

131st

IARW-WFLO Convention

8–12 October 2022

San Diego, California



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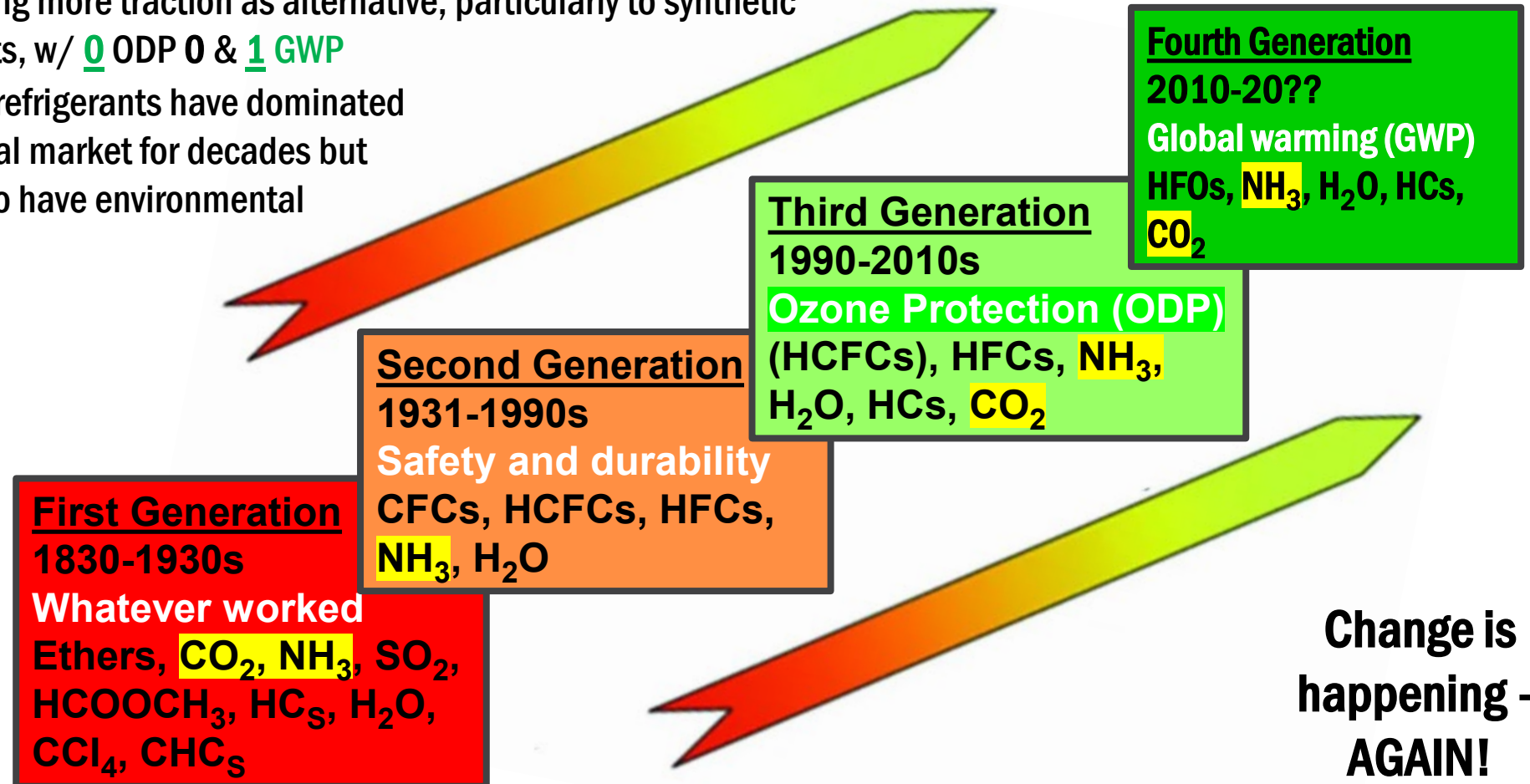
October 18, 2022

Why Ammonia (NH₃) & Carbon Dioxide (CO₂)?

Kurt Liebendorfer – Vice President - Evapco

Why NH₃ (R-717) & CO₂ (R-744) ?

- Both have been successfully used for 170 years , while the industry is now working thru its 4th Generation of man-made synthetic refrigerants that continue to harm the environment in new ways.
- NH₃ is the most environmentally friendly refrigerant w/ 0 ODP & 0 GWP
- CO₂ gaining more traction as alternative, particularly to synthetic refrigerants, w/ 0 ODP 0 & 1 GWP
- Synthetic refrigerants have dominated commercial market for decades but continue to have environmental problems



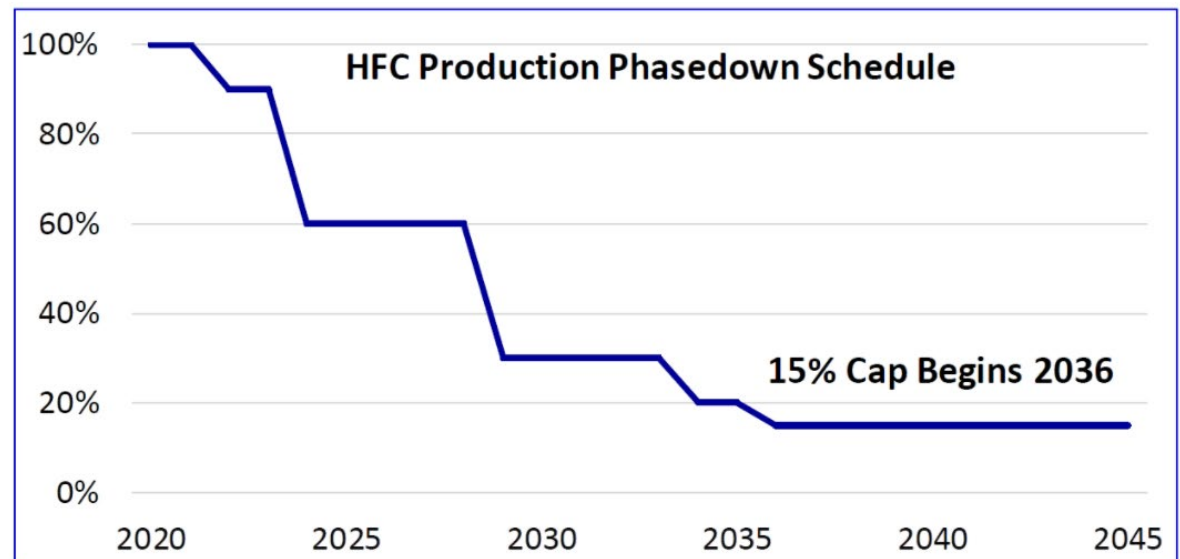
Why NH3 & CO2?

- Passage of American Innovation and Manufacturing Act (AIM Act) in 2020, & the U.S. Senate signing of the Kigali Treaty 3 weeks ago, has solidified the phasedown of production and consumption of HFCs.
- Many states, and the federal government (EPA) are now executing it to reduce HFC's to 15% over the next 14 years, because of the harmful effects they have on the environment.

As a result - Today, and long into the future, NH3 & CO2 natural refrigerants are the most climate-friendly & energy efficient solutions available in the industry.

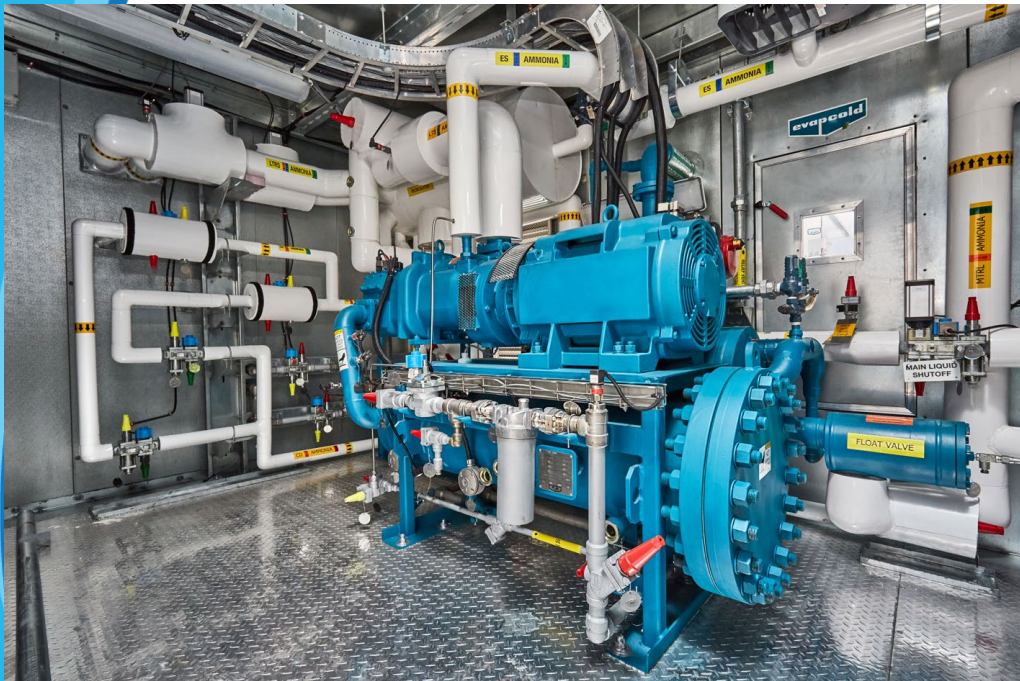
U.S. Will Dramatically Cut Climate-Damaging Greenhouse Gases with New Program Aimed at Chemicals Used in Air Conditioning, Refrigeration

American Innovation in Manufacturing (AIM) Act (2020)



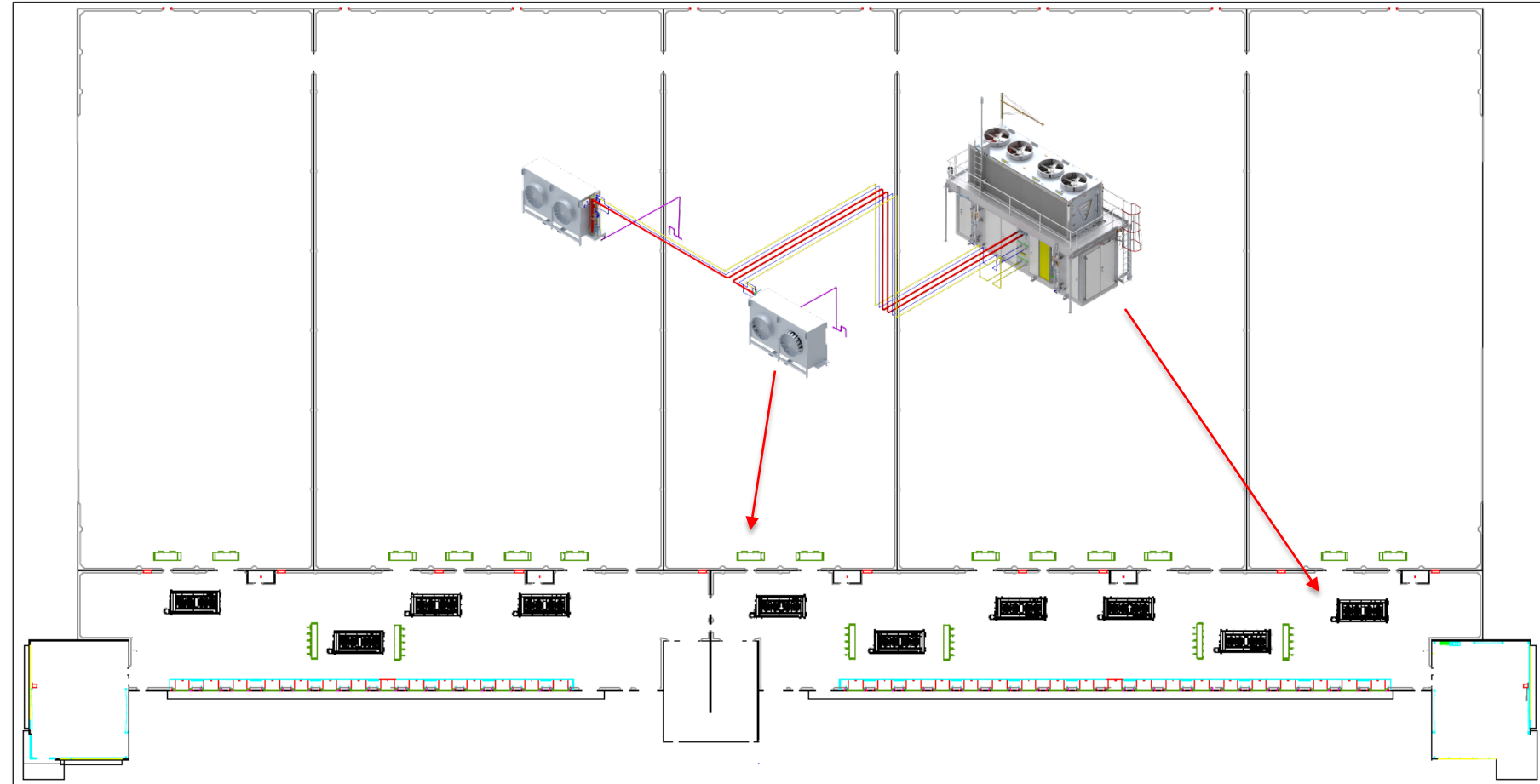
Acceleration of Low Charge Ammonia Adoption

- The environmental benefits of NH₃, combined w/ the refrigerant's unmatched thermodynamic properties & energy efficiency have made it the most widely used low temperature refrigerant.
- Low charge systems require just a fraction of the NH₃ charge associated w/ traditional field-built systems.
- Package systems also offer simple plug-and-play installation and faster startups with significantly less on-site labor than field-built alternatives.



Acceleration of Low Charge Ammonia Adoption

- “Distributed or Decentralized” NH₃ system design, which eliminate the traditional field-built “central” engine-machinery room.
- Eliminates or minimizes field piping – reducing mechanical integrity cost & risk.
- Extremely energy efficient proven in field by:
 - Eliminating piping losses
 - Matching compressor suction temp’s. to every room temp..



Acceleration of Transcritical CO2 Adoption

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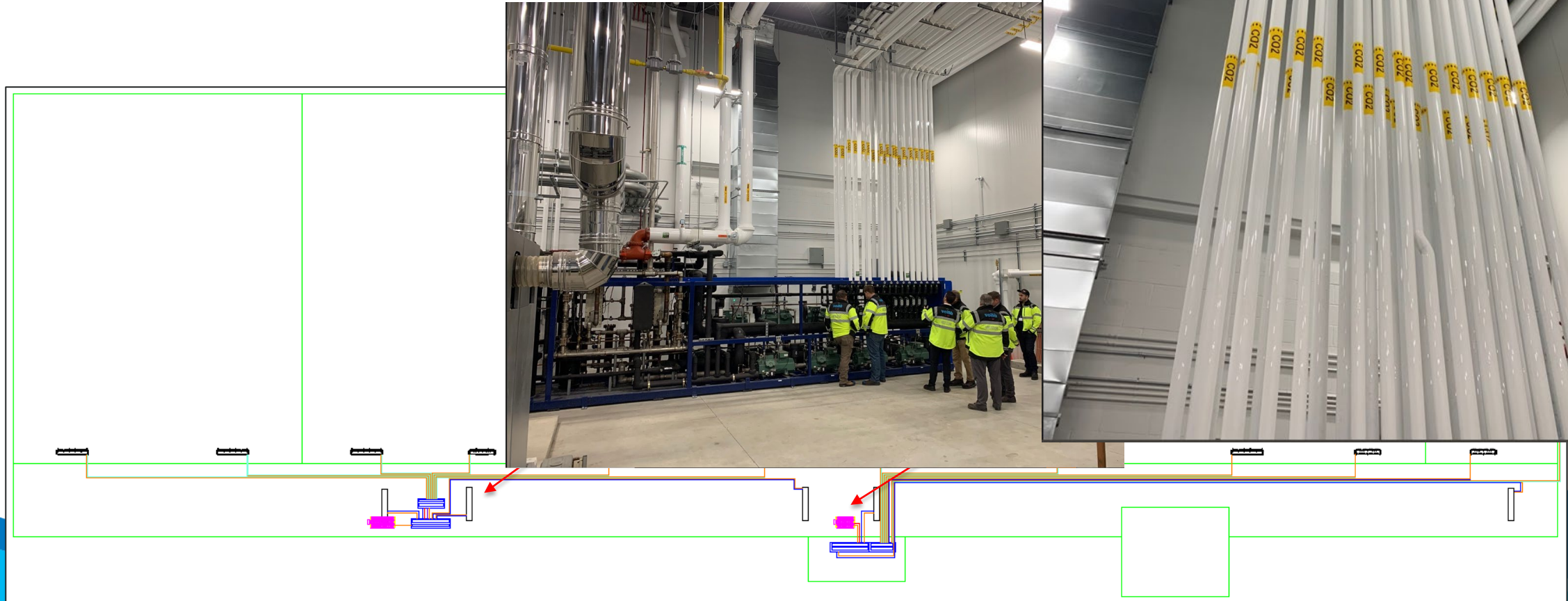
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- Increased installations in supermarkets leading to increasing availability of Packaged Transcritical CO2 Systems, including from Evapco.
- In our industrial market some contractors & end users choosing this developing technology because of the lower toxicity than NH3.
- Combining Transcritical package (“Racks”) with high pressure CO2 evaporators and industrial eco-Air™ gas coolers to complete the system.



Acceleration of Transcritical CO2 Adoption

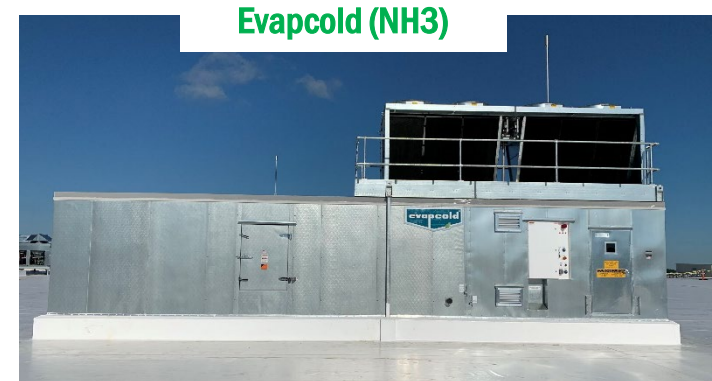
- Application for cold storage results in a “hybrid design” between complete package systems (like Low Charge NH3) and traditional field built NH3 system w/ fewer packages (“Racks”) but more field piping.
- Can also eliminate the traditional central engine-machinery room.



How Do They Compare?

- With the phasedown of HFCs in full swing, Evapco expects NH3 and CO2 to become the go to refrigerant solutions for the foreseeable future.
- Evapco, and to some extent our industry, is starting to learn how they compare as shown here:

CATEGORY & SCOPE	Evapcold (NH3)	Evapco-LMP (CO2)
Impact on building structural steel	yes	yes - may be less
Crane access important	yes	yes - may be less
Retrofits	good	very good
Room size	Sweet spot larger systems	Sweet spot smaller systems
Installation	Less field install Scope	More field install scope
Water Usage	Low or NO WATER	Low
Code Compliance	IIAR-2-2021 (Well Known)	ANSI/IIAR-CO2-2021 (Evolving for Industrial)
Operator Safety	good	very good
Access	very good	good
Efficiency	very good	good
Environmental	excellent	excellent



Thank You

You have a Natural Choice – come see Evapco in the Supplier Showcase to learn more