



Business Case for  
Natural Refrigerants

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June 12-14, 2018 – Long Beach

# Integrated Display Case Options For Small Supermarkets

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## What is The Helix Innovation Center?

It is a building which will foster an environment for academia and industry collaboration. The Helix is dedicated to advancing research and education in heating, ventilation, air conditioning, and refrigeration technologies.

## The Modules

The center will feature interactive real-world environments, or modules, designed to spur innovation and help advance the technology used in homes, commercial buildings, supermarkets, restaurants and data centers.



Residential  
Connected  
Home



Light  
Commercial  
Building



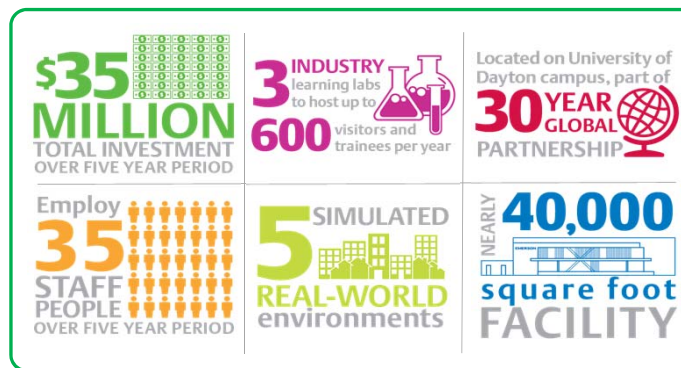
Data Centre  
Thermal  
Management



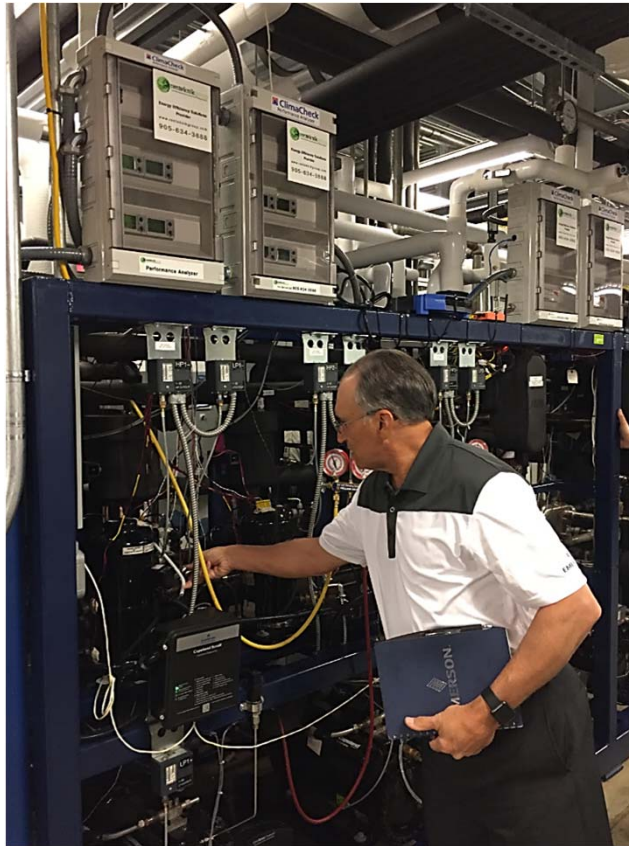
Food  
Service  
Operation



Supermarket  
Refrigeration

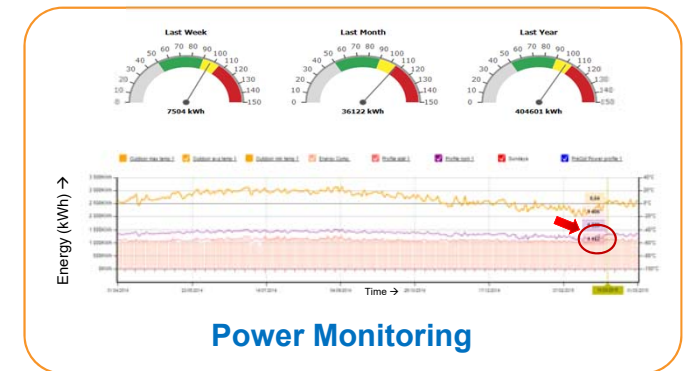
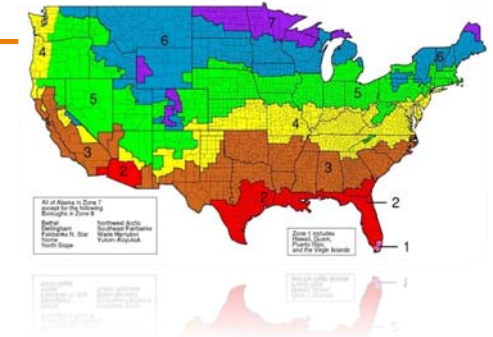


# CO<sub>2</sub> Energy Optimization Update



## Features

- CO<sub>2</sub> Transcritical Booster
- Parallel Compression
- Dry Gas Cooler
- Adiabatic Gas Cooler
- Mechanical Sub cooling
- Heat Reclaim, Water,
- HVAC, & Snow Melt
- Interrelated A/C
- Gas Ejector



The Helix Innovation Centre, Dayton, OH

# Integrated Display Case Technology - Case Study Details

Emerson Commissioned Study by an Independent Institute

## Focus of Study

- Two Different Refrigeration Systems
- Both Using Natural Refrigerants
- European Discounter
- Evaluated Applied Savings to a 1000 Store Portfolio Based on Total Cost of Ownership over a 10 year Period

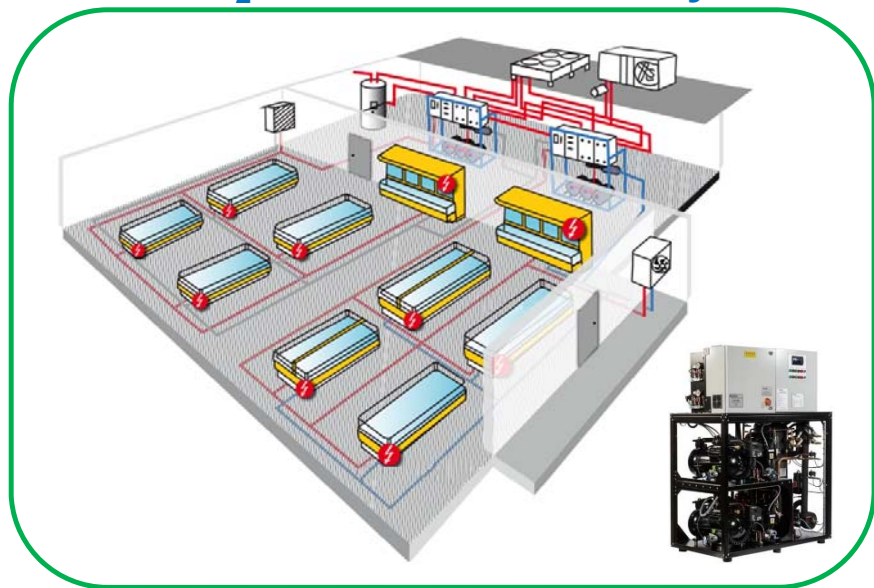


ILK Dresden   
Institut für Luft- und Kältetechnik  
gemeinnützige Gesellschaft mbH



# Integrated Display Case Technology - Case Study Details

## System "A" CO<sub>2</sub> Transcritical MT Only



### Centralized Systems

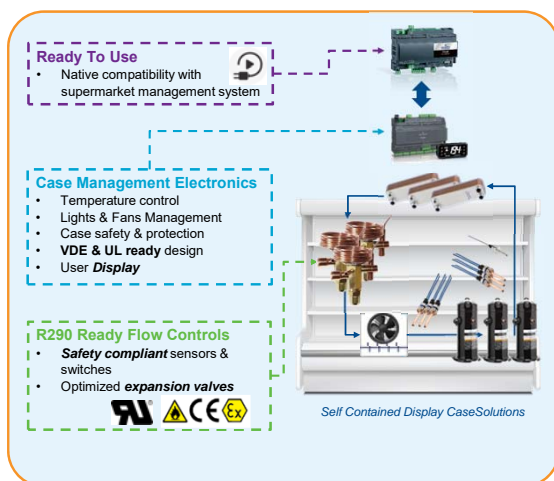
- Typically use in Supermarkets
- Medium Temp systems for (meat, prepared foods, dairy, refrigerated drinks).
- The cooling equipment is typically housed in a separate machine room.
- Long piping runs, many joints, large refrigerant charge
- 3 MT Compressors, no parallel comp, no ejectors
- Location; Germany

**For the purpose of this Case Study it was limited to Medium Temperature Loads Only**

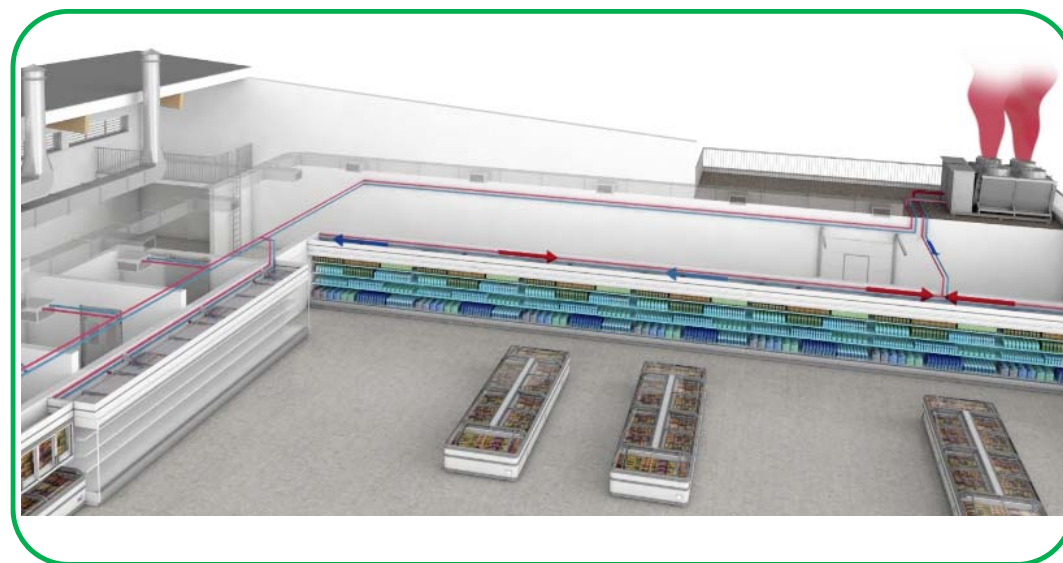
# Integrated Display Case Technology - Case Study Details

## 'Integral' Refrigeration

- **Stand-alone integrated** display cabinets that each contain their own cooling system
- Can provide refrigeration for entire store provided the heat generated is removed to an external chiller or heat exchanger through a simple pipe containing water or brine.



## System "B" R290 Micro Distributed

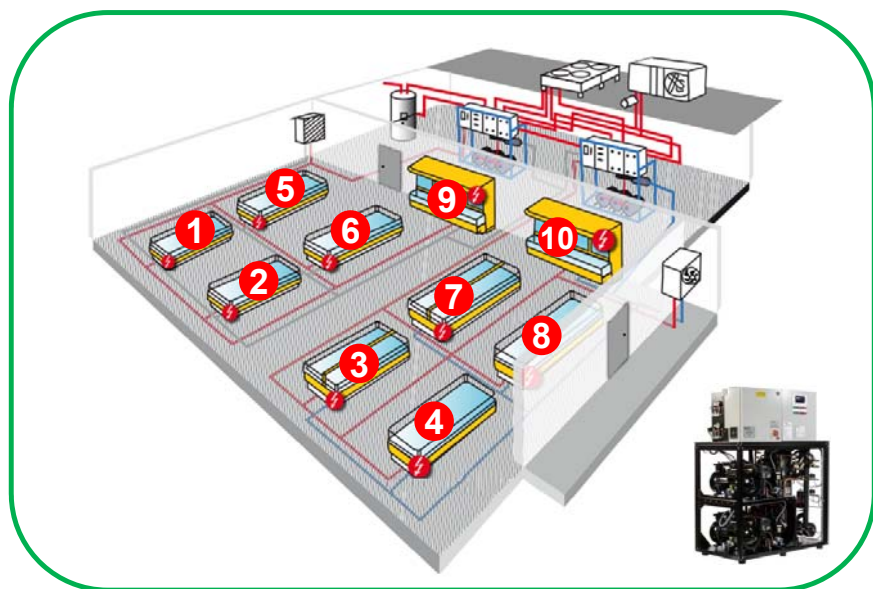


# Integrated Display Case Technology - Case Study Details

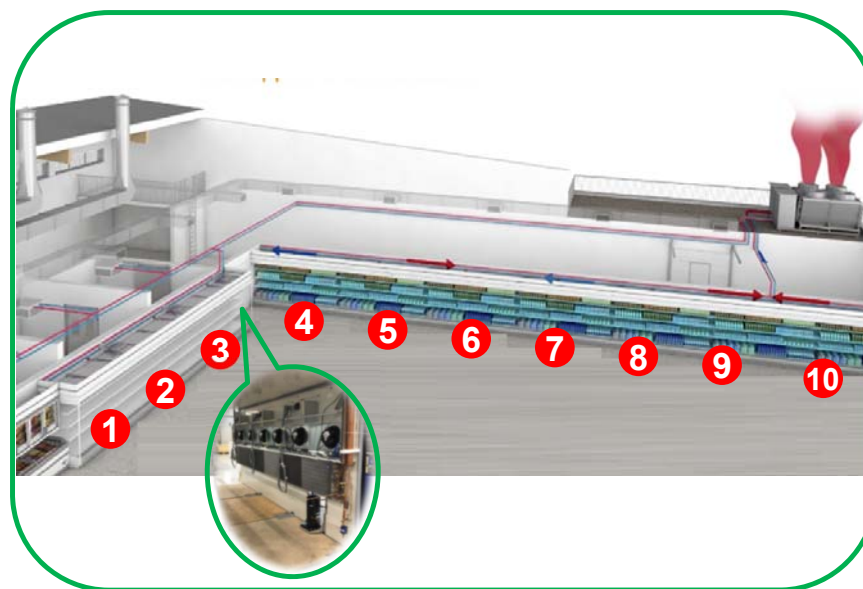
Emerson Commissioned Study by an Independent Institute

**10 year Life Cycle Cost Savings from Using R290 Integral Display Case System Architecture Instead of CO<sub>2</sub> Rack**

**System "A"**  
CO<sub>2</sub> Transcritical Centralized System



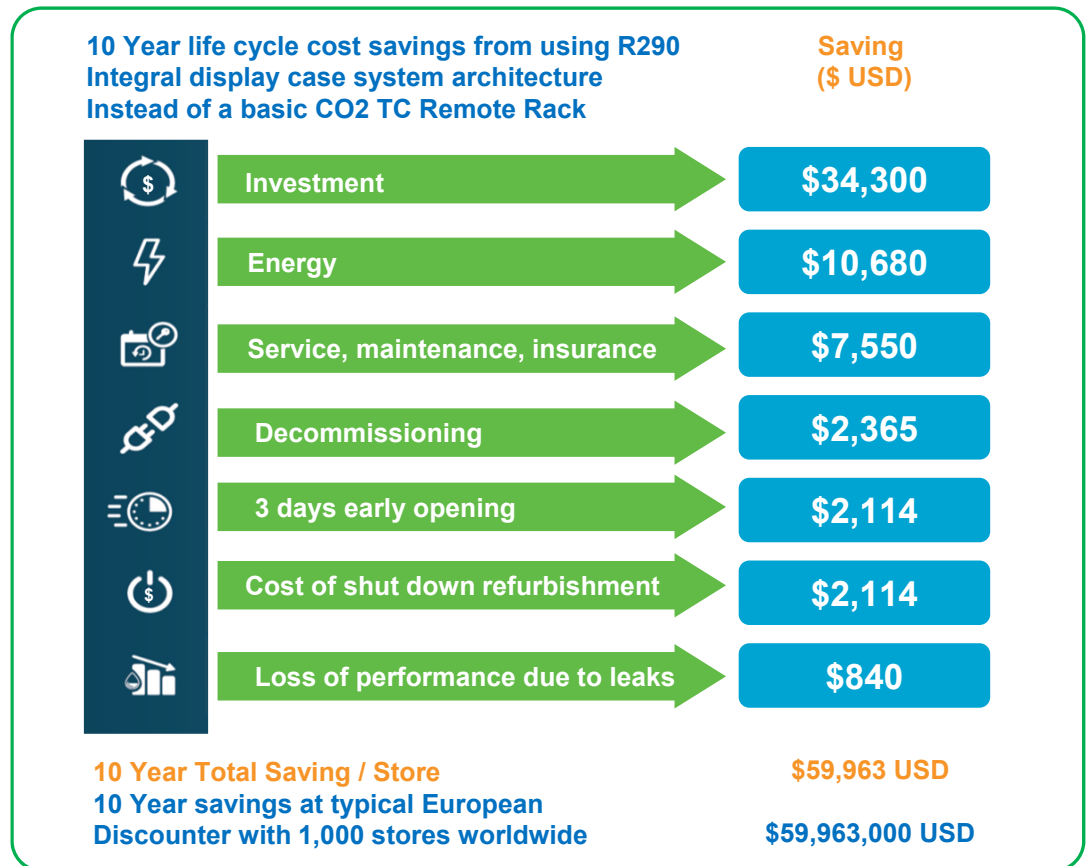
**System "B"**  
R290 Micro Distributed



# Case Study Details

## Emerson Commissioned Study by an Independent Institute

- The Study Focused on the Medium Temperature Display Cases of a Typical European Discounter Store
  - 10 display cases per store & 11,000 ft<sup>2</sup> vending area.
  - **System A** was designed as a remote display case architecture supplied by a *centralized Transcritical CO2 rack*.
  - **System B** was designed as an *integral display case architecture with compressors*.

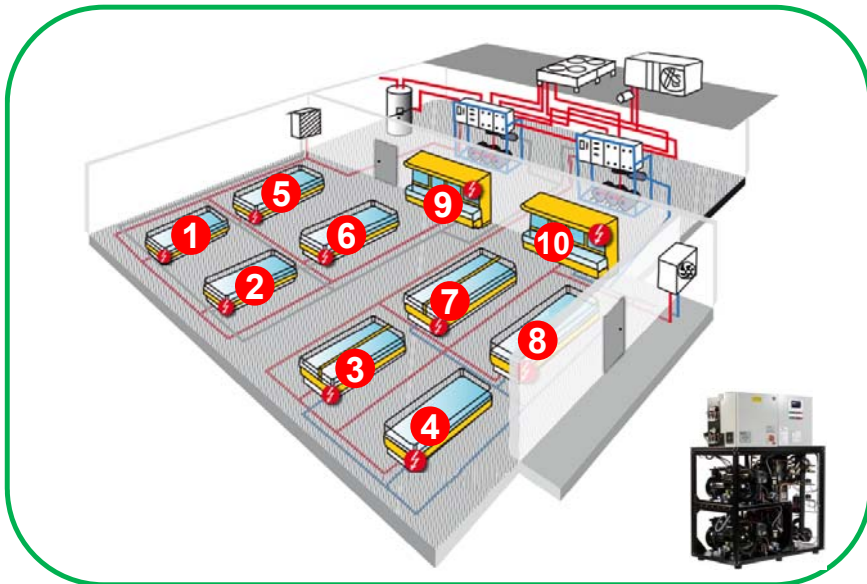




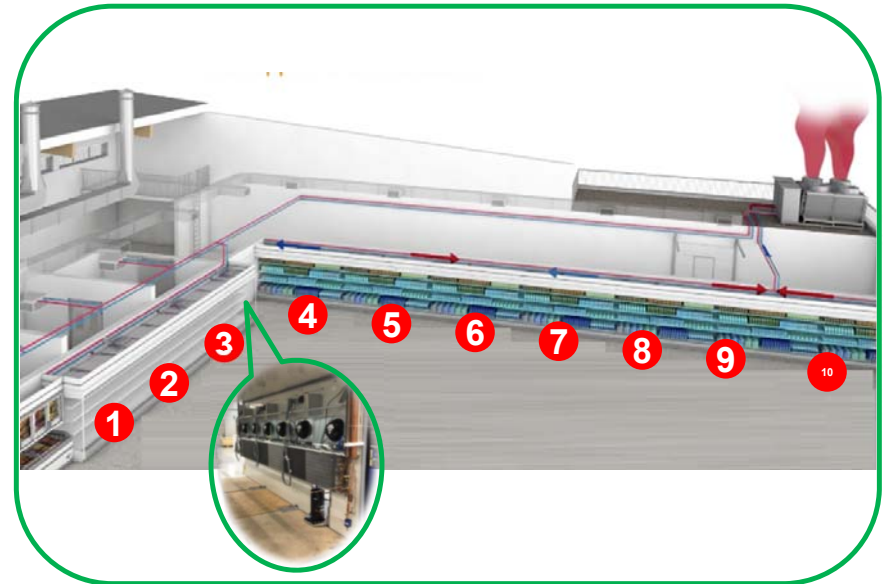
# Integrated Display Case Technology - Case Study Summary

Emerson Commissioned Study by an Independent Institute

**System "A"**  
CO<sub>2</sub> Transcritical Centralized System



**System "B"**  
R290 Micro Distributed



Life Cycle Cost Savings from using R-290 Integral Display Case Architecture Vs Centralized CO<sub>2</sub> Transcritical System for small 11,000 ft<sup>2</sup> store with 10 M.T. cases was  
**\$59,963 USD Savings / Store over 10yrs**



**ATMO**  
sphere

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**Thank you very  
much!**

A scenic photograph of a white lighthouse on a grassy hill, surrounded by palm trees and a body of water. The lighthouse has a red top section. The water in the foreground reflects the lighthouse and the sky.

## Integrated Display Case Options For Small Supermarkets

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