



CASE STUDY

SANTANDER ARENA

PENNSYLVANIA, USA

Dive into the real story of how this 8,000-seat venue dramatically cut its energy consumption, water usage, emissions and unlocked a local utility incentive. Explore the data and details here.

AT A GLANCE

UPGRADING TO CO2 REFRIGERATION CONTRIBUTED TOWARDS A 55% REDUCTION IN SANTANDER ARENA'S ENERGY CONSUMPTION

THE REFRIGERATION SYSTEM

- Refrigerant Replaced: R22 to CO2
- New System: Packaged Transcritical CO2
- Gas Cooler: Yes
- Heat Recovery: Yes
- Year of Upgrade: 2022
- Installation Time: 12 weeks
- Refrigeration Capacity: 190 TR (668 kW)

SAVINGS IN NUMBERS

 **55%**
REDUCTION IN ENERGY CONSUMPTION

 **1,147,494 KWH**
ENERGY SAVED IN 6 MONTHS

 **≈ 55.23%**
WATER USAGE REDUCTION

 **60%**
CO2 EMISSIONS REDUCTION

 **\$81,000**
GRANTS UNLOCKED

ABOUT SANTANDER

TRANSFORMING SUSTAINABILITY AND SAVINGS: SUCCESS STORY WITH CO₂ REFRIGERATION



Santander Arena in Reading, Pennsylvania (U.S.) is a Tier 3 rink and home of the ECHL (East Coast Hockey League) Reading Royals who are affiliated with the Philadelphia Flyers of the National Hockey League (NHL). This multi-purpose venue is managed by ASM Global, an international management firm responsible for more than 300 venues – many of which include ice arenas.

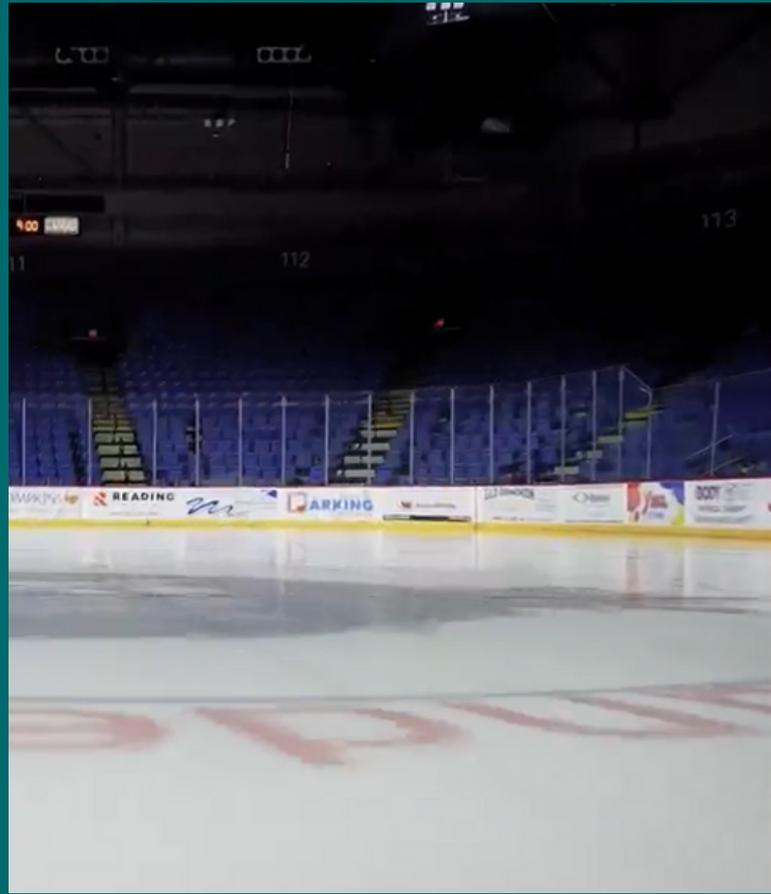
Since its opening in 2001, the Santander arena has been served by an R22 refrigeration system. However, as the global crackdown on R22 refrigerant intensified, driven by the HCFC refrigerant phase-out, it became clear that the time had come to upgrade the refrigeration system to a more sustainable option.

SANTANDER ARENA'S EXPECTATIONS

Santander's management had four priorities for the new system –

- ✓ Energy efficiency
- ✓ Low water consumption
- ✓ 30-year life cycle
- ✓ Low maintenance costs

ASM Global had prior experience collaborating with CIMCO on a CO₂ system installation. Given this successful history, they invited CIMCO to bid for the Santander project. After a comprehensive assessment of the project's requirements, CIMCO determined that CO₂ technology would offer the most efficient and economical solution for Santander, taking into account potential savings in emissions, energy consumption, and the prospect of utility incentives. This decision ultimately proved to be a win-win for the customer.



THE R-22 PHASE OUT



R-22, a refrigerant commonly utilized in air conditioning and refrigeration systems, underwent a phased-out process in compliance with the Montreal Protocol. This phase-out was primarily instigated by the detrimental effects of R-22 on the ozone layer and its substantial contribution to global warming.

R22 is associated with a remarkably high Global Warming Potential (GWP) of 1,810 when measured over a 100-year period. However, its GWP over a shorter "real" 20-year timeframe is even more concerning, with a value of 5,310. In contrast, natural refrigerants typically exhibit a GWP of 1 or less. This holds true whether one considers their impact over a 20-year span or a 100-year one.

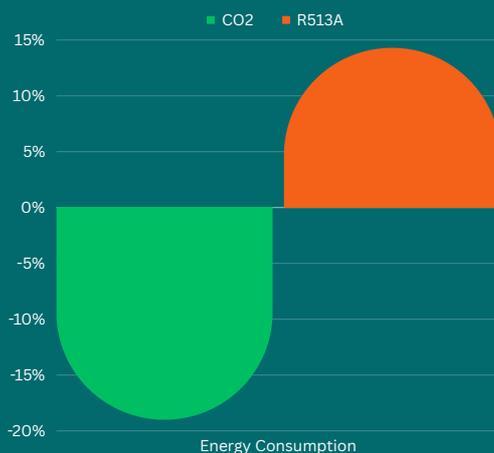
CO₂ REFRIGERATION: THE PERFECT FIT FOR SUSTAINABILITY AND SAVINGS

CO₂ proved to be the ideal choice, offering future-proof sustainability with its negligible GWP and alignment with the arena's 30-year lifecycle objective. The system design and refrigerant properties require less water usage and maintenance. Combined with its proven energy efficiency and enhanced performance, CO₂ emerged as the clear frontrunner for the arena's upgrade.

New CO₂ System

Santander's R22 refrigeration system was replaced with a packaged 190 TR (668 kW) transcritical CO₂ system complete with a gas cooler. To take advantage of CO₂'s favorable refrigerant properties, the system was also kitted out with heat recovery for the underfloor and snow melt, further improving the energy efficiency of the installation.

Projected Energy consumption



Energy Projection

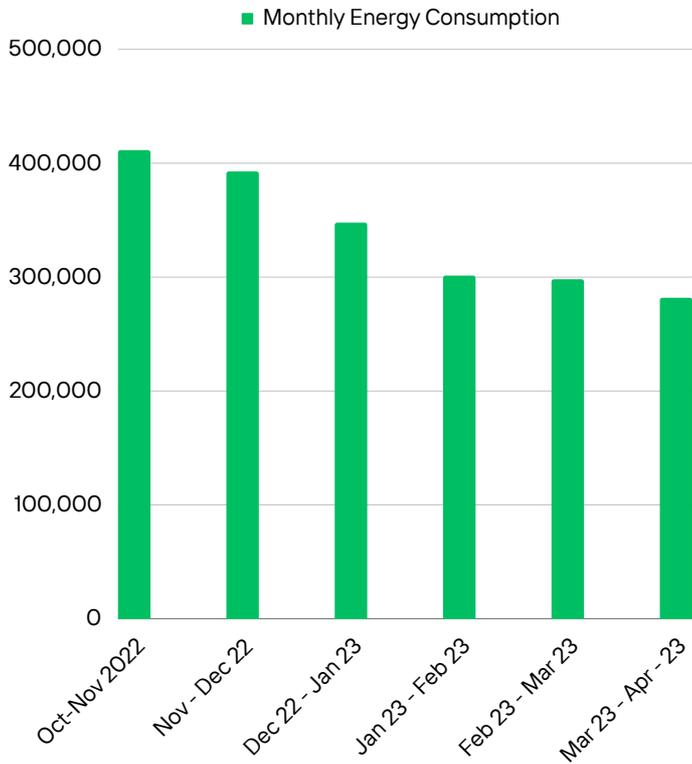
Although the upfront investment is fairly similar for both systems when comparing the life cycle cost of this CO₂ system to an f-gas alternative, CO₂ had a much lower total cost. The modeled annual energy cost is also much lower for the CO₂ system. Calculations showed that CO₂ would result in a 19% energy reduction, while choosing R513A would actually increase energy costs by 14.3%.

Installation time

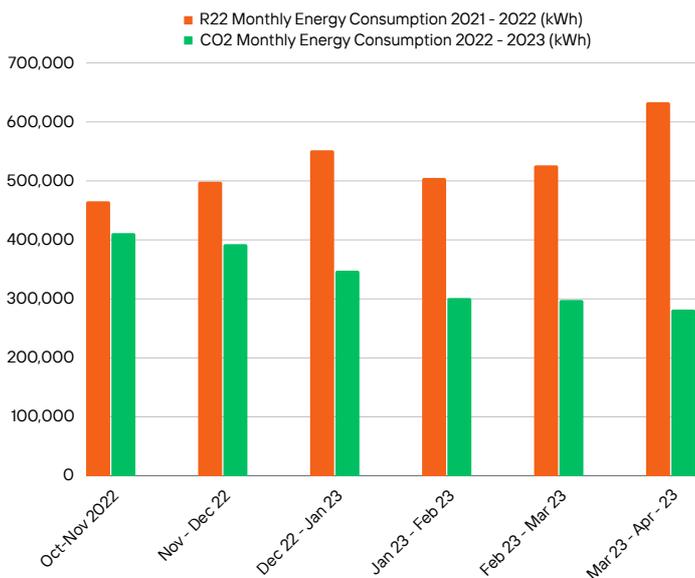
The installation wrapped up in August 2022, with the entire project completed in just 12 weeks, demonstrating CIMCO's capability to deliver high-quality results within a tight timeframe

SAVINGS REALIZED AT THE ARENA

ENERGY



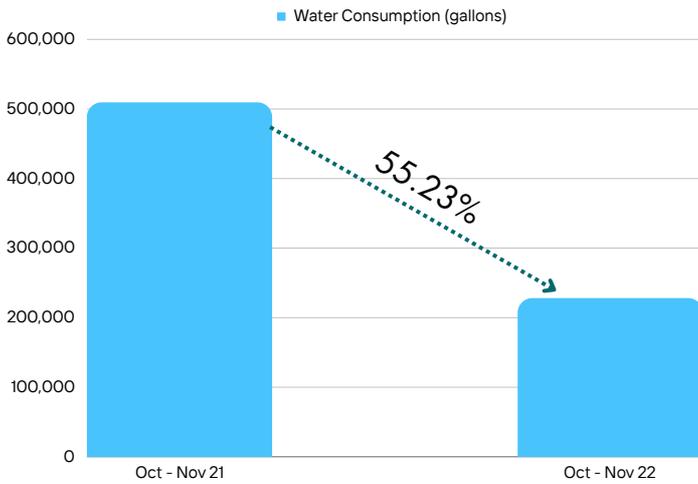
In order to ascertain the tangible energy savings resulting from the installation of CO₂, a comprehensive analysis of energy bills spanning from October 2022 to April 2023 was conducted. These bills consistently revealed a notable **decrease in energy consumption of 129,627 kilowatt-hours (kWh)** in the six month period.



To further bolster the argument, the data for the six-month period from October 2022 to April 2023 was juxtaposed with the corresponding period in the prior year. This comparative analysis unveiled a significant decline in energy usage, commencing at a 12% reduction for the October bills and culminating in a substantial **55% reduction in energy consumption** by April 2023. This cumulative effect translated into a total **savings of 1,147,494 kWh** over the span of six months.

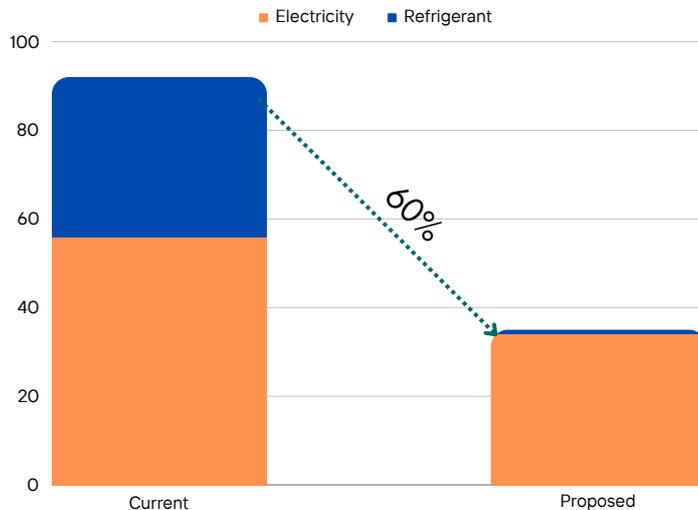
WATER

Moreover, in order to assess the effect of replacing the evaporative condenser with a new gas cooler on water consumption, a comparative analysis was conducted against the corresponding period in the previous year. It is worth noting that the cooling load remained constant throughout this evaluation. The results revealed a substantial **reduction in water usage of approximately 55.23%**, with consumption decreasing from 509,520 gallons in the previous year to 228,130 gallons.



EMISSIONS

By strategically eliminating R22, a high GWP refrigerant, and optimizing electricity consumption, the arena achieved a remarkable 60% reduction in CO2 emissions.



INCENTIVE

Beyond the notable energy and water savings achieved, Santander Arena demonstrated its commitment to environmental responsibility by meeting the criteria for reduced emissions and energy usage, making it eligible for a local utility incentive program. As a recognition of these efforts, the arena received a substantial **incentive payment of \$81,000** in October 2023.

CLIENT TESTIMONIALS

At the end of the day the financials are our lifeblood. What we had before was just an energy guzzler. From a usage standpoint, we are using only 50% a month vs last year.

David Farrak,
General Manager, Santander Arena

Some ice across the league will get bumpy and choppy. And I think here the ice is still very smooth by the time we're done with a period. And its not like we're battling, trying to pass the puck around the ice. You can control what youre doing out there.

Shane Sellar,
Santander Royals

Even though youre saving the money, youre not compromising what the ice looks like

Grant Ossman
Director of Operations, Santander Arena

The ice is so good that we can rent the ice and feel confident that we are going to have good ice.

David Farrak,
General Manager, Santander Arena

This project is very important to me and I am very proud to work for CIMCO. We deliver packages that last and provide a quality sheet of ice. Theres a reason why we're in three quarters of the NHL rinks.

Brad Wilkins
US Project Team Lead, CIMCO Refrigeration

I believe Santander has a system here that is going to outlive the facility itself.

David Fauser
Director of Sales & Marketing, CIMCO Refrigeration

CO₂ GAINING MOMENTUM IN NORTH AMERICA

The adoption of CO₂ refrigeration in ice arenas is on the rise globally—from local community rinks to grand international facilities at the Beijing Winter Olympics.

“CO₂ is a widely adopted, proven refrigerant now,” said David Fauser, Director of Sales and Marketing at CIMCO. “It is no longer a new technology; it is becoming more mainstream. The technology is also constantly improving and the costs are coming down, making it an easy choice for customers.”

To date, CIMCO has successfully executed over 100 CO₂ installations, with a significant focus on North American ice arenas. Based on demand, this number will continue to grow. “CIMCO has seen a significant jump in the demand for CO₂ in ice arenas. Around 40% of CIMCO's sales pipeline now comprises CO₂ installations,” Fauser confirmed.

Local policy is also supporting this trend towards CO₂. More states are joining the U.S. Climate Alliance, committing to reducing greenhouse gas emissions and eliminating hydrofluorocarbon (HFC) refrigerants with proven harmful effects. Pennsylvania, where the Santander Arena is located, became the 24th state to join this alliance in 2019, shifting a focus to more sustainable cooling solutions. This meant that CO₂ was the perfect fit for the Santander project.

Opting for CO₂ refrigerant was not only good for the environment, but good for the customer's bottom line too. By installing a CO₂ system, Santander could benefit from CO₂ technology's proven energy efficiency in this application, reducing their future utility bills.

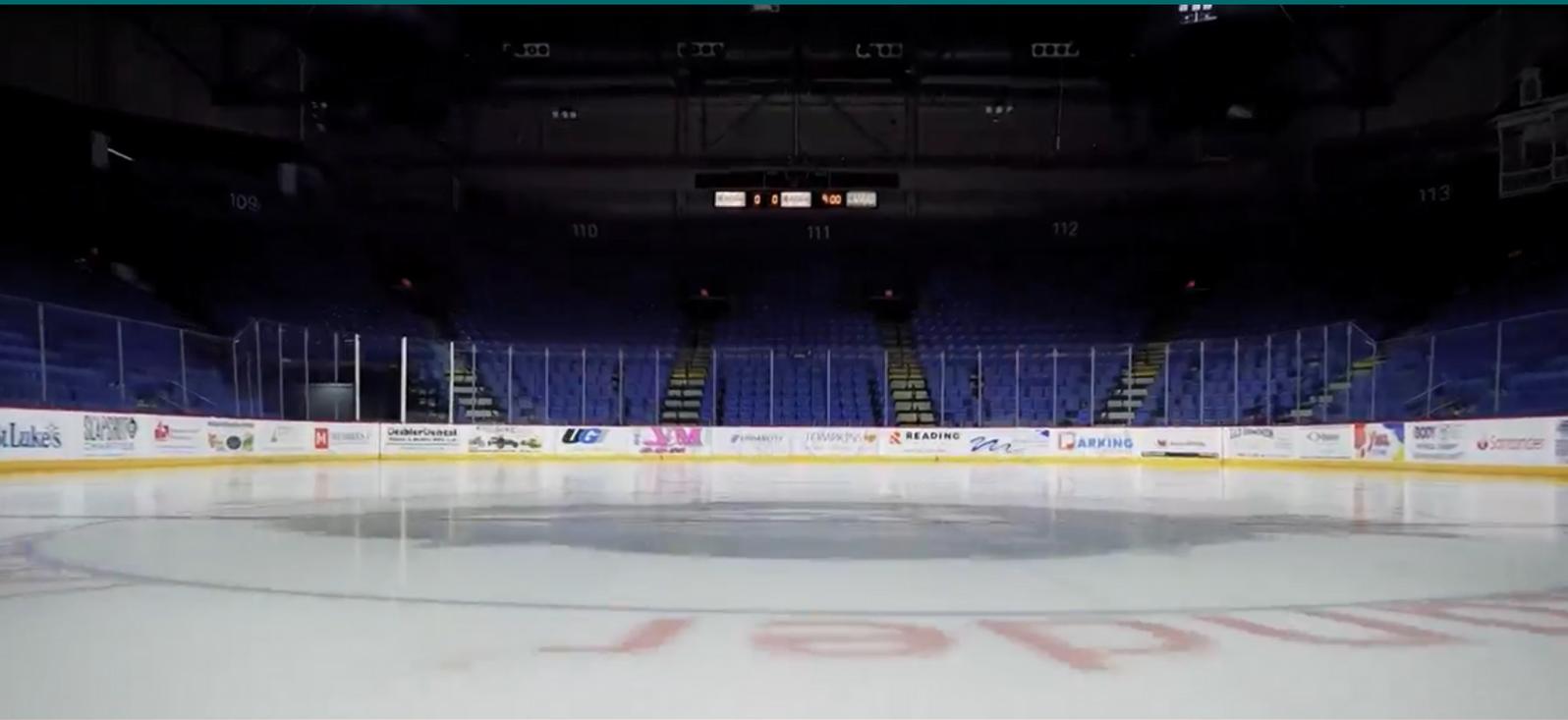
Even professional hockey leagues are waking up to the benefits of CO₂. The Nationwide Arena in Columbus, Ohio, recently implemented a CO₂ project that meets the high-performance expectations of the NHL's Columbus Blue Jackets team.



WONDERING IF CO₂ COULD BE THE KEY TO COST SAVINGS FOR YOUR ARENA?

If you would like to know more about CO₂ and how it can help your arena reduce costs, energy consumption and emissions, get in touch:

cimcocommunications@aim.toromont.com



www.cimcorefrigeration.com