership. It operates with a low ammonia charge and delivers cooling capacities suitable for both industrial and commercial use.

Enhancements include updated components, refined control strategies, and greater adaptability to varying load profiles. The chiller is suitable for both indoor and outdoor installations and complies with global sustainability targets through its use of natural refrigerant.

Carrier Introduces Domestic Hot Water Air-to-Water Heat Pump

Carrier has introduced an R-290-based air-to-water heat pump specifically for domestic hot water production. Designed for residential use, the unit delivers water temperatures suitable for standard household needs while maintaining a low environmental impact.

It supports energy-efficient operation in both new constructions and retrofit projects. The heat pump features compact dimensions, enabling flexible installation options. Integration with smart home energy management systems enhances perfor-

mance monitoring and remote control, contributing to energy savings and convenience for homeowners.

Advansor Enhances ValuePack CO2 Climate Solution

Advansor has upgraded its ValuePack CO2 refrigeration system, tailored for small to medium-sized retail and commercial spaces.

The new version offers higher performance, a broader capacity range, and a more compact design. It supports both refrigeration and heating needs using CO2 as a natural refrigerant, providing a climate-friendly solution for stores with limited space.

The enhancements also include easier installation and service access, making it a practical choice for convenience stores, small supermarkets, and food service outlets prioritizing sustainable operations.

Trane Launches Compact Heat Pumps with R-454B and Wider Operating Range

Trane has launched a new series of compact air-to-water heat pumps using R-454B refrigerant, featuring an extended operating range for year-round climate control. Designed for residential and light commercial buildings, the units support both heating and cooling applications.

The systems use inverter-driven compressors and variable fan speeds to optimize energy efficiency and adapt to varying load demands.

The smaller footprint allows for easier integration into constrained spaces, while the low-GWP refrigerant supports regulatory compliance and sustainability goals.

Hitema International Unveils Innovative MRI Chiller for Healthcare

Hitema International has introduced a specialized chiller for MRI equipment cooling in healthcare facilities. The unit ensures continuous and precise temperature control, which is critical for the stability and performance of sensitive medical imaging systems.

It uses eco-friendly refrigerants and features low-noise operation, making it suitable for hospital environments. Customization options are available to match infrastructure requirements, and built-in redundancy ensures uninterrupted operation.

The chiller is engineered for reliability and efficiency in mission-critical applications.

Daikin Launches ERA Condensing Units with R-32 Refrigerant

Daikin has released the new ERA line of condensing units, using R-32 refrigerant to reduce environmental impact while maintaining high performance.

The units are intended for use in commercial refrigeration applications such as cold rooms and display cabinets. They offer compact dimensions, quiet operation, and digital compatibility for better control and system integration. R-32 enables higher energy efficiency and lower GWP compared to traditional refrigerants, aligning the product with evolving environmental standards and energy regulations across Europe.

Lennox EMEA Introduces High-Performance CRAH Unit for Data Centres

Lennox EMEA has launched a new high-efficiency Computer Room Air Handler (CRAH) unit for modern data centre cooling. The system features advanced EC fan technology and precise airflow management to maintain stable conditions in server rooms. It offers improved energy performance, supports modular configurations, and allows integration with building management systems.

Designed for high-density IT environments, the unit ensures continuous cooling with low operational costs. It meets the cooling demands of hyperscale and edge data centres while supporting sustainability targets.

Hoshizaki Introduces IM Cube Series Ice Makers

Hoshizaki has launched the IM Cube Series, a new line of ice makers designed to produce high-quality, crystal-clear ice cubes for foodservice and hospitality applications. The series features a closed-cell evaporator system that ensures uniform cube shape and clarity while reducing energy and water consumption.

Available in various sizes, the units offer daily ice production capacities to suit small cafés, bars, and large restaurants. The machines are built with durable stainless steel and include user-friendly controls for easy operation and maintenance.

Designed for hygiene and reliability, the IM Cube Series meets industry standards for food safety and efficiency.

artisan soul, innovative personality

Alberto
Refrigeration system mechanical designer

ARNEG CO_2 SYSTEMS

We take the time we need to build a new refrigeration system

YOU CAN RELAX IN THE KNOWLEDGE
THAT OUR SYSTEMS COMBINE
MAXIMUM PERFORMANCE
WITH MINIMUM DIMENSIONS.

GLOBO and **MINI BOOSTER** are the creations of Arneg's R&D department. Thanks to their extended power range, these two innovative technical solutions combine NT and LT refrigeration in the same unit to deliver maximum efficiency in a minimum of space.

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Product Showcase

The partner's materials

Frascold Introduces Next-Generation Semi-Hermetic Compressors for 2025

The HVAC/R sector is evolving rapidly, driven by the need for more efficient, high-performance, and sustainable solutions. In response, Frascold has announced a new generation of semi-hermetic compressors set to launch in 2025, designed to overcome existing market limitations and meet the increasing complexity of refrigeration and heating applications.

Expanding the Scope of Compressor Applications

With the upcoming compressor series, the company is broadening its focus to include high-temperature applications, achieving operating temperatures of up to 165°C.

This advancement enables new possibilities in industrial heating, district heating, and heat pumps, as well as applications in the chemical, pharmaceutical, and food sectors.

Know more

Secop Introduces SCE Plus Propane Compressors with Increased Displacement

Secop has expanded its S-Series with the new SCE Plus refrigeration compressors, offering 23 cm³ and 25 cm³ displacement. Optimized for R290 (propane), these compressors provide high energy efficiency and are designed for sustainability in commercial refrigeration applications.

The SCE Plus models are suitable for food service and food retail environments, including supermarket refrigerators and freezers, walk-in freezers, double glass door merchandisers, monoblocks, and sealed systems.

They operate efficiently across various conditions:

- Low Back Pressure (LBP): Evaporating temperatures from -40°C to -5°C, delivering a cooling capacity of 1200 W (ASHRAE LBP).
- Medium Back Pressure (MBP): Evaporating temperatures from -25°C to +10°C, with a cooling capacity of 2100 W (ASHRAE MBP).

Know more

The bonus for our Platinum and Gold partners includes the free publication of press releases, subject to space availability in the Product Showcase section.

Learn more about opportunities for our partners.

Market News

Climate Pros Celebrates First Graduates from Refrigeration Academy

Climate Pros marked a key milestone with the graduation of the first class from its Refrigeration Academy. The program was created to address the skilled labor shortage in HVACR by equipping trainees with both theoretical knowledge and hands-on experience.

Participants received training in refrigeration fundamentals, diagnostics, and safety, preparing them for entry-level service roles. The initiative supports the company's workforce development strategy and aims to create a sustainable talent pipeline across its national network.

Copeland Collaborates with HVAC OEMs to Advance Cold-Climate Heat Pump Solutions

Copeland is partnering with HVAC manufacturers to accelerate the development of cold-climate heat pumps that operate efficiently in sub-zero temperatures. The collaboration focuses on leveraging advanced scroll and inverter technology to ensure reliable heating performance in regions with severe winters.

These systems are designed to reduce dependence on fossil fuels while maintaining comfort and energy efficiency. The project supports government incentives and decarbonization goals in North America and Europe.

Copeland Launches Scout AI for Enhanced HVACR Troubleshooting and Support

Copeland has launched Scout AI, a digital tool aimed at simplifying service tasks and improving troubleshooting accuracy for HVACR professionals. Using artificial intelligence, Scout AI helps users identify parts, access wiring diagrams, and connect with technical support in real time.

It pulls from an extensive product database and field data to deliver context-specific guidance. The tool is accessible via desktop and mobile platforms, enhancing service efficiency and reducing downtime across multiple system types.

AI-Controlled Heat Pumps Improve Efficiency and Comfort

A new generation of heat pumps equipped with artificial intelligence is enhancing system performance through adaptive controls. These AI algorithms analyze weather conditions, occupancy, and user behavior to automatically adjust settings, optimizing energy use and indoor comfort.

The technology helps reduce energy waste while ensuring consistent temperatures throughout the day. Manufacturers are

adopting AI to meet stricter energy standards and rising customer expectations for smart climate control solutions.

Fujitsu Sells Stake in Fujitsu General to Paloma Rheem

Fujitsu Limited has agreed to sell part of its stake in Fujitsu General to Paloma Co., the parent company of Rheem, as part of a strategic business realignment.

This transaction enables Paloma to strengthen its position in the global air conditioning and HVAC markets. Despite the ownership shift, Fujitsu and Fujitsu General will continue collaborative development of advanced products.

The move supports a focus on core operations and expanding international competitiveness.

Andrea Belloni Appointed Executive Director of Sales for Europe & Central Asia

Güntner has promoted Andrea Belloni to Executive Director of Sales for Europe and Central Asia. Belloni previously served as Head of Sales Europe, where he led key initiatives to expand the company's market presence and strengthen customer relations.

With two decades of experience in sales and business development, he has been central to achieving strategic milestones in the region. In his new role, Belloni will oversee sales operations, focusing on customer engagement, sales optimization, and sustainable growth. Celebrating ten years at Güntner, he expressed enthusiasm for the opportunities ahead and emphasized collaboration with regional teams to drive continued expansion.

SWEP Launches New Propane Testing Rig in Sweden

SWEP has commissioned a new propane (R290) testing rig at its R&D facility in Landskrona, Sweden, enabling rigorous evaluation of heat exchanger performance with natural refrigerants.

The setup allows testing under real-world pressure and temperature conditions to ensure safety and reliability. It reflects SWEP's ongoing investment in eco-friendly technologies and aligns with the global shift toward refrigerants with low global warming potential.

The testing rig will support development of heat pump and refrigeration solutions for multiple markets.

Daikin Applied Acquires Modular Comfort Systems to Strengthen HVAC Solutions in New York

Daikin Applied has acquired Modular Comfort Systems, a provider of custom HVAC solutions in New York State.

The acquisition enhances Daikin's ability to deliver integrated building systems, including applied and VRV technologies, to commercial customers in the region. Modular's expertise in engineered systems complements Daikin's focus on high-efficiency, low-carbon solutions.

The deal supports Daikin's goal of strengthening its service and distribution network in the northeastern U.S.

Moon-Tech Launches Low-Carbon Cold Chain Projects in Yunnan

Moon-Tech has begun several low-carbon cold chain projects in China's Yunnan Province focused on food preservation and logistics efficiency. The systems use environmentally friendly refrigerants and energy-saving technologies to reduce carbon emissions.

These projects are designed to support local agricultural supply chains and meet

growing demand for sustainable cold storage.

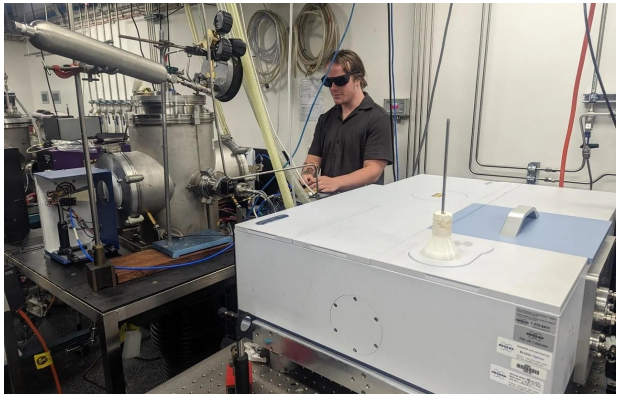
They reflect Moon-Tech's broader commitment to supporting China's ecological transition in the refrigeration sector.

UNSW Study Reveals HFO Refrigerants Can Break Down into Greenhouse Pollutants

A study from the University of New South Wales has shown that hydrofluoroolefin (HFO) refrigerants can degrade into persistent greenhouse gases under atmospheric conditions.

While HFOs are promoted as low-GWP alternatives, the research indicates they may form trifluoroacetic acid (TFA), which accumulates in water and soil.

These findings raise concerns about the long-term environmental impact of HFOs.



The study calls for further evaluation of refrigerant degradation pathways and regulatory oversight.

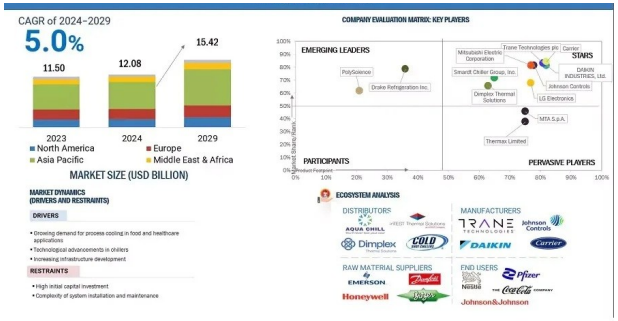
Carrier and JMI Collaborate for HVAC Skill Centre

Carrier has joined with JMI to establish a specialized training center focused on HVAC skills development.

The facility will offer courses in refrigeration, air conditioning, system maintenance, and troubleshooting. It aims to build a pipeline of qualified technicians to meet rising industry demand and support local employment. The initiative contributes to workforce development in energy-efficient and sustainable HVAC technologies.

Market Research

The Chillers Market Set to Reach $15.42 Billion by 2029



The global chillers market is projected to grow from $12.08 billion in 2024 to $15.42 billion by 2029, at a compound annual growth rate (CAGR) of 5.0%, according to a recent report. Factors fueling this growth include rising demand for energy-efficient cooling solutions, advancements in IoT-based smart controls, and stricter environmental regulations encouraging the adoption of low-GWP refrigerants.

Key Market Trends and Drivers

Increased Demand Across Industries

Chillers are integral to industries such as food and beverage, pharmaceuticals, and data centers, where precise temperature control is essential for maintaining product quality and operational efficiency. Rapid urbanization and infrastructure development in emerging markets have further expanded the demand for efficient cooling systems.

Technological Advancements

The integration of IoT and smart control systems has revolutionized chillers, enabling predictive maintenance and enhanced system performance. Energy efficiency improvements through features like variable speed drives and advanced heat exchangers align with global sustainability goals.

AHR Expo Releases 2024 HVACR Industry Trend Report

Regulatory changes, sustainability initiatives, and workforce development dominate the latest insights from industry leaders.

The AHR Expo has released its highly anticipated 2024 Industry Trend Report, providing a comprehensive look at the key challenges and opportunities shaping the HVACR sector. The report, compiled with input from leading industry associations and professionals, highlights the ongoing evolution of regulations, the push toward decarbonization, advances in smart technology, and the growing need for a skilled workforce.

As the HVACR industry continues to adapt to shifting market demands and environmental policies, the report outlines major trends that will define the year ahead. These include:

- Regulatory Impact & Green Transition: The transition to low-global warming potential (GWP) refrigerants, updated building performance standards, and decarbonization initiatives continue to shape industry practices. The global refrigerant transition, led by the United States, remains a focal point.
- Workforce & Training Needs: Addressing labor shortages and enhancing training programs are critical as the industry shifts towards electrification, heat pumps, and new refrigerants. Associations emphasize the need for upskilling HVACR professionals to meet these evolving demands.
- Supply Chain Stabilization & Market Growth: After years of disruption, the HVACR supply chain has largely recovered.

Sustainability

CO_2 Refrigeration Special Edition

As global awareness about climate change grows, and environmental regulations become stricter, industries worldwide are rapidly shifting toward sustainable solutions. Refrigeration systems, essential across commercial and industrial sectors, significantly impact energy consumption and environmental health.

This has driven the widespread adoption of natural refrigerants, placing CO_2 (R744) prominently at the forefront due to its eco-friendly properties.

This special section provides an extensive overview of how CO_2 refrigeration technologies are reshaping the industry, emphasizing their application, advantages, and evolving solutions to overcome challenges.

Included in this special edition:

- A technology review based on our article Essential Insights into CO_2 Refrigeration Technology
- An exclusive interview with Andre Patenaude, Director of Solution Strategy at Copeland
- A collection of real-world case studies, highlighting practical applications from companies such as Arneg, Copeland, CCR Commercial Refrigeration, Enex Technologies, Rivacold, Karyer and Frascold.

Together, these contributions paint a clear picture of where the industry stands today—and where it's headed next.

Follow the latest CO_2 refrigeration news and innovations on our website.

CO_2 Refrigeration Technology: A Snapshot of Innovation

CO_2 is a natural refrigerant with a global warming potential (GWP) of just 1, making it an environmentally responsible alternative to traditional HFCs. Once seen as complex and costly, CO_2 systems are now mainstream in Europe and gaining traction in North America, thanks to regulatory support and significant advances in component and system design.

Key developments include:

- Widespread use of transcritical booster systems
- Integration of ejector technology for energy efficiency
- Parallel compression and heat recovery as standard in new systems
- Increasing deployment of CO_2 heat pumps for heating and cooling

Yet, challenges remain—especially in hot climates and in technician training. In our interview with **Andre Patenaude**, he explores the innovations that are helping overcome these hurdles and highlights the importance of system integration and startup expertise. Find his interview in this issue.

In his interview, **Ross B. Shuster**, CEO of Copeland, reinforced the company's investment in CO_2 manufacturing and its strategic focus on expanding natural refrigerant technologies globally. Copeland's innovation lab in Ohio is now dedicated to system design strategies for CO_2, underlining their commitment to a sustainable refrigeration future.

Giuseppe Galli, CEO of Frascold, emphasized the company's growing portfolio of CO_2 compressors and the long-term R&D focus that positions Frascold as a leader in decarbonization. He noted, "Natural refrigerants allow us to develop high-performance products in total safety," reinforcing CO_2's critical role in the shift to eco-friendly systems.

From Danfoss, **Kristian Strand**, President of Commercial Compressors (now President of Danfoss Climate Solutions), shared how the acquisition of Bock enhances Danfoss' full-system offerings, especially in CO_2-based solutions. He added, "With Bock

Copeland CEO Ross B. Shuster

Frascold CEO Giuseppe Galli

President of Danfoss Climate Solutions
Kristian Strand

compressors integrated into our systems, we're pushing the industry forward in both energy efficiency and sustainability."

Find interesting cases in this edition:

- Arneg & Basko: CO_2 refrigeration for a sustainable Italian supermarket
- CCR Commercial Refrigeration: CO_2 air -to-water heat pump for a German shopping center
- Copeland: Smooth CO_2 system commissioning in California with insights from Don Cole
- Enex Technologies – CO_2 chiller heat pump enabling a 400% production scale-up at 3 Ravens Brewery (Australia) with 76% lower energy consumption and 75% lower carbon intensity per product unit
- Frascold & Aircodue: Cutting-edge railway HVAC with a CO_2 heat pump
- Karyer: KARYER CO_2 Evaporators in TESCO and Sainsbury's UK Supermarket Chains
- Rivacold: Full CO_2 logistics facility with high-efficiency racks and chillers

These real-world projects showcase the scalability, flexibility, and ecological advantage of CO_2 technologies in different climates and sectors.

Read the full technology article: *Essential Insights into CO_2 Refrigeration Technology*

Explore featured interviews on our website:

Ross B. Shuster, Copeland

Giuseppe Galli, Frascold

Kristian Strand, Danfoss

Interviews

Innovations and Challenges in CO2 Refrigeration: Insights from Chillventa 2024 with Andre Patenaude

At Chillventa 2024, one of the HVACR industry's biggest international events, Sergei Mukminov, the editor-in-chief of Refindustry.com, sat down with Andre Patenaude, Director Solution Strategy at Copeland.

They discussed the current trends, opportunities, and challenges in CO2 refrigeration technologies and how global regulations and sustainability goals are shaping the industry's future. Andre shed light on the significant challenges, including high-pressure systems, technician shortages, and the complexity of modern refrigeration systems, while also highlighting the industry's drive toward more efficient and environmentally friendly solutions. Here's the full interview from their conversation.

Ri: Andre, thank you for joining us at Chillventa 2024. You're one of the most prominent figures influencing the global refrigeration industry, particularly through sustainable technologies and solutions. Can you share with our readers what you see as the biggest opportunities and challenges in the current landscape?

Andre Patenaude: Thank you, Sergei. I appreciate that question. One of the largest opportunities right now is the shift toward CO2 technologies, driven primarily by regulations. As we know, global refrigerant regulations are happening—they've already been implemented in Europe, are taking shape in North America, and are spreading around the world. The GWP (Global Warming Potential) levels have dropped to a point where retailers and system operators must adapt to meet these regulatory standards. That's a significant driver.

But what's also very important, and perhaps even more so, is that large retailers and end-users have ambitious sustainability targets. They're under pressure not only to comply with regulations but also to reduce their carbon footprints for their investors and stakeholders. It's a global imperative, both for the industry and for the planet, to mitigate global warming. Sometimes, these sustainability goals outweigh the regulatory pressures, pushing companies to adopt CO2 technologies to achieve long-term environmental benefits.

Ri: It seems that the pressure is both regulatory and market-driven, with sustainability targets playing a critical role. What are the key challenges the industry faces in adopting CO2 systems?

Andre Patenaude: The primary challenge with CO2 systems, without a doubt, is managing high pressures. CO2 operates at much higher pressures than traditional refrigerants. The industry has largely figured out how to handle the high side—high-pressure systems—but the challenge now lies in the low side, the liquid lines, and suction pressures. We're talking about pressu-

Shannon Lovett, Country Manager, on the left, and Andre Patenaude, Director Solution Strategy, on the right at the Copeland booth.

res like 30-bar low-temp and 45-bar medium-temp systems. These pressures are increasing in visibility as the industry works to reduce release events.

For example, in the event of a power outage, CO2 starts absorbing heat and pressures can quickly rise beyond the system's pressure relief value. Retailers have experienced these situations, and some are now willing to invest more in order to increase their standstill pressures, so their systems can handle these spikes without releasing refrigerant into the atmosphere. It's about preventing those release events, especially in higher ambient temperatures.

Ri: That's interesting. So the challenge isn't just in building high-pressure systems, but also in maintaining them safely and efficiently. Are there any other significant challenges?

Andre Patenaude: Another big challenge is high ambient efficiency. Operating CO2 systems in warmer climates requires advanced strategies like parallel compression, ejectors, and other technologies to reduce peak energy demands. Systems like adiabatic cooling and PX ejectors are helping, but they do add complexity, which is difficult for the industry to manage when many experienced service technicians are retiring, and we don't have enough new technicians entering the field quickly enough.

In the past, refrigeration systems could be managed with mechanical controls, which most technicians were well-versed in. Now, with CO2, we're shifting to electronic controls, and that requires retraining a lot of technicians. It's a race against time to get enough skilled workers trained in these modern systems.

Read the full interview

Arneg

Green technologies for retail: the Basko case study with Arneg's CO_2 system

Location: Italy

Client: Basko, Retail

Nowadays, environmental sustainability plays an increasingly important role in our daily lives, influencing both individual behavior and organizational practices.

In this context, the commercial refrigeration sector is also rising to meet these expectations, with the goal of creating zero-impact supermarkets.

Arneg is actively contributing to this progress, as demonstrated by its collaboration with Basko—a supermarket chain that is part of the Sogegross Group—in Villalvernia, Italy.
Arneg, indeed, implemented an integrated CO_2 refrigeration system, avoiding the use of HFC refrigerants, which have a high global warming potential if released and therefore are gradually being phased out in accordance with EU directives.

CO_2, by contrast, is a safe, non-flammable natural gas with minimal environmental impact and excellent energy efficiency. It is affordable, widely available, and well-suited for heat recovery applications.

This solution uses high-performance plate heat exchangers to capture waste heat and raise water temperatures to 50°C for sanitary use and heating. The recovered heat powers underfloor heating, air conditioning, and fan coil units—entirely free of charge.

Arneg's collaboration with Basko in Villalvernia has resulted in significant energy savings and enhanced sustainability. By adopting a CO_2 refrigeration system, the need for harmful HFCs was eliminated, and energy consumption was reduced through efficient heat recovery. The same system now provides hot water, heating, cooling, and dehumidification, reducing reliance on traditional energy sources. This innovative approach has not only cut costs but also lowered the carbon footprint, aligning with Basko's environmental goals.

Read the full case study

CCR Commercial Refrigeration

Air-To-Water Heating & Cooling Heat pump

Location: Germany

Completion date: March 2025

Client: Shopping center

CCR Commercial Refrigeration is redefining efficiency in industrial refrigeration by providing air-to-water heating & cooling for an entire shopping center.

- This project highlights how CO_2 heat pump technology can provide reliable, high-performance heating and cooling, while reducing carbon footprints.
- Designed for -15°C ambient temperatures, it ensures a year-round comfort
- Heating (comfort @ 60/78°C and 30/60°C simultaneously) + comfort cooling 16/10°C
- Providing 1.5MW of hot water and 900kW of chilled water
- Outdoor configuration (no machine room required), fast installation
- Integrated gas cooler, outdoor evaporator, piping & commissioning
- Achieving a COP > 3.4 for optimal energy efficiency

Contact us today

Copeland

CO_2 System Integration Makes for "Flawless" Start-up

Location: Chino, California

Completion Date: 2023

Client: Don Cole, director of training and journeyman refrigeration technician

Contractor Name: Arctic Cooling Systems

Compared to other states, California is ahead of the curve in adopting low-GWP refrigerants. According to Don Cole, director of training and a journeyman refrigeration technician at Arctic Cooling Systems in Chino, California, CO_2 booster systems have quickly become the dominant architecture in new retail stores.

"*Almost every grocery chain I can think of is installing CO_2 booster systems*," he said.

Commissioning a CO_2 system is somewhat of an art form and can be challenging. During the start-up process, technicians typically follow a sequence of many steps, which include these key benchmarks:

1. Staging medium- (MT) and low-temperature (LT) compressors
2. Ramping up to full speed and/or capacity
3. Regulating system pressures in the gas cooler, flash tank, high-pressure valves (HPVs) and bypass gas valves (BGVs)
4. Minimizing oil carry-over, especially during the supercritical mode of operation

As someone who has embraced the initial emergence of CO_2 refrigeration in California, Cole has worked with his share of CO_2 booster systems. For the past five years, he has helped to install, start up and commission CO_2 systems from various equipment and component manufacturers. He now leverages nearly three decades of refrigeration experience to educate associates of the Arctic Cooling System organization and is a certified trainer at the local United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada (UA) 250 HVACR branch.

"*It's a passion. I am a believer in CO_2 refrigeration*," he said.

At a new installation in 2023, Cole led a contractor team through the start-up process, using a Zero Zone CO_2 booster system with a full-Copeland solution of compression, controls, valves and associated components. Despite his experience, Cole explained that every installation comes with potential snags.

"*You have to understand that with a start-up, the system's never run before; you have to test every aspect 100 percent, and there are always some hiccups*," he said.

Cole and his team quickly discovered that the Zero Zone-/Copeland-powered CO_2 booster system significantly reduced these hiccups.

"*Everything just meshed and worked perfectly together*," he said, referring to how the coordination of each component contributed to a nearly stress-free installation.

Cole explained how this configuration played a key role in bringing the system into equilibrium during start-up.

"*The CV4 high-pressure valve ran flawlessly*," he said, noting that communication with Copeland compressor electronics technology provided further assurance.

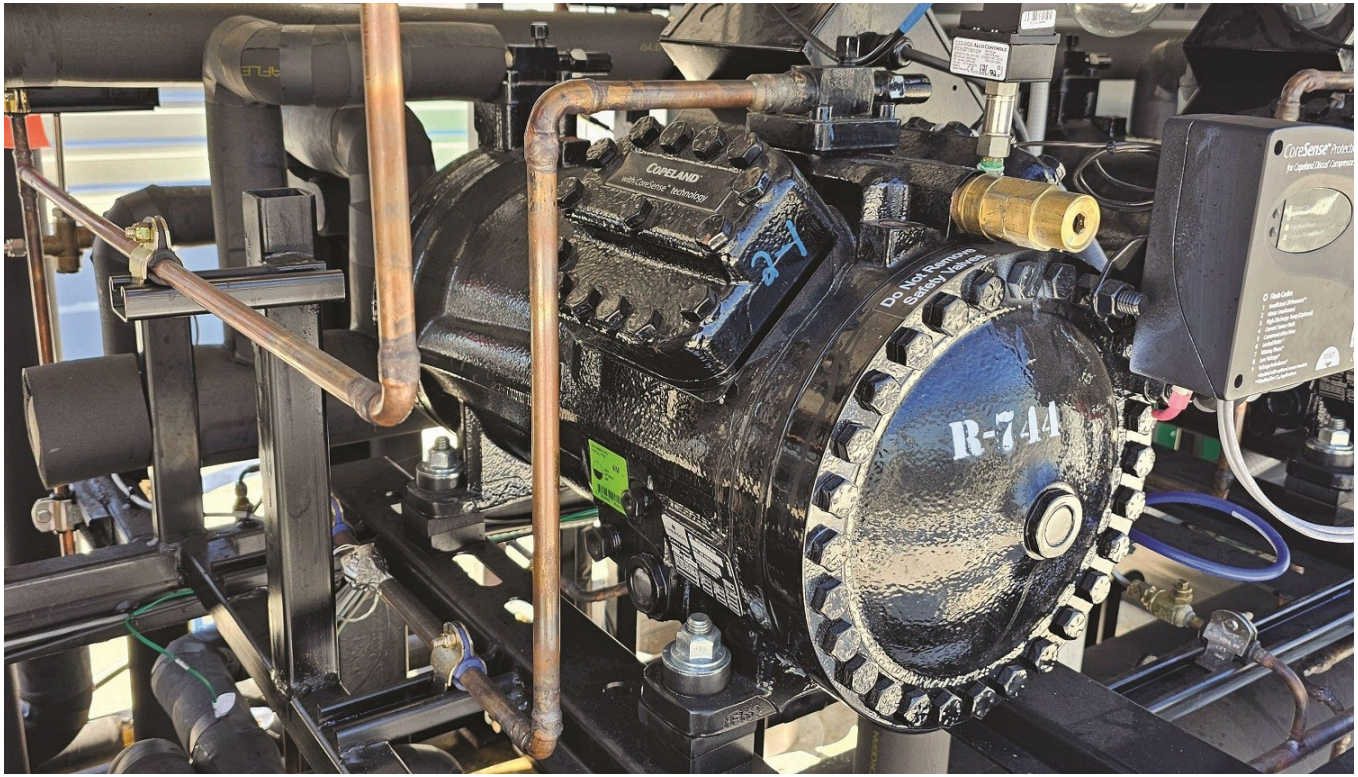
Copeland's onboard compressor electronics technology gave Cole's contractors additional tools to monitor performance data. "*There's so much data that it makes troubleshooting easy*," he said, noting that his team had no issues with any of the compressors during this start-up.

Should any issues arise, the system features built-in safety measures to help protect compressors from harm or failure and preserve end users' system investments.

When it came time to get compressor racks up and running, Cole recounted how the operation of Copeland compressors and VFDs surpassed anything he'd previously worked with — particularly in terms of quiet sound, low vibration levels and high performance.

"*It was so quiet that I was physically a foot and a half away, and I couldn't hear it*," he said.

His next course of action was to test the vibration levels as compressors ramped up to full speed using the EVH drive. He shared that this step typically requires his teams to skip hertz increments as they



bring racks online and up to speed. Dealing with this issue can be a major source of frustration for technicians during system start-up and potentially put the system at risk of damage.

"*I'm usually the one that has to make sure all compressors are rotating the correct way and figure out if we're fighting opposing forces*," he said.

But with the Copeland compression and drive combination, Cole said these concerns were all but eliminated.

"*Vibration levels were non-existent all the way from 25 to 60 Hz, which we had never seen before*," he said. "*I was giggling like a kid in a candy store with a $20 bill.*"

Because the installation took place in the warm Southern California climate, the CO_2 booster system was designed and expected to run in supercritical mode much of the time. Typically, this can cause a rise in oil carry-over rates that can lead to poor lubrication and an increased risk of compressor damage.

Cole explained that from his calculations, it appeared that the oil carry-over rate was very low in the all-Copeland system, saying, "*There was nowhere near the oil we typically see moving through a system.*"

As with any start-up process, Cole said his team needed some help familiarizing themselves with the new equipment. At one point during the installation, they needed assistance setting the discharge temperatures on the Copeland compressor electronics module. After a quick phone call to a Copeland solutions architect, Cole was directed to the correct application engineering bulletin and the exact page number with programming instructions.

"*Copeland support has been absolutely unbelievable*," he said.

A model of CO_2 simplicity

After a successful start-up process, Cole said that the system has been running so well that he uses it as an example of an ideal CO_2 booster system.

The installation and partnership with Zero Zone reflect Copeland's longstanding commitment to developing user-friendly, robust and fully integrated CO_2 refrigeration technologies.

Learn more about Copeland's CO_2 refrigeration technologies at ***Copeland.com****.*

Enex Technologies

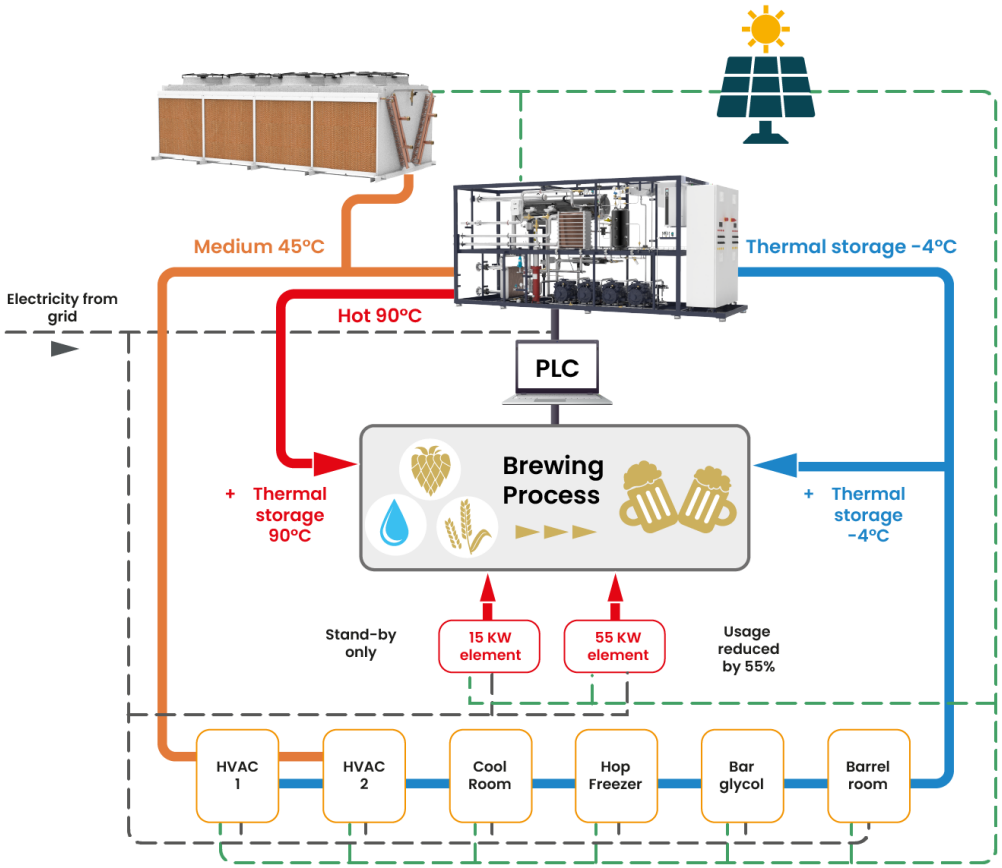
Green 3 Ravens Brewery

Location: Melbourne, Australia

Completion date: June 2023

Client: 3 Ravens, Brewery

Contractor: A2EP



3 Ravens Brewery, an independent craft brewery based in Melbourne, Australia, initiated a comprehensive energy transition to support its planned production scale-up while aligning with long-term sustainability goals. In collaboration with Enex Technologies, the brewery replaced legacy R22-based HVAC systems with a fully integrated, high-efficiency CO_2 chiller heat pump. This system was designed not only to address cooling and heating demands through a single, low-impact solution but also to enhance process integration and thermal energy management.

Main Results & Benefits:

The implementation of the integrated CO_2-based chiller heat pump system is projected to allow an increase of 400% in production capacity without a corresponding rise in total site energy consumption. This is achieved through the strategic recovery and reutilization of waste heat, substantially decreasing dependence on conventional thermal energy inputs and improving overall process efficiency. As a result of these innovations:

- Specific energy consumption per unit of product is forecasted to decline by 76%, reflecting major gains in energy efficiency and system integration.
- Carbon intensity per unit of product is expected to decrease by over 75%, from 184 g CO_2-e to approximately 44 g CO_2-e per 250 ml of beer.

Read the full case study

AKO

The power to control gas leaks is in your hands

Refrigerant gas leaks pose a key challenge in industrial and commercial refrigeration. Control and detect these gases to ensure efficiency, safety, and sustainability in your refrigeration facilities.

Discover more

Frascold

Innovate railway HVAC with a CO2 heat pump

Location: Italy

Client: Aircodue, Innovative start-up

The rail sector is increasingly focused on sustainability, aiming to accelerate its energy transition. The collaboration between Frascold and start-up Aircodue – *a spin-off of the Miri Group, a leader in both the Railway and Renewable Energy sectors* – is revolutionizing the industry through the development of an innovative CO2 heat pump, equipped with Frascold's transcritical compressor series. The partnership is built on four ambitious goals: energy savings, reduced environmental impact, lower maintenance costs, and high reliability, all in full compliance with national and international regulations.

Aircodue's ARCA project incorporates patented technical solutions and is presented as a demonstrator of a split system with a capacity of approximately 28 kW, tailored to the needs of a medium-distance railway carriage, a common configuration in Italy. In collaboration with Frascold, the study explored the feasibility of replacing the existing system (drop-in) with a new CO2 heat pump capable of operating within the original configuration while meeting the requirements of the entire train.

The heat pump consists of an external unit housing the compressors for the primary and auxiliary circuits, and an internal unit responsible for ventilation, providing heating and cooling to the passenger area. To identify the most suitable compressor for the application, the technical teams selected the D-TK model from Frascold's transcritical piston series.

The results of the study are significant: the CO2 heat pump enables energy savings ranging from 51% to 58%, depending on the location, alongside a substantial reduction in CO2 emissions released into the atmosphere.

KARYER

KARYER CO_2 Evaporators in TESCO and Sainsbury's UK Supermarket Chains

Location: Europe

Clients: TESCO and Sainsbury, Retail

Behind every fresh product in a supermarket lies efficient refrigeration technology. Refrigeration is necessary to maintain low temperature in display cabinets and cold storage rooms to preserve food. Conventional supermarket cooling systems play a major role in greenhouse gas emissions, primarily due to refrigerant leakage and the electricity required for their operation.

As a consequence of growing environmental consciousness, CO_2 systems are getting more popular in supermarket refrigeration, cold rooms and heat pump applications.

The retail business is one of the major users of our CO_2 Evaporators. This cutting-edge CO_2 evaporators has been successfully installed in TESCO and Sainsbury's supermarket chains in United Kingdom.

OEM evaporators are designed for CO_2 usage, and are able to satisfy small, medium and large cooling capacity needs. They are compatible to run with CO_2 operation pressure and tested under high pressure.

These products are specifically engineered to meet the unique demands of modern retail refrigeration, offering high energy efficiency, reduced environmental impact, and reliable performance even under extreme operating conditions. With its compact design, and optimized heat exchange surface, it ensures excellent heat transfer while maintaining low energy consumption.

KARYER's CO_2 evaporators are a key component in sustainable refrigeration solutions, supporting retailers in achieving their environmental targets without compromising on cooling performance or food safety.

Rivacold

Transcritical CO_2 Installation for Cold Logistics in Northern Italy: Four Rivacold TX Racks with RRCX Remote Gas Coolers

Location: Italy

Client: Logistic center

A recent installation carried out in Northern Italy, showcases an advanced transcritical CO_2 refrigeration system supplied by Rivacold, designed specifically for a large, refrigerated logistics center dedicated to the storage and handling of agri-food products.

The logistics facility includes:

- 5 medium-temperature cold rooms,
- 2 low-temperature cold rooms
- and one high-temperature cold room,

for a total refrigerated area of 4.817 square meters, and serves as a key hub in the regional cold supply chain. The installation represents a full technological renewal of the site's refrigeration infrastructure: previously equipped with traditional HFC-based systems, the logistics center has now transitioned to a sustainable solution fully compliant with the latest F-GAS regulations. This upgrade reflects the customer's commitment to reducing environmental impact and improving energy efficiency across their operations.

A Complete CO_2 System Tailored for Customer's Needs

The refrigeration plant is engineered for an ambient design temperature of +38°C, ensuring stable and efficient performance even in warm climate conditions.

The new system features four Rivacold TX compressor racks operating on R744 (CO_2), a natural refrigerant with a Global Warming Potential (GWP) of just 1, paired with four RRCX remote gas coolers for heat rejection.

Part of Rivacold's comprehensive CO_2 product portfolio, Rivacold TX racks are highly customizable and perfectly suited for large-scale installations in food retail, cold logistics, and the agri-food industry. Designed to operate in ambient temperatures of up to

+43°C, they can be easily selected through Rivacold's Select configuration software and paired with low-noise remote gas coolers and dedicated CO_2 evaporators.

The system installed in Northern Italy consists of:

- Two transcritical CO_2 booster racks, with direct expansion circuits serving both low and high-temperature applications. The compressors used for this installation are provided by Dorin, and Rivacold used four MBP compressors and three LBP compressors.
- Each unit provides:

  - 140 kW at -37°C (low temperature)

  - 75 kW at 0°C (high temperature)

  Resulting in a total capacity of:

  - 280 kW at -37°C (LT)

  - 150 kW at 0°C (HT)

Each of the two booster units is equipped with an intercooler, specifically designed to reduce the discharge temperature of the low-temperature CO_2 gas before it enters the high-temperature compressors. This solution significantly enhances the reliability of the system and helps ensure consistent performance over time, even under demanding operating conditions.

TX transcritical racks are connected to a Rivacold RRCX068005SB remote gas cooler, ensuring optimal heat rejection for transcritical operation.

- Two transcritical CO_2 chillers dedicated to medium-temperature applications, each with a capacity of:

  - 250 kW at -10°C, with a 30% MEG glycol solution (inlet/outlet 0/-5°C)

  Providing a total of:

  - 500 kW at -10°C (MT)

For the chillers as well, Dorin compressors were selected, with each unit equipped with five medium back pressure (MBP) compressors.

The chillers are paired with a Rivacold RRCX088005SB remote gas cooler for maximum efficiency.

Both the transcritical compressor racks, as well as the remote gas coolers, are entirely designed and manufactured by Rivacold in Italy, at the company's headquarters and primary production facility located in Valle-foglia (PU). This fully in-house approach en-

CO_2 technology demonstrates a proactive approach to sustainable cold chain management, aligning with broader industry trends toward decarbonization and climate responsibility.

The customer has been served by RAV - the VAG Group's specialized distribution network active in the Italian refrigeration and air conditioning sector – and, specifically, by RAV Districold.

This project highlights Rivacold's ongoing commitment to delivering high-performance, environmentally responsible refrigeration systems for commercial and industrial applications across Europe and beyond.

For more information on Rivacold racks ***click here***

sures complete control over every stage of development—from engineering and prototyping to final assembly and quality testing—guaranteeing consistency, reliability, and performance across the entire CO_2 product line.

Supporting a Greener Refrigerated Supply Chain

This CO_2-based solution offers several advantages over traditional synthetic refrigerants:

- Minimal environmental impact, thanks to the use of R744
- Enhanced energy efficiency, even under high ambient conditions
- Full compliance with the evolving F-GAS regulation
- Future-proof system design, ready for long-term operational demands

By replacing legacy HFC systems with a fully natural refrigerant solution, the logistics center not only enhances performance and reliability but also significantly reduces its carbon footprint. The use of transcritical

Events

Partner's material

Register now: Industrial Refrigeration Network Conference (IRN) 2025

On 4 and 5 June this year, the Industrial Refrigeration Network Conference (IRN) will take place for the second time at the SCHAUFLER Academy, BITZER's international training centre in Rottenburg-Ergenzingen. The aim of this event is to create a recurring platform for thought leadership in the industrial refrigeration sector in Europe.

Participants will include manufacturers, installers and contractors, specifiers and consultants, as well as end-users and academia. Industry associations such as eurammon are also involved in the event to further promote the use of natural refrigerants in Europe. The IRN Conference was established in 2024 by a diverse group of sponsors, consisting of European HVAC&R component and system suppliers, service providers and associations, which currently consists of the following members:

- Armaturenwerk Altenburg GmbH
- BITZER Kühlmaschinenbau GmbH
- Christof Fischer GmbH
- compact Kältetechnik GmbH
- Danfoss A/S
- Eurammon
- Eurovent Certification
- Evapco Europe GmbH
- Güntner GmbH and Co. KG
- HB Products A/S
- NEXT Lubricants
- SCM FRIGO spa (AM)
- TEKO Gesellschaft für Kältetechnik mbH
- TH. WITT Kältemaschinenfabrik GmbH
- Vahterus Oy
- Wurm GmbH & Co. KG Electronic Systems

This two-day IRN conference provides a platform for industry leaders to exchange ideas on the latest trends, discuss current challenges in industrial refrigeration and present and debate solutions to actively

shape the future of industrial refrigeration. These challenges are technical, economic and environmental in nature and require continuous innovation and adaptation to meet the industry's demands for regulation, efficiency and sustainability.

This event has a varied agenda consisting of:

- Daily keynote speakers, consisting of experts in their field, who will share their insights into the future of industrial refrigeration
- Peer-reviewed technical papers, presented by each sponsor on topics relevant to industrial refrigeration in Europe
- Sponsored networking break-out sessions, where technical paper presenters will have mini-exhibition booths to interact with delegates and showcase their companies' products and solutions.
- A sponsored networking dinner and many other networking opportunities for delegates throughout the event
- Optional post-event factory tours offered by the host

Registration for the IRN2025 conference is essential and remains open until 29th May or until the event is fully booked. In addition to registering, interested parties can also view the agenda as well as accommodation and travel tips and other useful information pertaining to this event, here.

Registration link: ***IRN Conference 2025***

Natural Refrigerants Conference 2025: A Pivotal Gathering for Innovation and Sustainability

The third edition of the *Natural Refrigerants Conference*, held March 13–14, 2025, at the World Trade Center in Bucharest, brought together 150 refrigeration professionals from across Europe, highlighting the industry's shift toward sustainable and efficient technologies.

Organized by AB Tehnic Profesional, the event blended technical presentations, live demos, and an expansive expo, creating a hands-on experience with the latest in natural refrigerant innovation.

Adrian Balaoi, CEO of AB Tehnic Profesional and AB Frigo Consult Tehnic, emphasized in our interview the deeper motivation behind the event: "*After seeing Romania move from ammonia to synthetic refrigerants post-1990, it became clear that environmental and efficiency issues required us to return to more natural solutions. That's why this conference exists—to educate and drive real-world adoption of natural refrigerants*."

A standout moment included Refolution's presentation of a groundbreaking air-based refrigeration system using adiabatic cooling, tailored for ultra-low temperatures. HB Products also impressed with their advanced sensors, boosting system efficiency and reliability.

Key topics covered ranged from CO and ammonia systems to new compressor technologies and refrigerant lubricants. Presenting companies included Copeland, Bitzer, JCI, Scantec, Intarcon, and others, each offering insights into real-world applications and future-ready solutions.

"The conference directly reflects the shifting landscape of our industry," said Adrian Balaoi. *"Synthetic refrigerants are increasingly restricted, and natural alternatives like ammonia and propane are proving to be more sustainable and reliable in the long run."*

To explore the full interview and event coverage, read:

- *Natural Refrigerants Conference 2025: Innovations and Future Trends*
- *Ammonia, Propane, and Beyond: Adrian Balaoi on the Future of Refrigeration*

Introducing the magazine in PDF Format to the partners

We are thrilled to introduce our new PDF magazine, designed to be a valuable resource for our readers. In a world brimming with information, our mission is to streamline the process of staying informed by delivering the most crucial updates and insights from the past quarter.

Distribution Strategy

We are committed to ensuring that our readers receive our magazine promptly. We distribute it through our newsletter to over 4,000 subscribers, registered users on our website, and webinar attendees.

Additionally, we will actively promote the magazine across our social media platforms. With more than 50,000 followers on our news feeds and over 150,000 members in our LinkedIn and Facebook groups, we guarantee extensive and far-reaching exposure.

We are excited to share our initial outlook on this new magazine and have plans for its ongoing development. Join us on this exciting journey, and please share your feedback and ideas.

Discover more about the magazine's features and pricing on the following pages.

Main Headings in the Magazine

- **The Most Popular News from Refindustry.com:** Stay updated with the most crucial developments.
- **Sustainability:** Discussing green refrigeration practices and their impact on the environment.
- **Technical Insights:** Explaining complex concepts and providing technical insights into refrigeration equipment.
- **Case Studies:** Real-world examples of successful industrial refrigeration projects, installations, and problem-solving.
- **Maintenance and Troubleshooting:** Tips and guides for maintaining and troubleshooting refrigeration equipment.
- **Interviews:** Insights from industry experts, engineers, and leaders in the field.
- **Opinions:** Expert perspectives, commentary, and analysis on relevant industry issues and trends.

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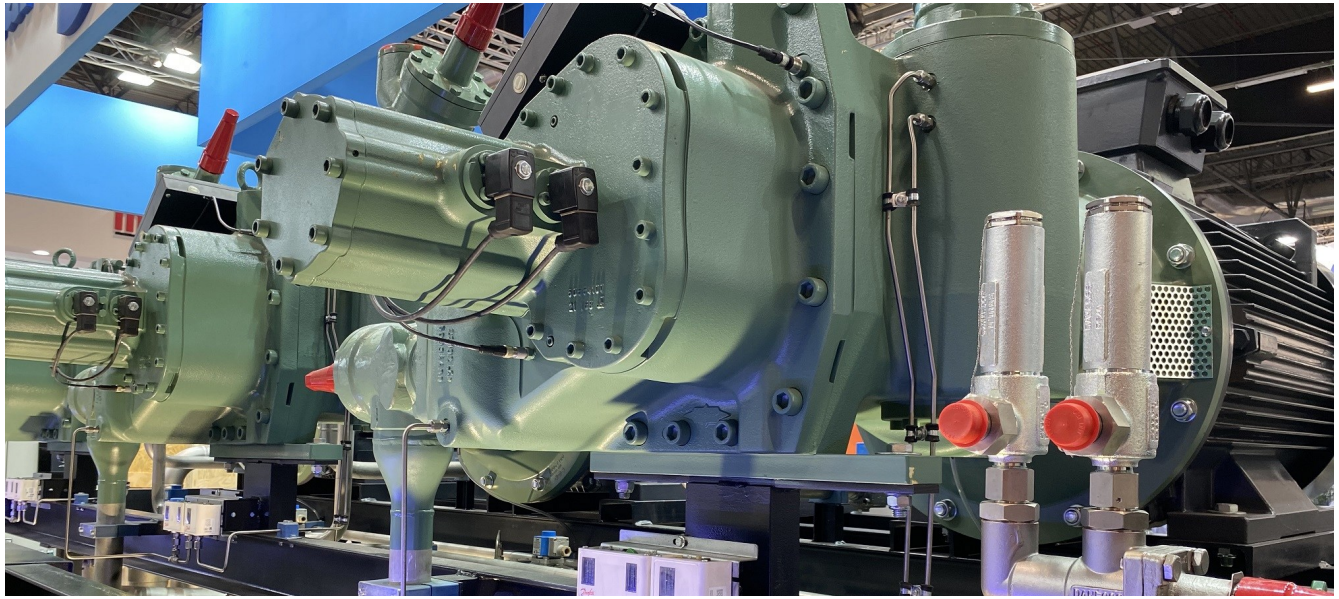
Place an advertising module or contribute an article on topics like sustainability or successful case studies, sharing your company's experience with the magazine audience. Discover more in our Media Kit.

Magazine Issue Plan

- N 2025 / 3 — July: Ammonia Refrigeration
- N 2025 / 4 — October: Heat Pumps
- N 2026 / 1 — January: Propane Refrigeration

For any inquiries, feel free to contact us at info@refindustry.com.



The opportunities

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