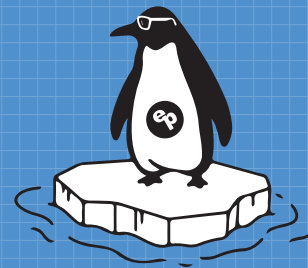


# KEEP IT COOL



REFRIGERATION ENGINEERING NEWS from **emanuelson-podas** | Q4.24

## EP INNOVATION

### Elevating the Refrigeration System for a Florida Grocery

#### The Situation

Recently, one of our clients, an independent retailer who operates several Cuban grocery stores in the Tampa area, leased a 7,250 sq. ft. space that had formerly housed a dance studio. Situated in a growing neighborhood, the building seemed like a perfect place for a business expansion. The client developed a store plan, hired an architect, and ordered equipment.

#### The Challenge

Though the space was small, the client wanted to install nearly 27 tons of refrigeration equipment. As orders began arriving, it became apparent that fitting the equipment and system into the building would require some creative solutions. After a discussion about the project's challenges and the client's preferences for case layout, Emanuelson-Podus was retained to create the mechanical and refrigeration system plans.

#### The Solution

EP reviewed the client's needs and suggested installing some refrigeration components outdoors, with a 10-by-100-foot elevated platform that could hold the condenser/compressor system, as well as two HVAC units, and the electrical service. (The roof wasn't strong enough to hold such equipment.) EP engaged a structural engineer to develop the support structure, while our mechanical team



***"Our flexibility and creativity allowed us to keep the project going for the client."***

— KEVIN GALBRAITH, PE

designed the connecting components and located the proper places for penetrations into the building. Overall, EP engineers were able to design a system that didn't affect the display case layout. Our work also encompassed humidity control — a significant challenge, given the number of open refrigeration cases and the heat and humidity of Florida. "Our flexibility and creativity allowed us to keep the project going for the client," says EP refrigeration expert Kevin Galbraith. The store is now open and operating. ❄️



# Combining CO<sub>2</sub> and Geothermal to Produce Sustainable Refrigeration

Geothermal heat pumps are increasingly used to harness the earth's underground temperatures for heating and cooling, reducing reliance on fossil fuels. Meanwhile, CO<sub>2</sub> has been gaining recognition as a leading natural refrigerant due to its low global warming potential (GWP).

Taken together, geothermal heat pumps and CO<sub>2</sub> refrigerants offer an innovative and environmentally friendly approach to refrigeration system design.

Here's how this combination is reshaping the refrigeration landscape.

## A powerful combination

Unlike traditional refrigerants, which often contain harmful chemicals with high GWP, CO<sub>2</sub> is non-toxic and non-flammable. CO<sub>2</sub> has a GWP of just 1, making it an environmentally responsible choice. It also

operates effectively at low temperatures, making it suitable for various refrigeration applications.

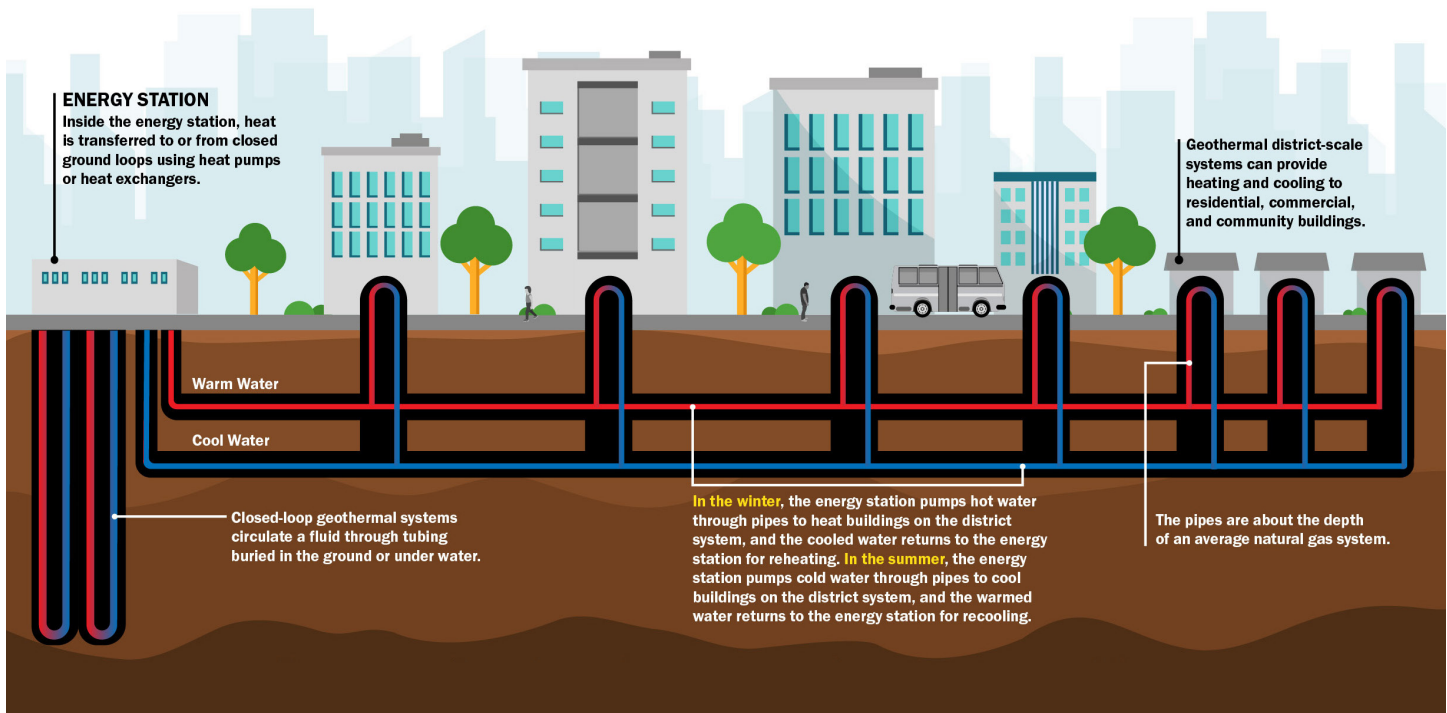
Geothermal heat pumps operate by transferring heat between the ground and a building, making them an efficient choice for temperature regulation. They provide consistent energy efficiency throughout the year, offering an ideal solution for commercial refrigeration needs.

Combining geothermal heat pumps with CO<sub>2</sub> refrigeration systems results in a highly energy-efficient setup. Because they leverage the earth's thermal energy, geothermal heat pumps require significantly less energy than conventional refrigeration systems. And when paired with CO<sub>2</sub>, which can operate efficiently across various temperature ranges, this system achieves remarkable energy savings.



Commercial Small-Package CO<sub>2</sub> Condenser System

***The integration of geothermal heat pumps and natural refrigerants like CO<sub>2</sub> represents a significant advancement in sustainable refrigeration. This combination not only enhances energy efficiency and reduces operational costs but also supports environmental conservation efforts.***



**Geothermal District Heating & Cooling 101** | Geothermal heat pumps can be scaled up to meet an entire community's heating and cooling needs on a single network, as shown in this illustration of a geothermal district heating and cooling system from the U.S. Department of Energy. Source: [energy.gov/eere/geothermal/geothermal-heat-pumps](https://energy.gov/eere/geothermal/geothermal-heat-pumps)

## Pros and cons

The versatility of geothermal heat pumps and CO<sub>2</sub> refrigerants makes them suitable for a wide range of applications. From food storage and distribution to commercial refrigeration in supermarkets and restaurants, this technology can be tailored to meet specific industry needs.

The use of CO<sub>2</sub> not only reduces environmental impact but also complies with increasingly stringent regulations regarding refrigerants. What's more, businesses can expect lower operating costs, particularly in climates with extreme temperatures.

System complexity, however, may result in elevated construction costs. The higher pressure levels of CO<sub>2</sub> refrigeration systems often require a more sophisticated design, including stronger materials and additional valves.

## Enhanced System Reliability

Systems that utilize geothermal heat pumps and CO<sub>2</sub> refrigerants tend to be more reliable and

require less maintenance than traditional systems. The underground components of GHPs are insulated from environmental extremes, resulting in fewer operational disruptions. Additionally, CO<sub>2</sub> systems are known for their robustness and longevity, further enhancing reliability in critical refrigeration applications.

The integration of geothermal heat pumps and natural refrigerants like CO<sub>2</sub> represents a significant advancement in sustainable refrigeration. This combination not only enhances energy efficiency and reduces operational costs but also supports environmental conservation efforts.

As businesses and industries increasingly prioritize sustainability, the adoption of these innovative technologies is likely to accelerate, paving the way for a greener future in refrigeration engineering. By embracing this approach, companies can not only comply with regulations but also establish themselves as stewards of the environment, contributing to a more sustainable world. ❄️



# KEEP IT COOL



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Emanuelson-Podas recently returned from the recent FMI Conference in Baltimore. Here are a few of the highlights.



- An end-user panel that discussed day-to-day, boots-on-the-ground experiences and struggles of retailer design, including temperature monitoring, equipment reliability, defrost cycles, inventory movement, and compliance.
- Hearing from construction professionals and how they are passionate about their work yet remain concerned about the next generation (their replacements) and how to both attract and train up the new workforce.
- A zero zone presentation by a large grocery retailer that included an overview of how maintaining precise temperatures between  $-2^{\circ}\text{C}$  and  $+2^{\circ}\text{C}$  ensures optimal freshness and safety for perishable products like meat, dairy, and seafood. It also highlighted energy-efficient refrigeration technologies and sustainability initiatives that align with reducing waste and improving cold chain logistics.
- Information on managing transcritical  $\text{CO}_2$  systems – which are increasingly used due to their environmental benefits and high efficiency applications – including  $\text{CO}_2$  flash gas and oil control.



## YOUR EXPERTS IN REFRIGERATION ENGINEERING

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