

SUPERVALU[®]



**SUPERVALU' s Development of
Next Generation Refrigeration
Systems:**

**Application of Ammonia, CO₂ and
Propane**

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Introductions

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SUPERVALU's Executive Level Commitment to Sustainability



Consumer Goods Forum – Natural Refrigeration by 2015
Better Buildings Challenge – 20% Energy Reduction

Refrigeration Partners:



Agenda



1. Project Goals
2. Project Overview
3. Efficiency & Cost Considerations
4. Lessons Learned
5. Future Steps

Project Goals

1. Develop a 100% natural refrigerant option for the refrigeration system
2. Determine the cost and value of attaining the 100% option
3. Compare the environmental impact of different refrigeration systems on-site

Project Overview

Project Location:

- Carpinteria, CA
- 85 miles northwest of Los Angeles
- Environmentally aware



ZEROWASTE



Project Overview

Store Design Highlights:

- Remodel-Expansion (20k ft² to 40k ft²)
- Timeline:
 - Design: July 2011
 - Construction: Dec. 2011 – July 2012
- Daylight harvesting
- Dimmable LED lighting technology



Project Overview

Refrigeration System Design Highlights:

- Medium temperature door cases
- R290 (Propane) spot display case
- Water-cooled
- 100% & 90% natural refrigerant options installed



Project Overview

NH₃ Primary
(100% Option)



R407A Primary
(90% Option)



System
Comparison



Cascade CO₂



Project Overview

Refrigeration Design Approach:

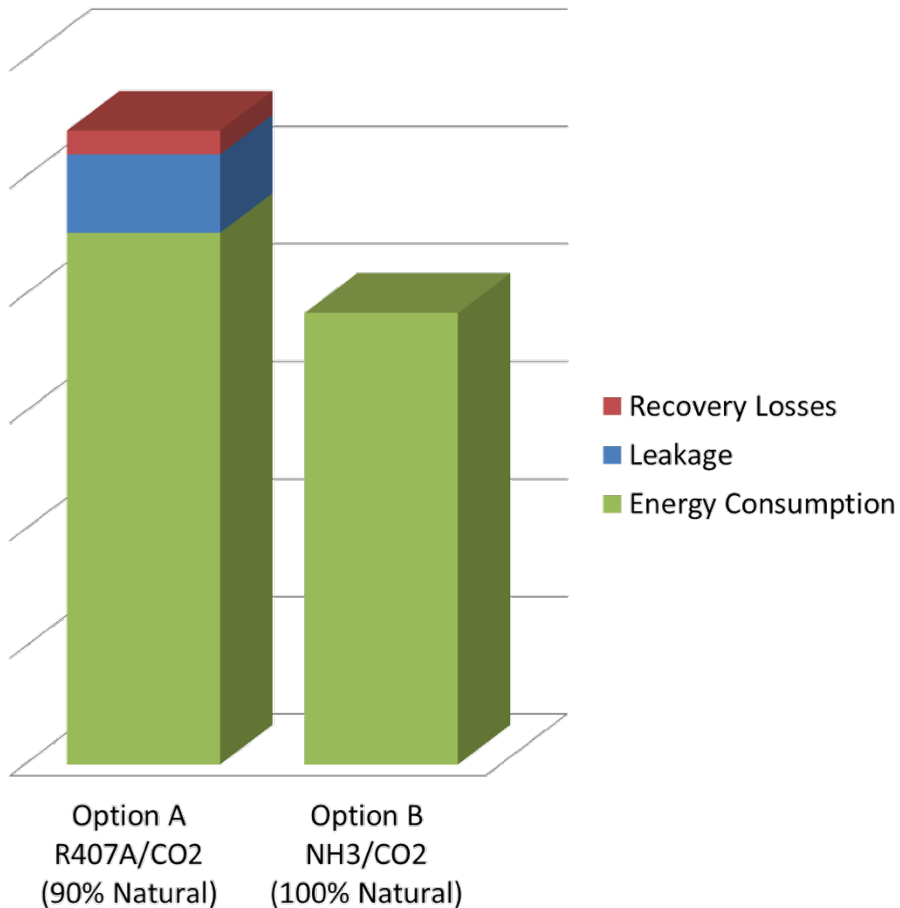
- Efficiency & proven technology
- Refrigerants chosen: NH_3 , CO_2 , R290, and R407A
- Code compliance research (NH_3 , R290)
- System Comparisons:
 - R407A/ CO_2 vs. NH_3 / CO_2

Environmental Impact Evaluation:

- Total Equivalent Warming Impact (TEWI)
 - Leakage, recovery losses & energy consumption
 - GWP R407A = 2107
 - GWP CO_2 = 1
 - GWP NH_3 = 0

Efficiency & Cost

Total Equivalent Warming Impact (TEWI)



Summary:

Environmental Impact of NH₃/CO₂ vs. R407A/CO₂

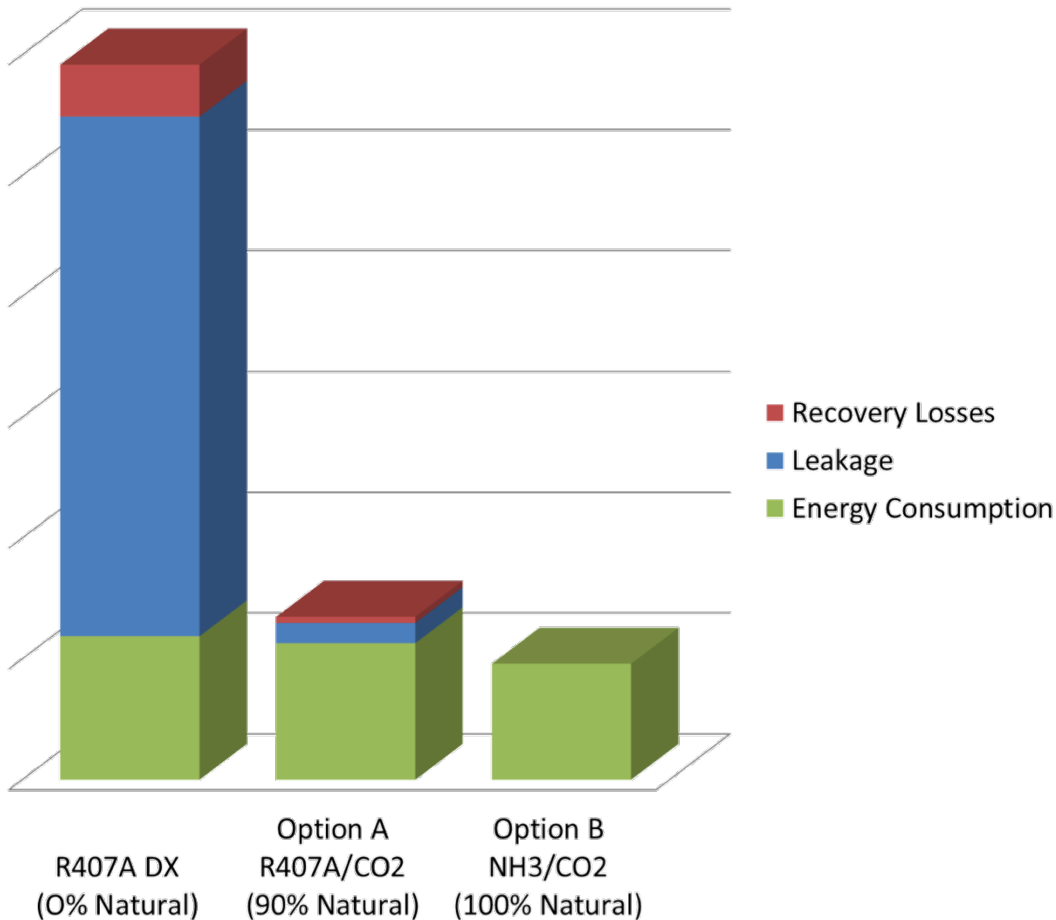
- 29% TEWI reduction
- 15% Compressor energy savings

Costs of NH₃/CO₂ vs. R407A/CO₂

- 18% First cost increase
- 35% Life cycle cost increase
 - First, Installation, Maintenance

Efficiency & Cost

Total Equivalent Warming Impact (TEWI)



Summary:

TEWI reduction compared to R407A DX

- 77% (R407A/CO₂)
- 84% (NH₃/CO₂)

Life cycle cost increase compared to R407A DX

- 14% (R407A/CO₂)
- 55% (NH₃/CO₂)

Lessons Learned

Cost solutions:

- Increase volume
- Reduce redundancy
- Use proven technology
- Reduce loads

NH₃ regulatory concern solutions:

- Understand charge threshold & safety
- Engage local authorities
- Educate, educate, educate

Qualified contracting & maintenance solutions:

- Increase volume
- Leverage experience
- Provide training

Future Steps

Develop a white paper on Albertsons Carpinteria showing actual TEWI results from tests

CO₂ is the future of distributed refrigeration in the supermarket

- Evaluating further the value proposition of attaining 100% through this solution or an alternative

Optimization of the 90% solution

- Actively designing retrofits for CO₂ in remodels



Questions?

Thank You!