



THE GREENCHILL PARTNERSHIP



Introduction to the North American Sustainable Refrigeration Council

August 16, 2016



Today's Host

Tom Land

U.S. Environmental Protection Agency

Stratospheric Protection Division

GreenChill Partnership

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Tom has worked to protect the earth's ozone layer and fight climate change for almost 20 years in the EPA's Office of Atmospheric Programs. He is now running the GreenChill Partnership program to help the supermarket industry reduce emissions of ozone-depleting substances and greenhouse gases.



Connecting to Webinar Audio

- ▶ Please dial in!
 - 1-866-299-3188 (706-758-1822 from outside the U.S.)
 - Code 202 343 9185#
- ▶ Dial-in listeners
 - Can more easily participate in the Q & A session
 - Have fewer technical complications
- ▶ Phones are muted (#6 to unmute)



Welcome / Webinar Etiquette

- ▶ Webinar is being recorded
- ▶ Recording will be available on
 - GreenChill [LinkedIn](#) site, and
 - GreenChill website under “Events and Webinars”
www2.epa.gov/greenchill
- ▶ To receive a copy of today’s webinar slides email: Alexis_StJuliana@abtassoc.com
 - Usually available within a day



Q & A after Presentation

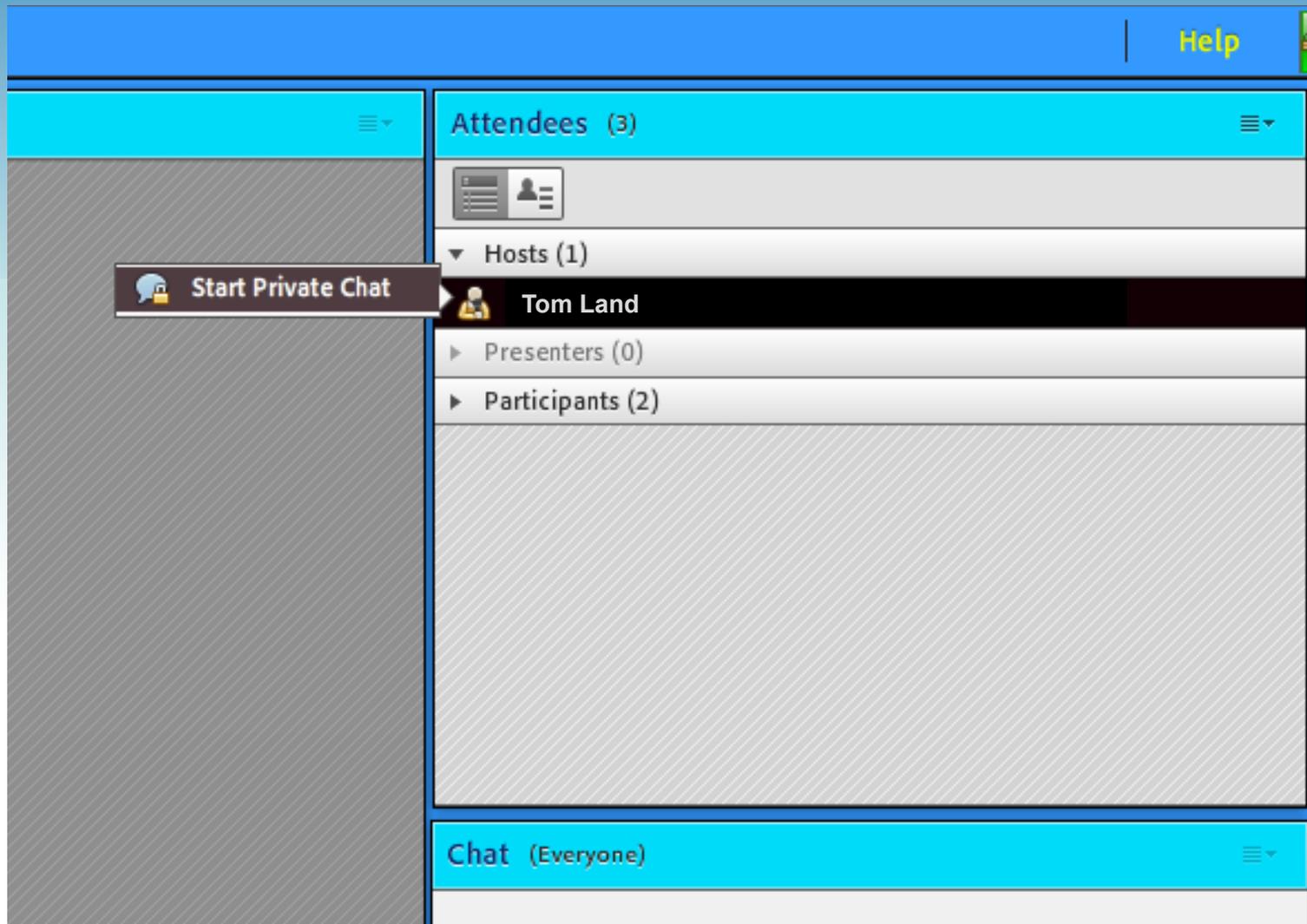
Options for submitting and asking questions:

- ▶ Submit your questions using CHAT at anytime
 1. Type question into “Chat” box in bottom right corner
 2. Send question to host by selecting “Start a Private Chat,” host will ask question “anonymously” during Q&A

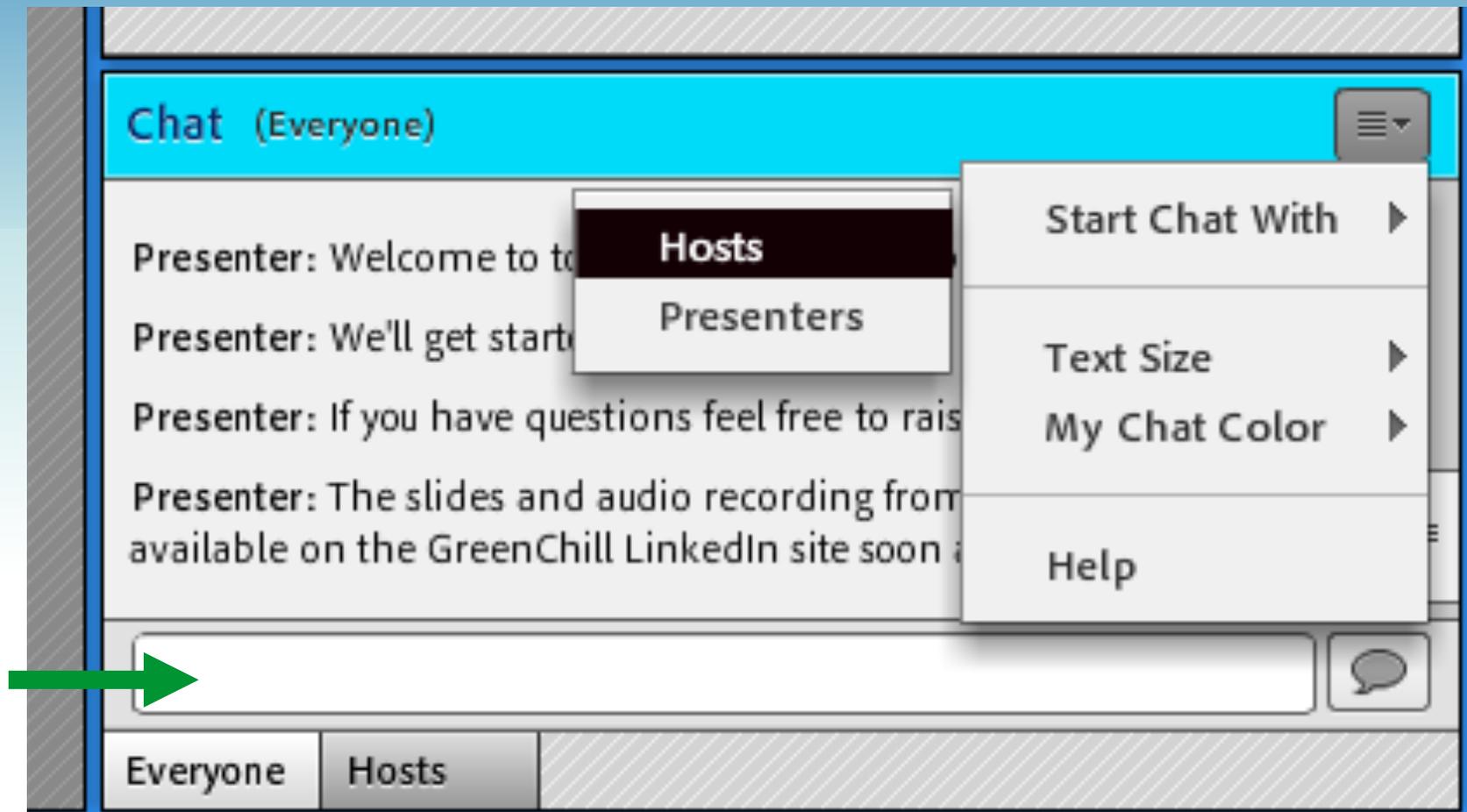
- ▶ Raise your hand during Q & A
 - Host will prompt you to unmute your line (#6) and ask your question verbally



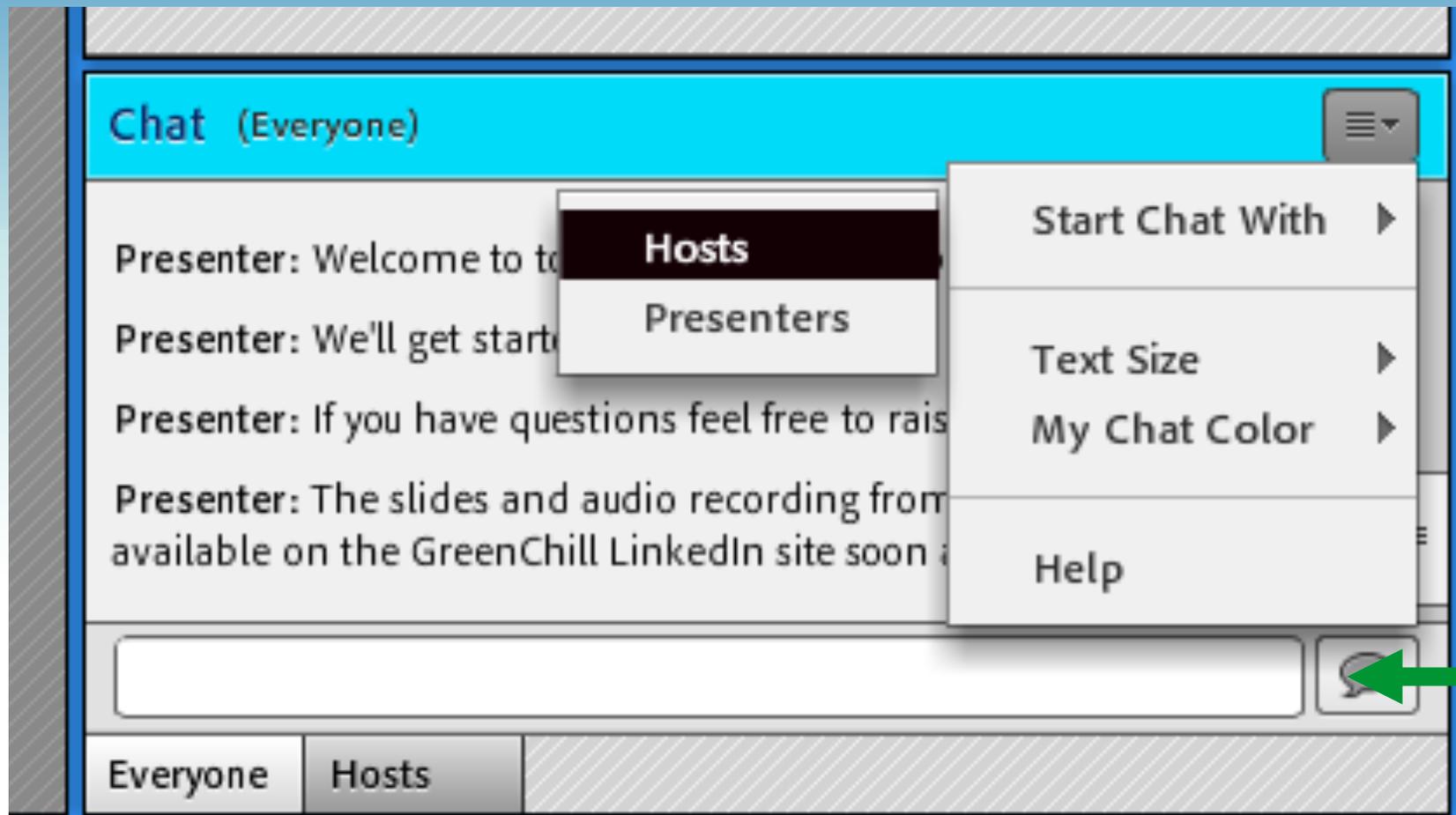
Sending Questions via Chat



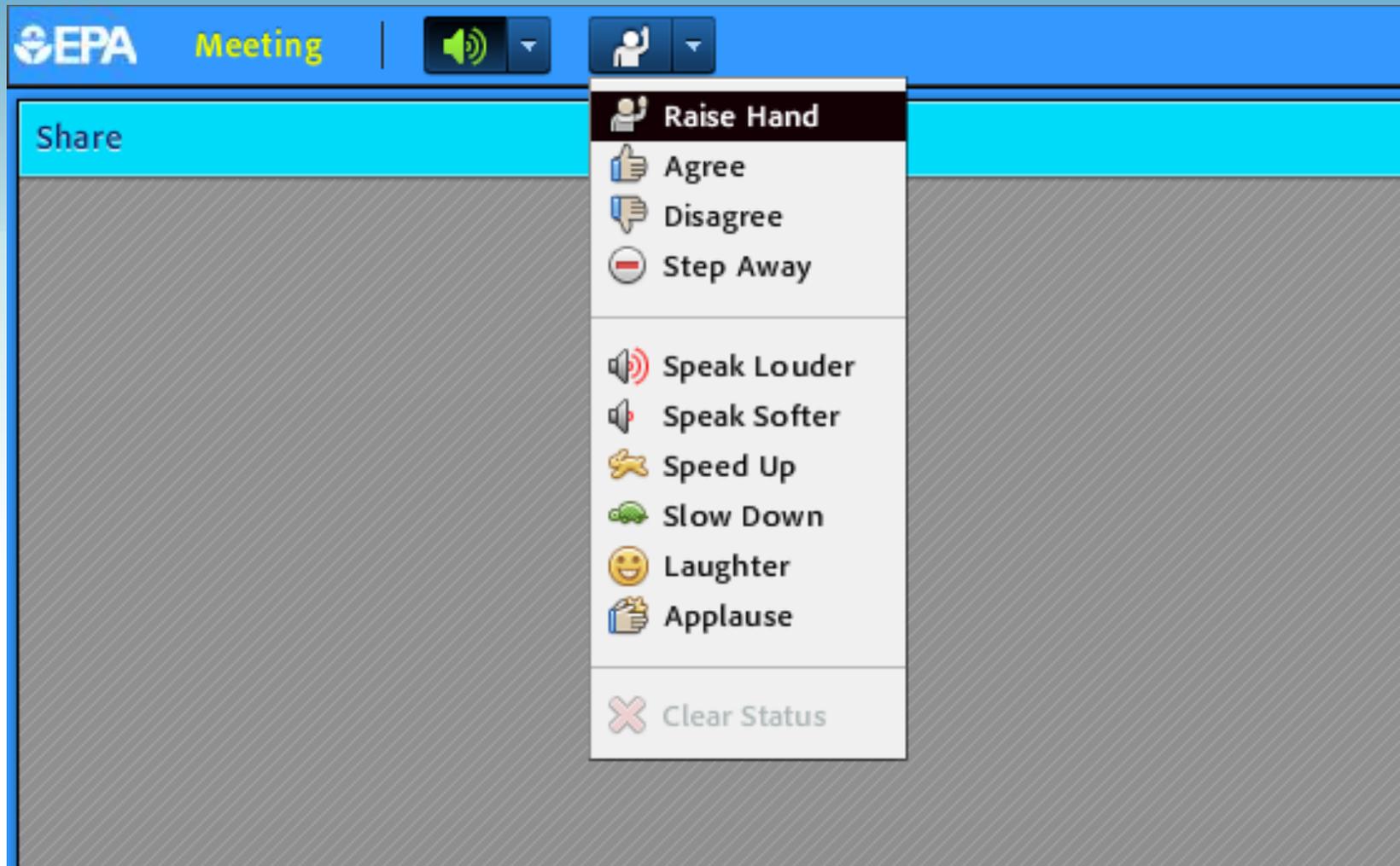
Sending Questions via Chat



Sending Questions via Chat



Raising Your Hand



Today's speakers...



Liz Whiteley

Liz Whiteley

Executive Director

North American Sustainable
Refrigeration Council (NASRC)

Office: 650-867-7533

Email: liz.whiteley@nasrc.org



Liz is the executive director of NASRC, a nonprofit dedicated to tackling the challenges that are slowing the uptake of natural refrigerants, specifically in retail food refrigeration. Prior to NASRC, Liz worked at the EPA in the Stratospheric Protection Division (the same office as GreenChill!) She led the development of the final R-22 phaseout rule and implemented other aspects of phaseout program. She holds of Masters of Environmental Science & Management from the Bren School at University of California, Santa Barbara.

Tristam Coffin

Tristam Coffin

Director of Sustainability & Facilities

Whole Foods Market

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Tristam is responsible for the coordination of the Mechanical, Electrical, Plumbing, and Refrigeration (MEPR) systems, innovative technologies, and green building certifications in the Northern California Region of Whole Foods Market. He also works on global sustainability initiatives for the company as a member of the Green Mission Leadership Team, including flagship projects such as Brooklyn, NY.



Aaron Daly

Aaron Daly

Global Energy Coordinator

Whole Foods Market

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Aaron is Global Energy Coordinator for Whole Foods Market and supports the company's twelve regional offices in all aspects of energy management. Prior to working at Whole Foods Market, Aaron was a National Account Manager at Portland Energy Conservation, Inc., a not-for-profit energy efficiency consulting group based in Portland, OR. Aaron is a Certified Energy Manager and holds an MS in energy management from Sonoma State University.



Bryan Beitler

Bryan Beitler

VP Engineering

Source Refrigeration & HVAC

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Bryan has 35+ years experience in refrigeration and HVAC design, sales, energy and operations support for businesses focused on grocery retailers and other clients in cold storage and process refrigeration. Mr. Beitler's responsibilities over the years have been highly technical, managing engineering services, manufacturing of refrigeration equipment, as well as operations support and management of field construction operations. In his free time, he is the CEO of NASRC.





**NORTH AMERICAN
SUSTAINABLE
REFRIGERATION
COUNCIL**

Who we are. What we're doing. How to get involved.



Today's webinar

- ▶ Introduction to North American Sustainable Refrigeration Council (NASRC)
- ▶ Whole Foods Market project in Santa Clara, CA
- ▶ Recognizing the challenges & taking action
- ▶ More about NASRC & how to get involved



Our vision

... is to significantly lessen the environmental impact of commercial refrigeration through widespread adoption of natural refrigerants and other innovative technology.



NASRC is an action-oriented nonprofit that wants to see natural refrigerants succeed, specifically within supermarket refrigeration.

Why naturals?



- ▶ **Phaseout proof**

- No more transitions!

- ▶ **Climate-friendly**

- Natural refrigerants (GWP <5)
- R-22 & R-407a (GWP ~2,000)
- R-404a & R-507 (GWP ~4,000)

- ▶ **Energy efficiency & performance**

- Ability to lower electric bills & servicing costs

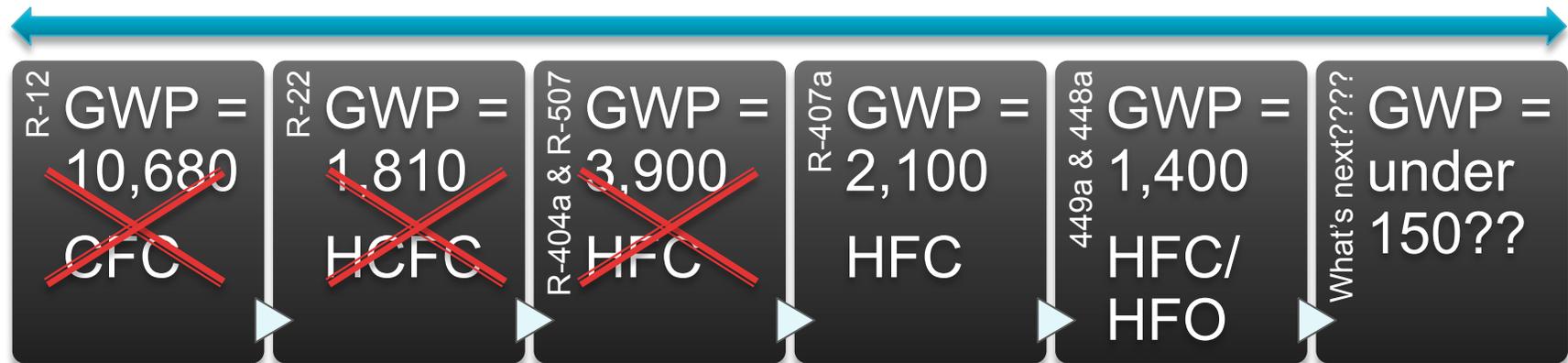
GWP = global warming potential

A brief history of refrigerant transitions...

A while back ...

...Now...

...future?



Or be done with it. Period.

Carbon dioxide (CO₂): GWP = 1

Ammonia: GWP = 0

Propane: GWP = 3

One store can make a big difference

- ▶ GreenChill [Climate Impact Calculator](#) is a great tool
- ▶ A store with 3,500 pounds of R-22 and *just a 15% annual leak rate ...*
 - Is leaking **950,250** pounds of CO₂eq per year
 - Equivalent to the annual tailpipe emissions of **85 passenger cars**
 - If it's R-404a instead of R-22, the climate impact is more than **DOUBLE** that – like the annual emissions of 170 cars
- ▶ A store with 2,000* pounds of CO₂ that has a *100% annual leak rate...*
 - Emits just 2,000 pounds of CO₂eq per year, which is like the annual emissions of ~1/6 of one passenger car.

*If you replace the R-22 DX system with a transcritical CO₂ (TC) system you'll decrease the refrigerant charge needed significantly – by half or even more. For this example we'll assume a very conservative 2,000 pounds of CO₂ to replace the 3,500 pound R-22 DX system above.

Why NASRC?

- ▶ Natural refrigerants have such clear benefits, but there are still challenges (like upfront cost) that keep naturals from being the go-to choice
- ▶ A few years of the same conversation over and over
 - *“Somebody has to do something”*
- ▶ The time is right
 - Hydrochlorofluorocarbon (HCFC) phaseout
 - Potential hydrofluorocarbon (HFC) phasedown
 - Significant New Alternatives Policy (SNAP) program decisions
- ▶ Naturals need a champion.

Whole Foods Market

Natural Refrigerant System Progression

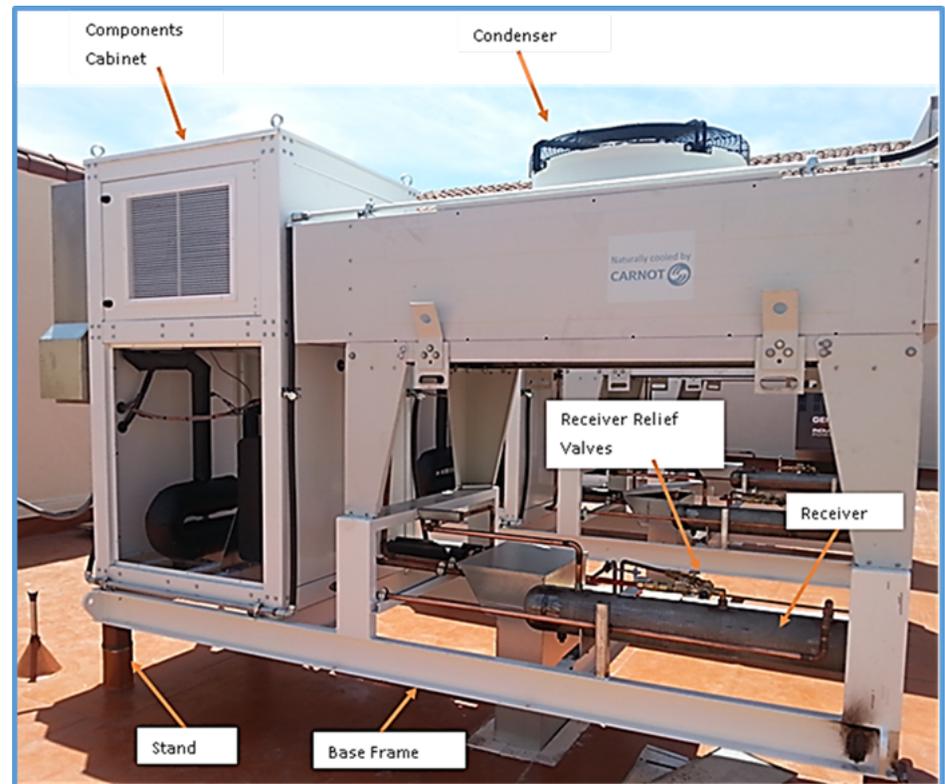
- ▶ Pumped CO₂ (LT)
- ▶ LT DX CO₂/ MT liquid overfeed CO₂, cascaded to R-407A
- ▶ LT DX CO₂ in a cascade system (including one conversion from HFC)
- ▶ Transcritical CO₂
- ▶ LT DX CO₂/ MT liquid overfeed CO₂, cascaded to R-717 (NH₃)
- ▶ LT DX CO₂/ MT liquid overfeed CO₂, cascaded to R-290

LT = low temp; MT = medium temp

Santa Clara, CA

R-290/R-744 Cascade System

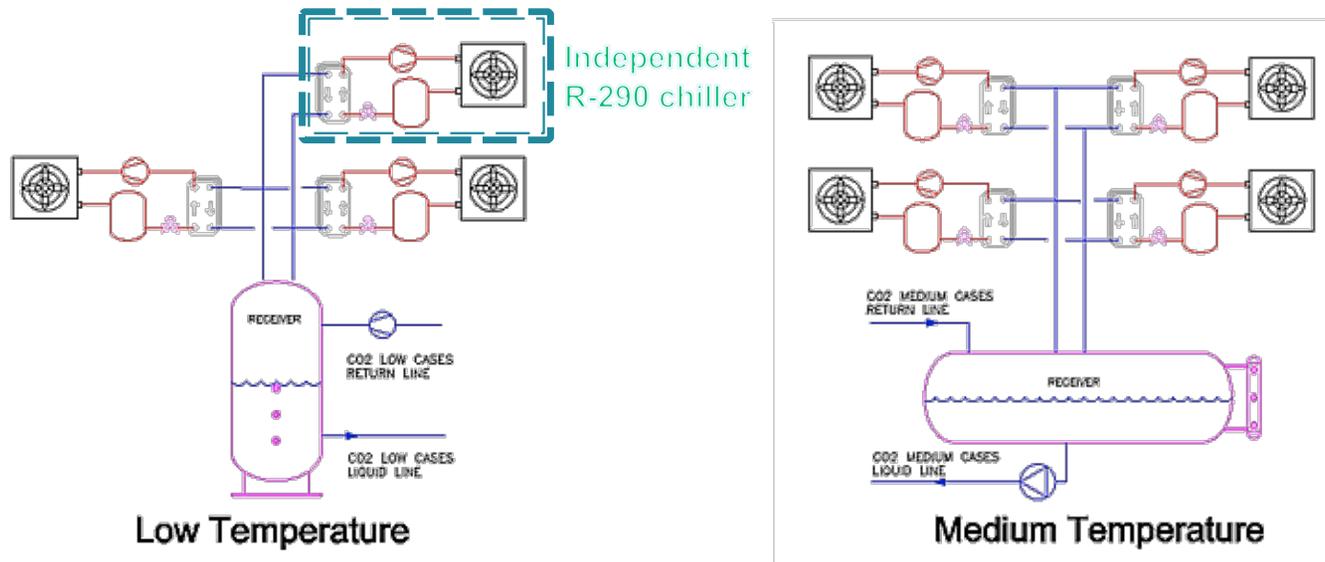
- ▶ The R-290 refrigerant is used in a “chiller,” and there are **seven independent chillers** located on the roof. Each chiller is, naturally, a **sealed** system.
- ▶ The R-290 chiller is responsible to cool the high temperature CO₂ gas. This **eco-friendly** design optimizes efficiency and improves refrigeration performance.



Santa Clara, CA

R-290/R-744 Cascade Design

The diagram below displays the **independent R-290 chillers** coupled via a heat exchanger to the CO₂ system



Benefits...

- ▶ TEWI (Total equivalent warming impact) is very promising
 - ▶ A+ from a climate impact perspective
- ▶ Collaboration between EOR, rack OEM, control vendors, CxA, and maintenance partners formed valuable synergies
- ▶ GreenChill Certifications!
- ▶ Zero-phase down potential = no more costly retrofits

Challenges...

- ▶ Install costs are artificially high due to contractors' lack of comfort; industry needs training
- ▶ Higher initial system costs compared to HFC DX, but prices are quickly dropping (especially on CO₂ transcritical)
- ▶ High grade CO₂ not immediately available (stocking on-site, bottle disposition)



...and Reflections

- ▶ Education of AHJ is critical especially with Hydrocarbons
- ▶ Pinpointing natural refrigerant technology options:
 - There is no silver bullet low GWP system
 - Climate and building-type specific design
- ▶ Maintenance is comparable to HFC DX system, but leak rates are higher
- ▶ Controls collaboration and commissioning are key
- ▶ Safety – equipment (i.e. leak detection), procedures, contractors, store personnel



NASRC is here to address challenges

Progress groups comprised of NASRC members, each focused on specific challenges that natural refrigerants face:

- ▶ Policy
- ▶ Codes/Standards
- ▶ Best Practices
- ▶ Utility Incentives
- ▶ Contractors/ Service Technicians
- ▶ Return on Investment
- ▶ Communications



Photo from our Aug 4th end-user & utility workshop in Boston, MA

<http://nasrc.org/about-nasrc#groups>

Featured progress group: **Best Practices**

- ▶ How to bring down installation costs? And Increase contractor knowledge & confidence?
 - NASRC authored equipment specs
- ▶ How to share actual experiences with other end-users?
 - NASRC authored case studies
- ▶ How to raise everyone's awareness? Answer questions, provide data? Including guidance on retrofitting into CO₂ from a DX HFC system?
 - NASRC online resource library: <http://nasrc.org/about-this-library/>



Another progress group: Contractors & Service Technicians

- ▶ How to ensure technicians are qualified to service these systems once they are installed?
 - Industry needs a commercial CO₂ training resource, available to any service tech
 - NASRC is working with a partner org to make this happen
- ▶ How to make sure new technicians have at least heard of natural refrigerants?
 - Provide comment on EPA's upcoming revisions of section 608 tech cert exam
- ▶ Future plans for linking qualified contractors with interested end-users

More about NASRC

- ▶ We are focused on action
 - Members are encouraged to join one of our seven progress groups, each focused on a specific challenge that natural refrigerants face
- ▶ NASRC is a 501(c)(3) nonprofit
 - Membership based; bringing together stakeholders from throughout the entire industry to make change happen through our progress groups
 - Membership dues are tax deductible
 - We are NOT a trade group. 501(c)(3) = commitment to education, outreach
- ▶ We are not “anti” anything
 - HFO blends show promise; they just don’t need the help of a nonprofit to succeed

With a concerted, industry-wide effort in the next 3-5 years we can make naturals a viable, logical solution for retail food refrigeration moving forward

Why join NASRC?

- ▶ Refrigeration decisions are challenging, complex
 - Finding the right info, data, getting your questions answered – it's a lot of work
- ▶ NASRC is the EASY button. Get your questions answered, access to resources. We're here to help!
- ▶ Plus, it's a chance to get involved (if you want to) – make good things happen for the environment and your industry



End-users:
\$300/yr or \$25/month

Time for some Q & A ...

- ▶ A big thank you to the GreenChill Partnership for hosting this webinar, and to all of you for participating.
- ▶ Visit <http://nasrc.org> for more info & to join NASRC. Membership is open to food retailers & any other company that is passionate about seeing naturals succeed.

Contacts and Additional Information

Presenter Contact Information

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Upcoming Webinars

Date	Topic
August 30	Kroger's Experiences with R-449A
September 20	Earning Carbon Credits through HFC Reclamation and Re-Use
October 4	Using the Internet of Things to Manage Refrigerants

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