Sustainable
Refrigeration Summit

Connecting the Pieces for
Supermarket Refrigeration Solutions

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Sustainable
Refrigeration
Council

nasrc.org

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Summit Program

Day 1: Monday, October 24

9AM-10AM PST	11AM-2PM PST	1PM-2PM PST
Keynote: Industry & Regulatory Trends	Technology Focus: Driving CO2 Performance	CO2 Systems: What Retailers Need to Know

Day 2: Tuesday, October 25

9AM-10AM PST	11AM-12PM PST	1PM-2PM PST
Distributed and Self-contained Systems	Technology Focus: Total Cost of Ownership	Measuring Performance of Natural Technologies

Day 3: Wednesday, October 26

9AM-10AM PST	11AM-12PM PST	1PM-2PM PST
Integrating Naturals into Existing Stores	Technology Focus: Modular Tech. for Existing Stores	Funding for Naturals

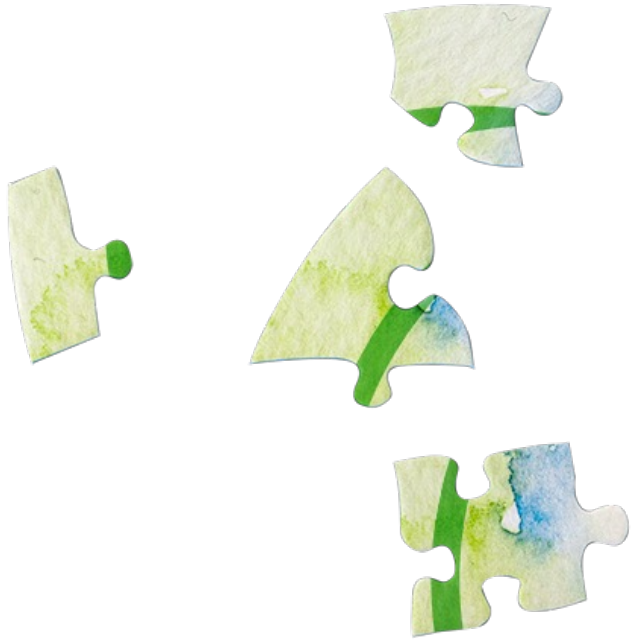
Day 4: Thursday, October 27

9AM-10AM PST	11AM-12PM PST	1PM-2PM PST
Solving the Technician Shortage	Technology Focus: Natural Innovations	Reducing Refrigerant Emissions

Day 5: Friday, October 28

9AM-10:30AM PST	11AM-12:30AM PST
State & Federal HFC Regulations	Workshop: Utility Incentives for Refrigerant GWP

Housekeeping & Logistics



Question and Answer Session

- Participants are muted
- Questions will be moderated at the end
- To ask a question, enter into the **Q&A section**

Need Help? Click the Support button on sustainablerefrigeration.com

Missed a Session? Session recordings and slides will be available on the platform

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Integrating Naturals into Existing Stores

Wednesday, October 26th, 2022

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Integrating Naturals into Existing Stores

Hear from retailers and their partners on experiences with remodeling existing stores with naturals, including the challenges of logistics and integration.

Jim McClendon
Director, Walmart Energy
Walmart

Dustin Lilya
Principal
DC Engineering

Mike Ellinger
Principal Program Manager - Engineering, Compliance & Sustainability
Whole Foods Market

Richard Heath
Program Manager
SEER2

Brad Person
President/Project Manager
SEER2

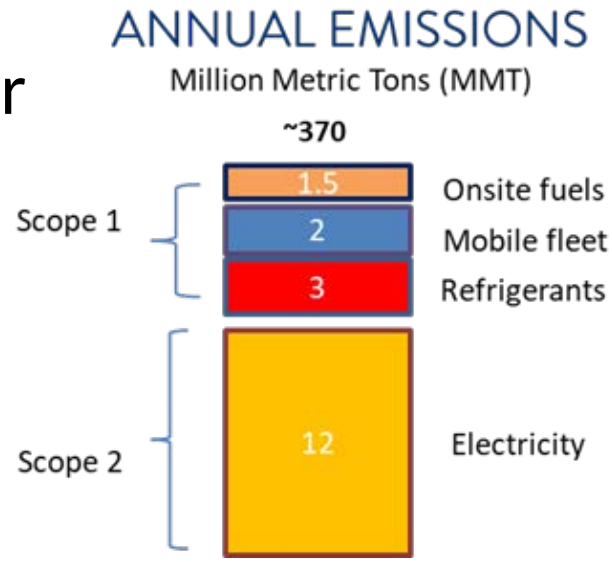
WALMART

Intro / Corporate Goals

- In 2020, we raised our aspiration to reduce emissions in our operations (Scopes 1 & 2) by realigning our science-based target to a 1.5-degree Celsius trajectory, the highest ambition approved by the SBTi.

- Our goal is to achieve zero emissions across Walmart's global operations by 2040, which includes our SBTi-approved interim goal of reducing absolute Scopes 1 and 2 GHG emissions by 35% by 2025 and by 65% by 2030 from our 2015 base year.

- We were the first U.S. retailer to make a zero emissions commitment that does not rely on carbon offsets. We achieved a 23.2% reduction in combined Scopes 1 and 2 emissions between our 2015 calendar year baseline and 2021.



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Intro / Corporate Goals

- Three Guiding Principles:
  - ❑ Minimize Store Disruption
  - ❑ Future Ready State
  - ❑ Lowest TCO

- Leverage existing assets vs wholesale replacement where viable

- Technology paths for transition
  - Self Contained Water Cooled Cases
  - Secondary Glycol (Bolt-on) Conversions (MT) *
  - Secondary Co2 (Bolt-on) Conversion (LT)
  - Transcritical Co2 Systems (Macro vs Micro)

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PROJECT OVERVIEW

- WALMART - CHINO CA

- Secondary Glycol Bolt-on Conversion
  - Replacement of medium temperature cases with secondary glycol
  - Conversion of high side system to R-448a refrigerant
  - Elimination of all store level HFC refrigerant and piping
  - Develop a “bolt-on” approach to an existing system with integrated controls and functionality

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TECHNOLOGY DESCRIPTION

- High side system converted to R-448a
  - Eliminated 3,010 LF of HFC piping
  - Eliminated 1,746 LF of HFC piping
  - System GHGP Reduction > 85% (90% target)
- Pump Skid has stand alone controls to accommodate bolt on configuration
- Existing refrigeration rack operates treats the chiller skid as a single system load
- Minimal rack configuration changes required

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ZE GOAL PROJECT – INTEGRATION

Keys to Successful Integration:

- Regular coordination meetings with all stakeholders
  - Operations
  - Service
  - Engineering/OEM's
- Risk mitigation plan for new technology
- Factory testing with OEM prior to installation

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ZE GOAL PROJECT

LESSONS LEARNED:

- Spend time on coordination of new items:
  - EG – Provide specific P/N for each item vs. a spec
- Include manufacturer in design review meetings during development
- OEM test bench can speed development of the stand alone control package
- Artificial load bank for onsite testing prior to connecting store load
- Provide spare parts on-site as part of risk mitigation plan until systems are well understood and supported by service

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Whole Foods Market

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Company Overview

- Whole Foods Market operates 534 Stores located in US, CAN, & UK.
- Whole Foods Market is part of Amazon's Climate Pledge.
- The Climate Pledge is a commitment to reach net-zero carbon emissions by 2040, a decade ahead of the Paris Climate Agreement.
- Refrigerants play a key role in achieving our goal. We take a multi-tier approach with our refrigerant management by retrofitting existing systems with high GWP refrigerants to lower HFO blends, installing leak detection in all facilities and replacing end of life refrigeration systems with the latest technology.

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Project Overview

4 Existing Sites with High GWP Systems

- Site 1 (San Francisco, CA)
  - 1495 lbs. R-407a (GWP 2100)
- Site 2 (San Francisco, CA)
  - 1150 lbs. R-507a (GWP 3985)
  - 500 lbs. R-407a (GWP 2100)
- Site 3 (Petaluma, CA)
  - 2183 lbs. R-404a (GWP 3922)
- Site 4 (Sebastopol, CA)
  - 200 lbs. R-404a (GWP 3922)
  - 230 lbs. R-407a (GWP 2100)

Low GWP Options Deployed

- Transcritical CO2
- Micro Distributed R-290
- Cascade R-448a (GWP 1390) over CO2
- Traditional DX Rack using R-448a (GWP 1390)

❖All system designs utilized Adiabatic Fluid Coolers/Condensers

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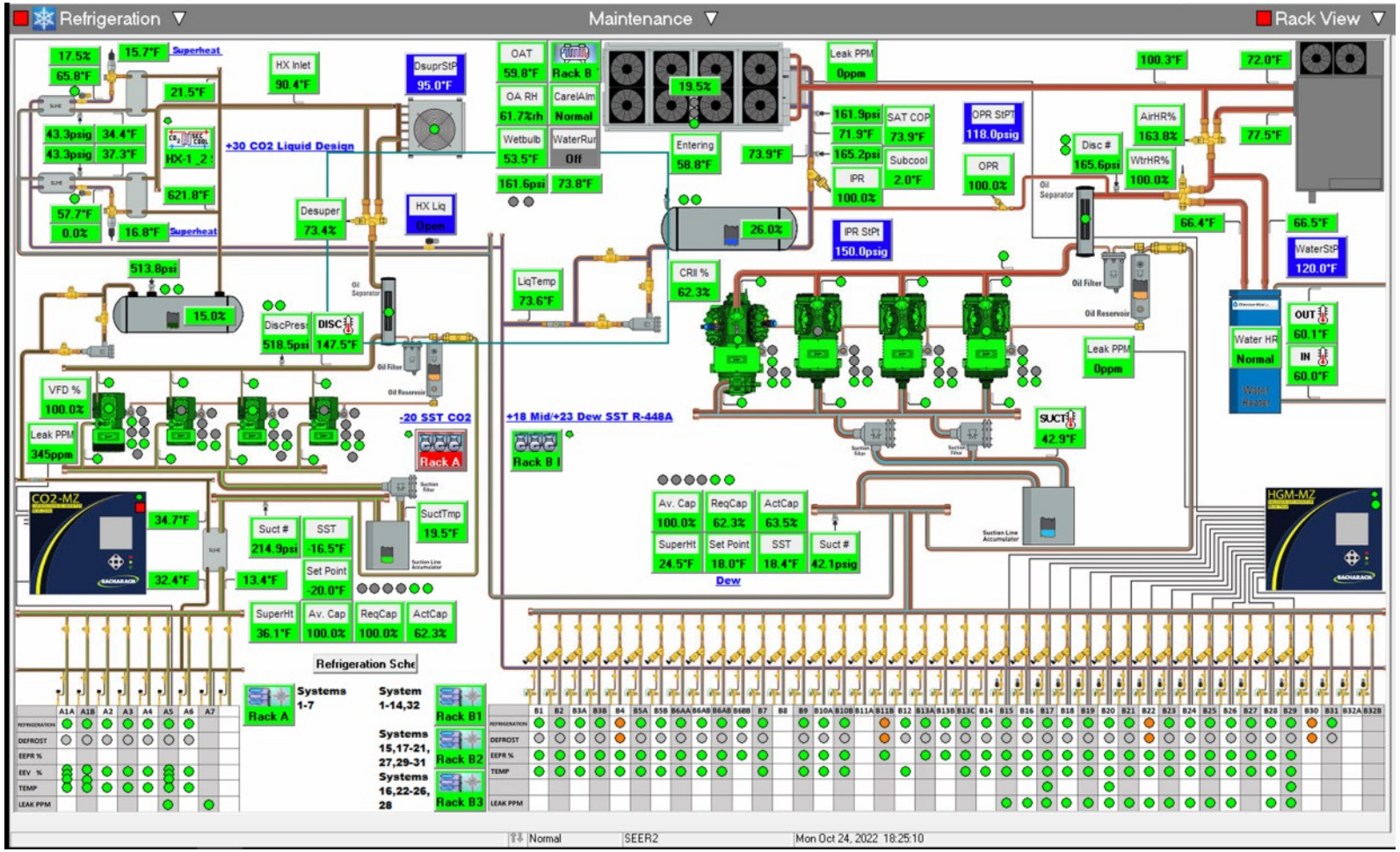
CO2/R448A Cascade System

Site 1:

- 1900 lbs. R-448a
- 250 lbs. CO2



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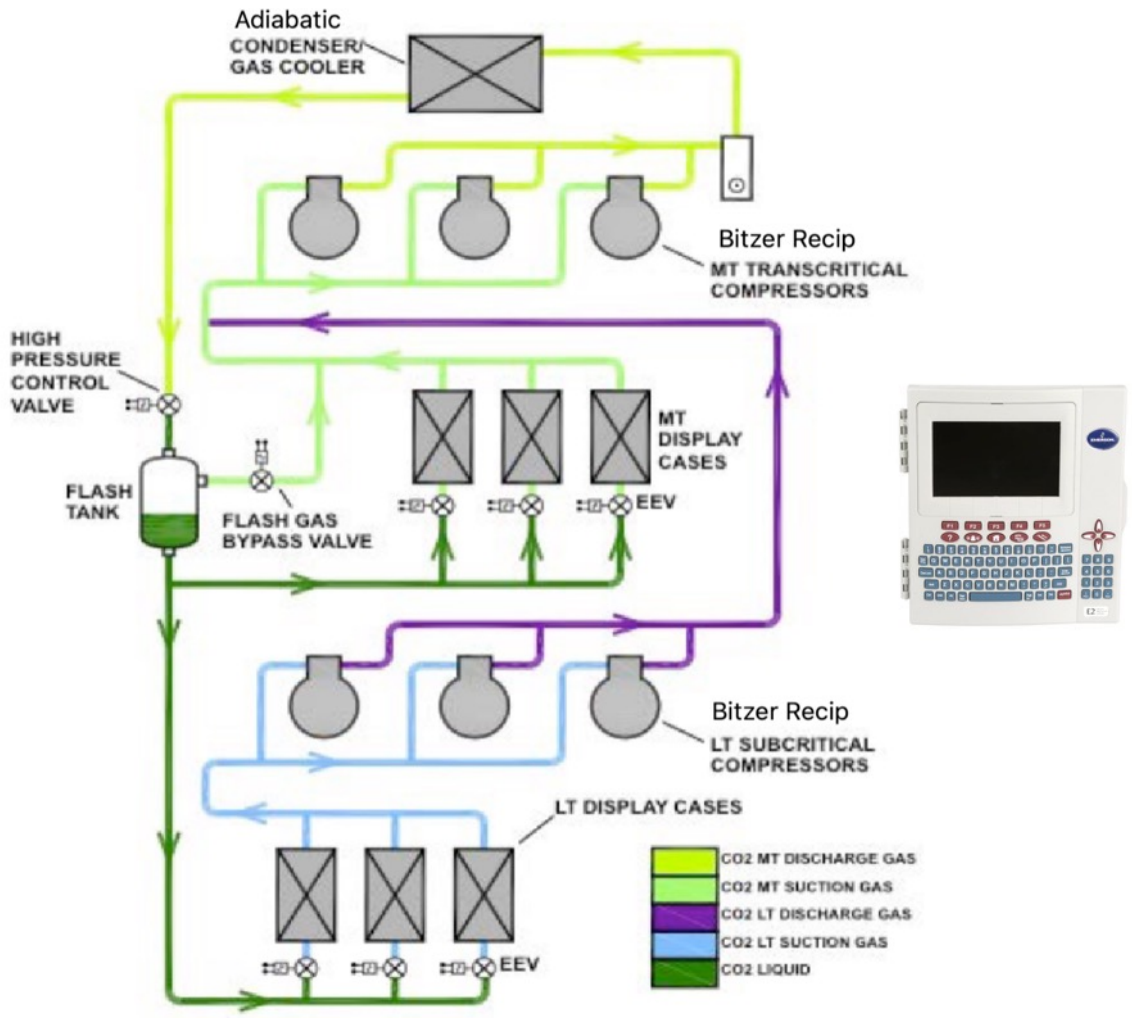
Typical Transcritical CO2



Site 2:

- 750 lbs. CO2
- Medium Temp cases and HVAC A/H New R448A racks

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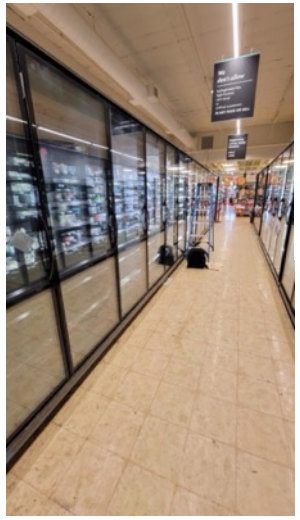
Typical CO2 Cascade System

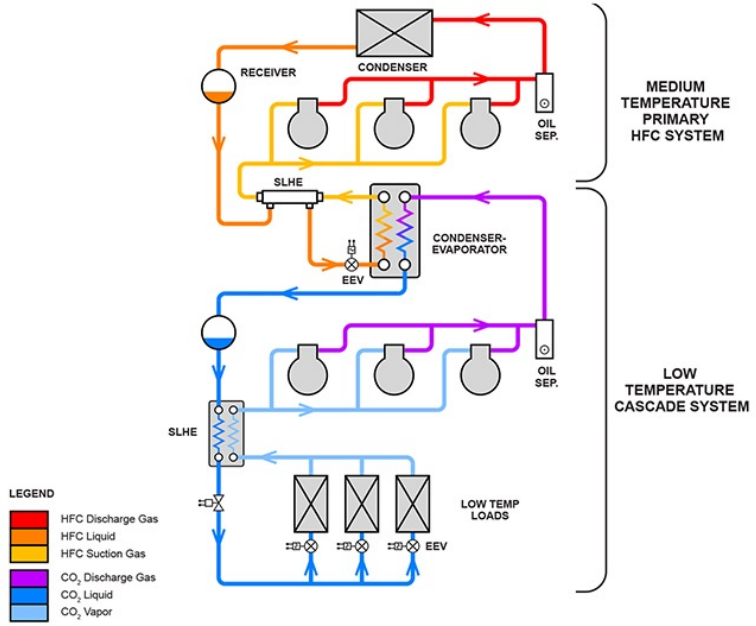
Site 3:

- 1500 lbs. R-448a
- 360 lbs. CO2

Existing R404A Protocol Air Cooled

New CO2/R448A Cascade System w/ Adiabatic Condenser





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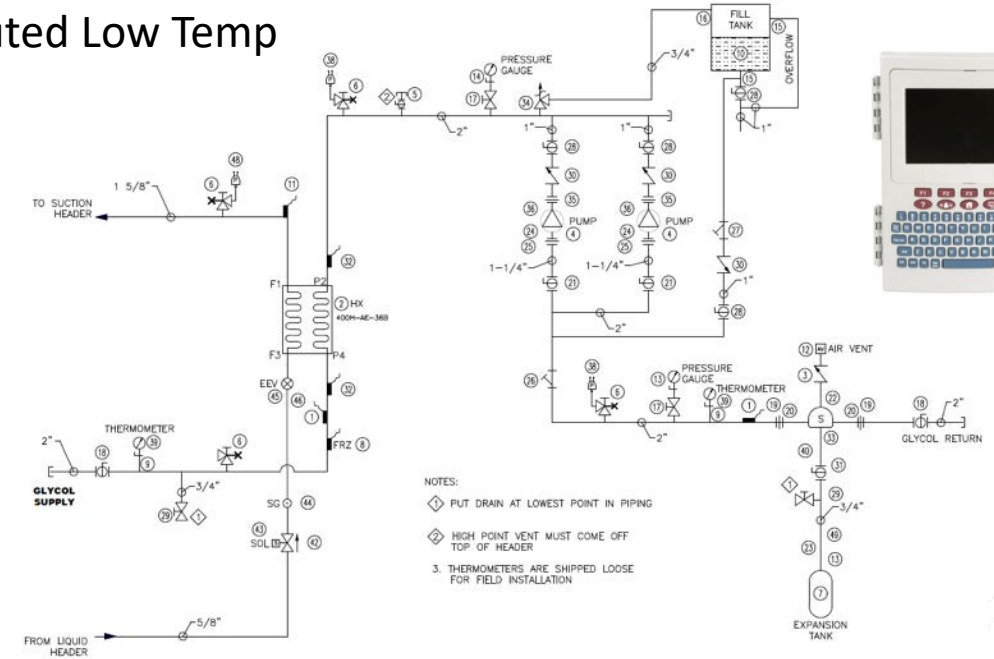
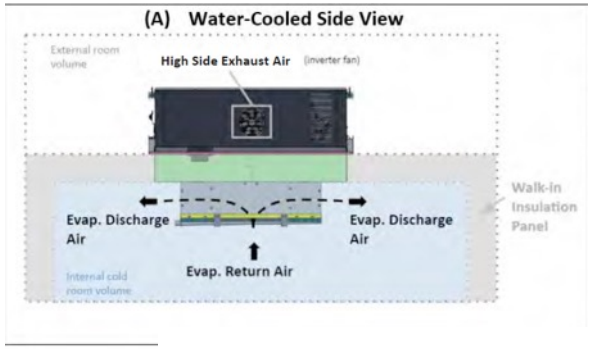
Typical Microdistributed System

DX 448A Chiller integrated in the Medium Temp rack, Feeding micro distributed Low Temp



Site 4

- Glycol Chiller 600 lbs R-448a
- Total R-290 Charge < 3 lbs



Micro-Distributed Reach-In Merchandisers with ***R-290 (Propane) Refrigerant***

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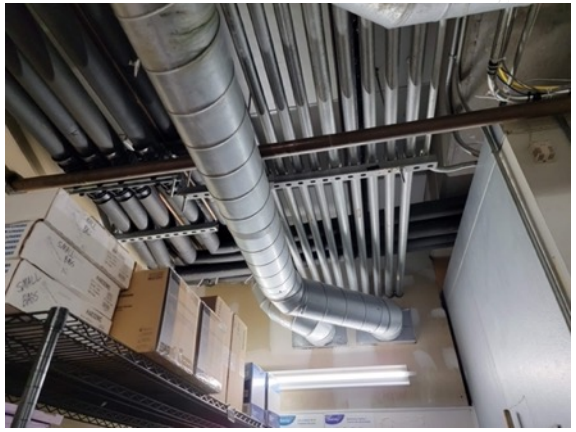
Integration Challenges

- California Title 24 implementation, heat recovery initiatives, etc.
- City permitting (noise ordinance)
- Space constraints
- Structural limitations
- Inability to reuse materials (e.g. piping)



Increased pressure of system can cause total charge losses from fittings & relief's

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Integration Challenges

- Space constraints
- Keeping the store open
- Overnight work (and labor)

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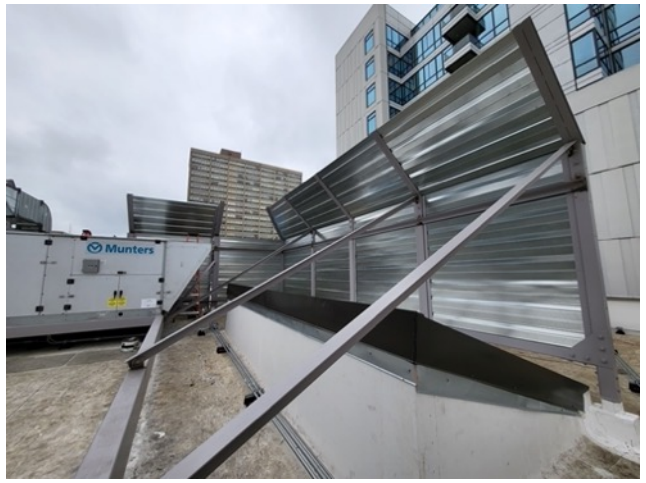
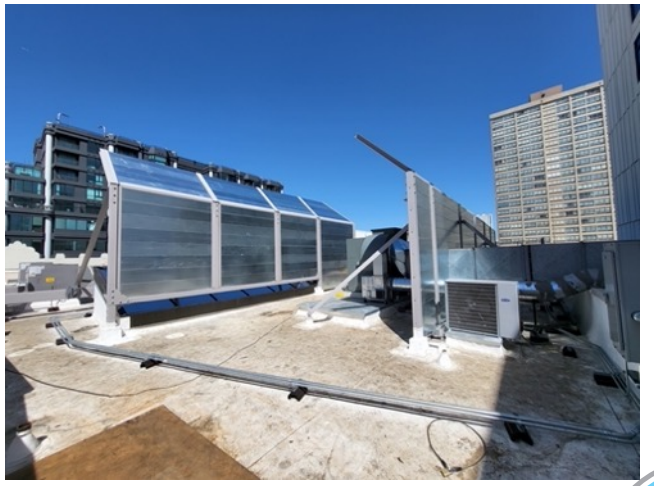
Lessons Learned

- California Title 24 requirements
- City permitting (noise ordinance)
- Space constraints
- Structural limitations





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Takeaways for Success

1. Work With NASRC resources and support!
2. Planning is key!
3. Consider utilities capacities and timing in developing phasing/schedule.
4. Remote or off-site staging of equipment is a must.
5. Contractor training and support from OEM field service team.
6. Project administration & commissioning experts leading development and integration.
7. Keep it simple (if possible, but it's a challenge)!

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