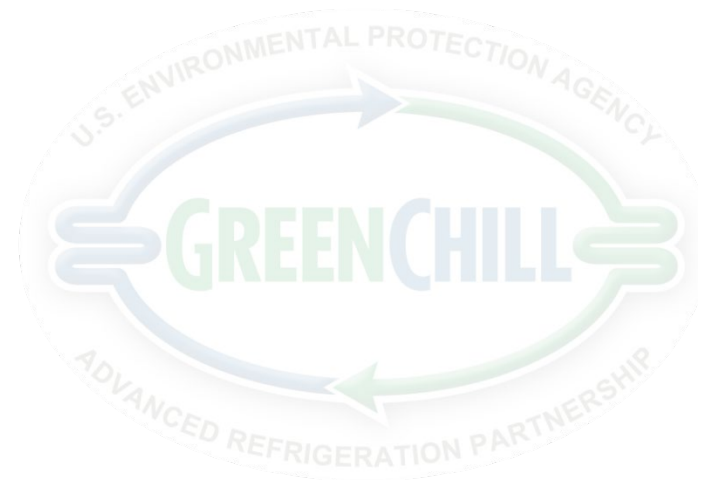




Supermarket Utility Incentives

May 12, 2020



Connecting to Webinar Audio



1. Listen via Computer

2. Call Me

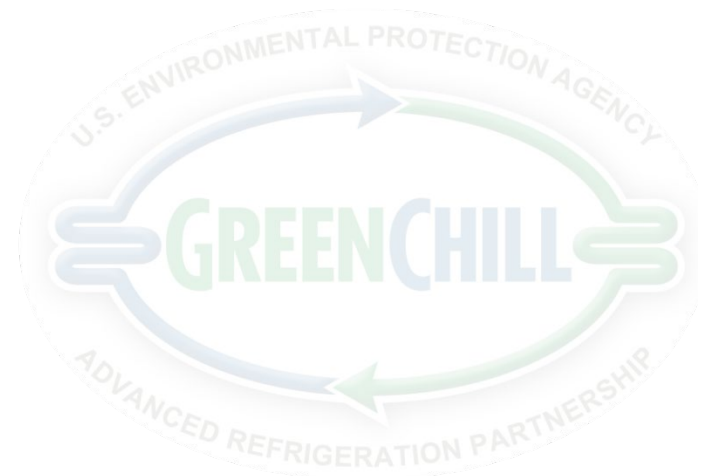
Receive an automated call connecting you to the webinar

3. Call In

Phone number: 1-415-655-0002 or 1-855-797-9485

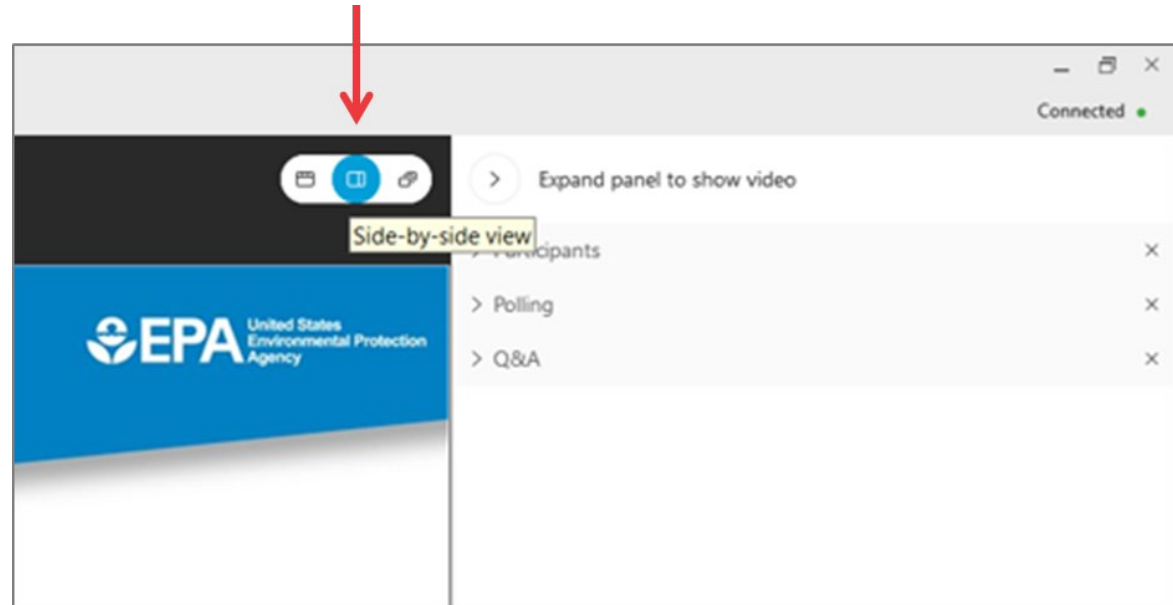
Event number: 610 277 487

All participants are muted



Webinar Screen View

- ▶ There are several layout options
- ▶ We recommend the side-by-side view



Webinar Panels

We'll use two panels

- ▶ Participants, and Question & Answer (Q&A)
- ▶ Use the arrow to expand or collapse the panels



Adding Panels

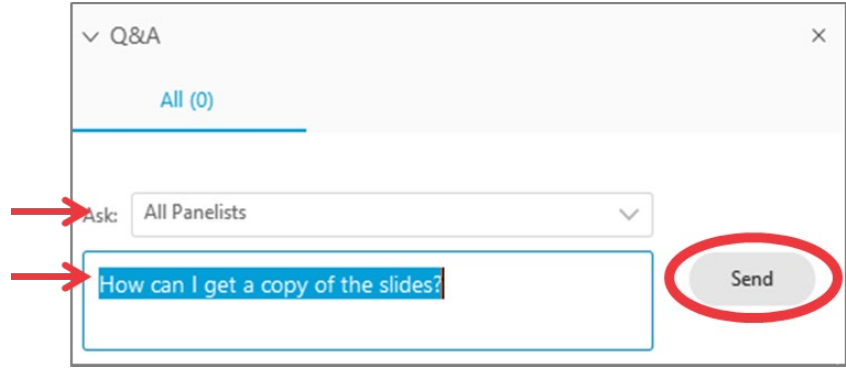
- ▶ If some panels don't appear, hover over the bottom of the screen and select the desired panels
- ▶ Select More Options (...) for additional panels
- ▶ Blue icons indicate active panels



Q&A and Webinar Feedback

Q&A Session

- ▶ Participants are muted
- ▶ Questions will be moderated at the end
- ▶ To ask a question:
 1. Select “All Panelists” from the drop-down menu
 2. Enter your question in the Q&A box
 3. Hit “Send”

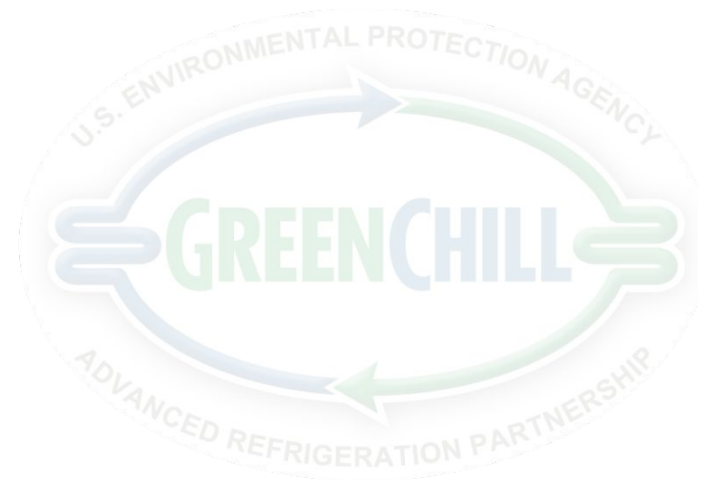


Feedback Form

- ▶ We value your input!
- ▶ A feedback form will pop-up when you close today’s webinar

Recording and Slides

- ▶ Webinar is being recorded
- ▶ Materials will be posted on the GreenChill website under Events and Webinars: www.epa.gov/greenchill
- ▶ To receive notification when materials are posted email: EPA-GreenChill@abtassoc.com





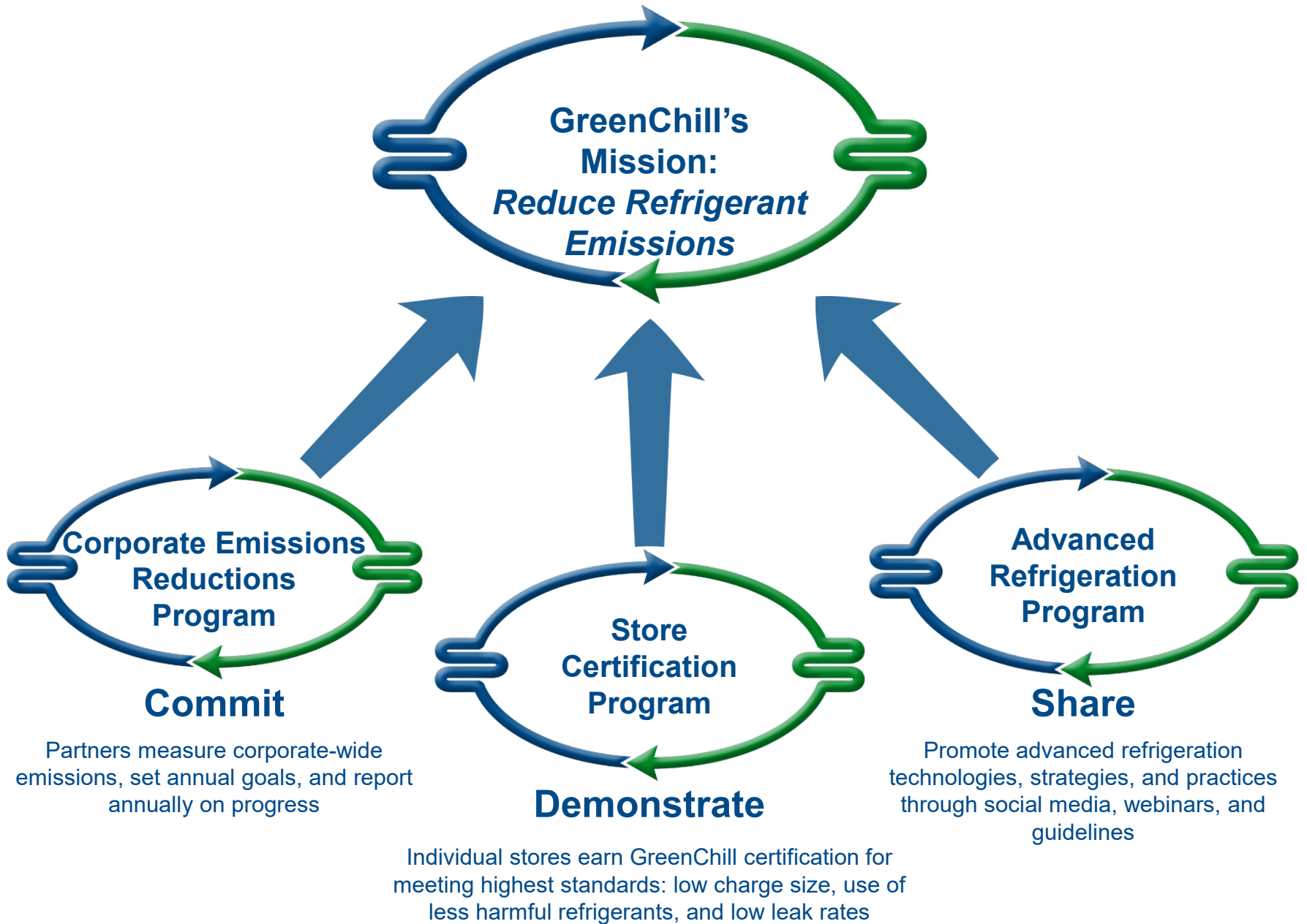
GreenChill Program Overview

GreenChill is a voluntary EPA partnership that works with food retailers and associated stakeholders to reduce refrigerant emissions and decrease stores' impact on the ozone layer and climate system

GreenChill works to help food retailers:

- ▶ Reduce leak rates
- ▶ Lower charge sizes
- ▶ Transition to environmentally friendlier refrigerants
- ▶ Adopt green refrigeration technologies and best environmental practices

www.epa.gov/greenchill

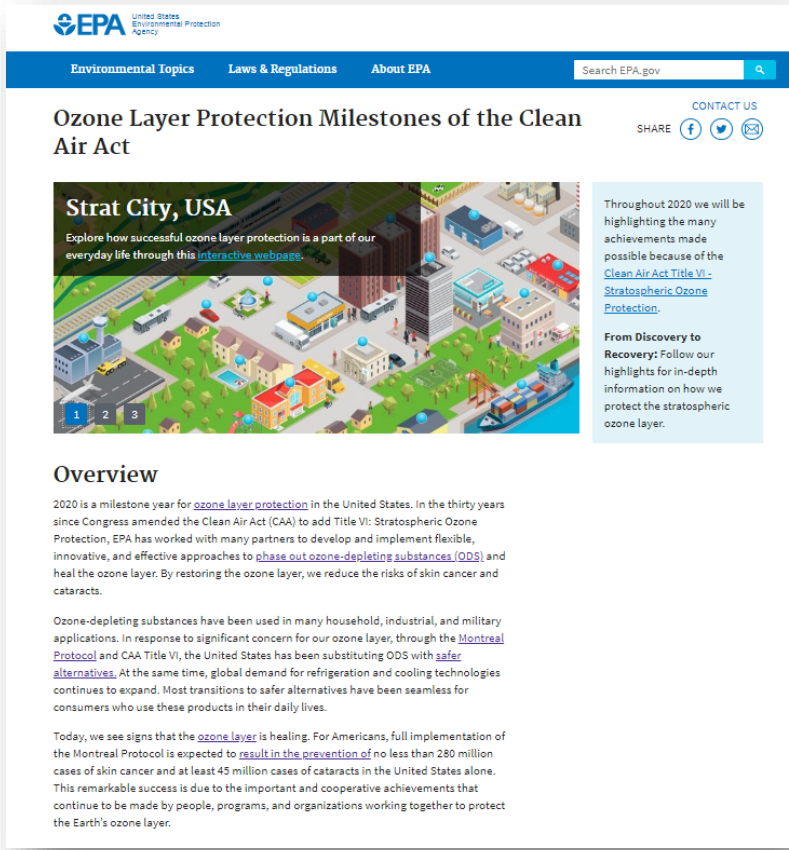


2020 Ozone Layer Protection Milestones

▶ In March 2020, EPA published a new site to highlight achievements made possible because of the Clean Air Act Title VI - Stratospheric Ozone Protection

▶ Visit:

www.epa.gov/ozone-layer-protection-milestones-clean-air-act



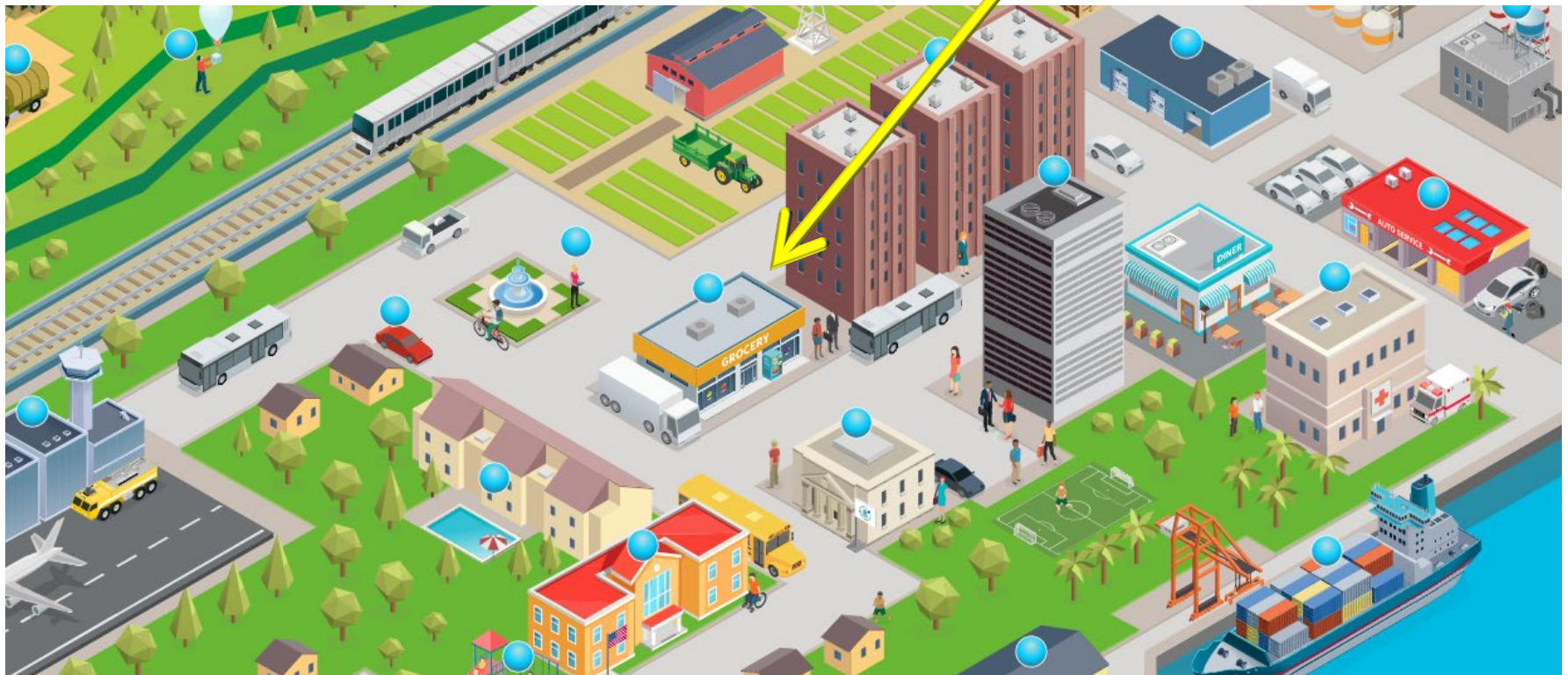
The screenshot shows the EPA website page for 'Ozone Layer Protection Milestones of the Clean Air Act'. The page features the EPA logo, navigation tabs for 'Environmental Topics', 'Laws & Regulations', and 'About EPA', and a search bar. The main heading is 'Ozone Layer Protection Milestones of the Clean Air Act'. Below this is a featured image of 'Strat City, USA' with the text 'Explore how successful ozone layer protection is a part of our everyday life through this interactive webpage.' To the right of the image is a sidebar with 'CONTACT US' and social media icons, and a text box stating 'Throughout 2020 we will be highlighting the many achievements made possible because of the Clean Air Act Title VI - Stratospheric Ozone Protection.' Below the image is an 'Overview' section with text explaining that 2020 is a milestone year for ozone layer protection in the United States, mentioning the Clean Air Act (CAA) Title VI, the Montreal Protocol, and the phase-out of ozone-depleting substances (ODS). It also notes that global demand for refrigeration and cooling technologies continues to expand and that the ozone layer is healing.

Strat City, USA



An interactive webpage where users can explore how ozone layer protection affects many aspects of everyday life.

GreenChill is highlighted



Learn More



www.linkedin.com/groups/1426947/

www.epa.gov/greenchill

EPA-GreenChill@abtassoc.com

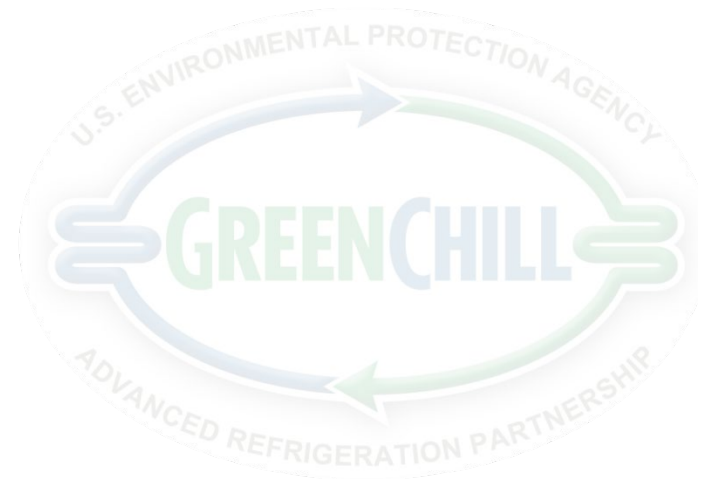




THE GREENCHILL PARTNERSHIP



Today's speakers...



Danielle Wright



Danielle Wright

Executive Director

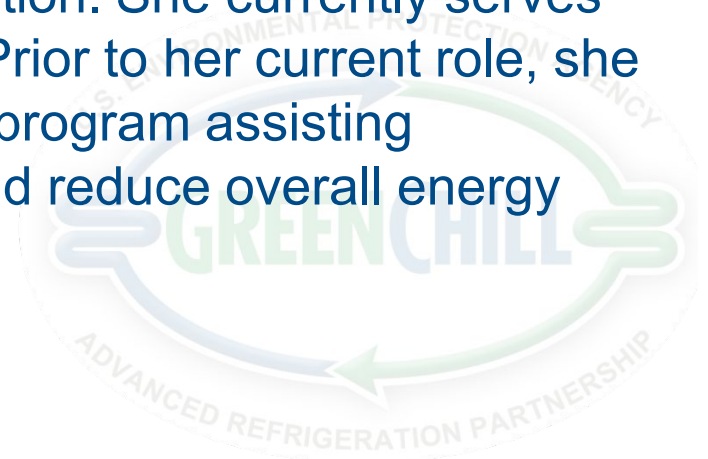
North American Sustainable Refrigeration
Council (NASRC)

Phone: 503-869-4191

Email: Danielle.wright@nasrc.org



Danielle has over 12 years of experience in sustainability and energy efficiency, with a focus in refrigeration. She currently serves as the executive director of the NASRC. Prior to her current role, she managed a large-scale energy efficiency program assisting supermarkets to optimize performance and reduce overall energy consumption.



Kathleen Ave



Kathleen Ave

Senior Climate Program Manager
Sacramento Municipal Utility District
(SMUD)

Email: Kathleen.Ave@smud.org



Kathleen is the Senior Climate Program Manager in Energy Strategy, Research & Development at the Sacramento Municipal Utility District. Her work is currently focused on climate readiness, natural refrigerants and land-based carbon initiatives. She co-chaired the Community Health & Resiliency Technical Advisory Committee to the Sacramento and West Sacramento Mayors Climate Commission and is the immediate past chair of the Capital Region Climate Readiness Collaborative. She was named a Living Future “Hero” by the International Living Future Institute in 2019 and is a UC Certified California Naturalist.

Megan Rodriguez



Megan Rodriguez

Senior Manager, Refrigeration
Grocery Outlet

Email: mrodriguez@cfgo.com



Megan is the Senior Manager of Refrigeration for Grocery Outlet. Her primary responsibilities include managing new construction and refrigeration remodel projects, and energy solutions to reduce operating costs. She also oversees store compliance for both U.S. EPA and State refrigerant regulations.



Edward R. Estberg



Edward R. Estberg

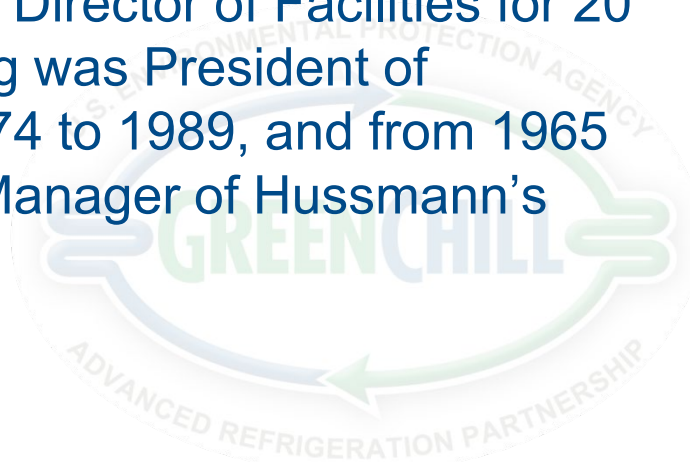
Refrigeration Consultant

Raley's

Email: eestberg@winfirst.com



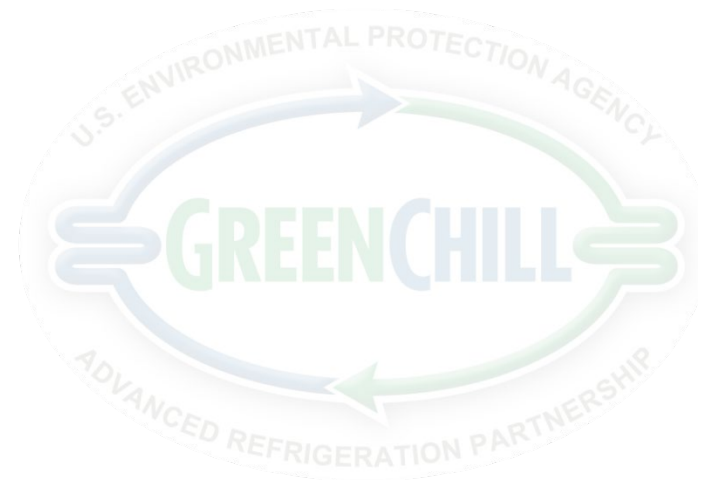
Edward has been a Refrigeration Consultant for Raley's since 2009. Before that, he was the company's Senior Director of Facilities for 20 years. Prior to his roles at Raley's, Estberg was President of Refrigeration Design Contractors from 1974 to 1989, and from 1965 to 1974, he was Installation and Service Manager of Hussmann's Sacramento branch.





Supermarket Utility Incentives

May 12, 2020



Glossary

- ▶ AIP: Aggregated Incentives Program
- ▶ BTUH: British Thermal Units per Hour
- ▶ CARB: California Air Resources Board
- ▶ CO₂: Carbon dioxide
- ▶ GHGs: Greenhouse Gases
- ▶ GWP: Global Warming Potential
- ▶ HFCs: Hydrofluorocarbons
- ▶ HFOs: Hydrofluoroolefins
- ▶ kW: Kilowatt
- ▶ kWh: Kilowatt hour
- ▶ MtCO₂e: Metric tons of carbon dioxide equivalent
- ▶ NASRC: North American Sustainable Refrigeration Council
- ▶ NRDC: Natural Resource Defense Council
- ▶ NH₃: Ammonia
- ▶ ODS: Ozone depleting substance
- ▶ SMUD: Sacramento Municipal Utility District
- ▶ SNAP: Significant New Alternatives Program
- ▶ US EPA: United States Environmental Protection Agency

Agenda

- ▶ Background
Danielle Wright, NASRC (10 min)
- ▶ Overview of SMUD Natural Refrigerant Incentive Program
Kathleen Ave, SMUD (10 min)
- ▶ Grocery Outlet Transcritical CO₂ Project
Megan Rodriguez, Grocery Outlet (10 min)
- ▶ Raley's Ammonia/CO₂ Project
Edward R. Estberg, Raley's (10 min)

North American Sustainable Refrigeration Council (NASRC)

501c3

Non-Profit Organization

130

Members

24,000+

Supermarket
locations

Mission

Remove barriers to adoption of natural refrigerants to create more sustainable future for refrigeration

Goals

- ▶ Achieve cost parity
- ▶ Drive data transparency
- ▶ Ensure service readiness

NASRC End-User Members



Other NASRC Members



Refrigerant Regulations

INTERNATIONAL

Ozone Depleting Substances

Global Warming Potential

Montreal Protocol
1987

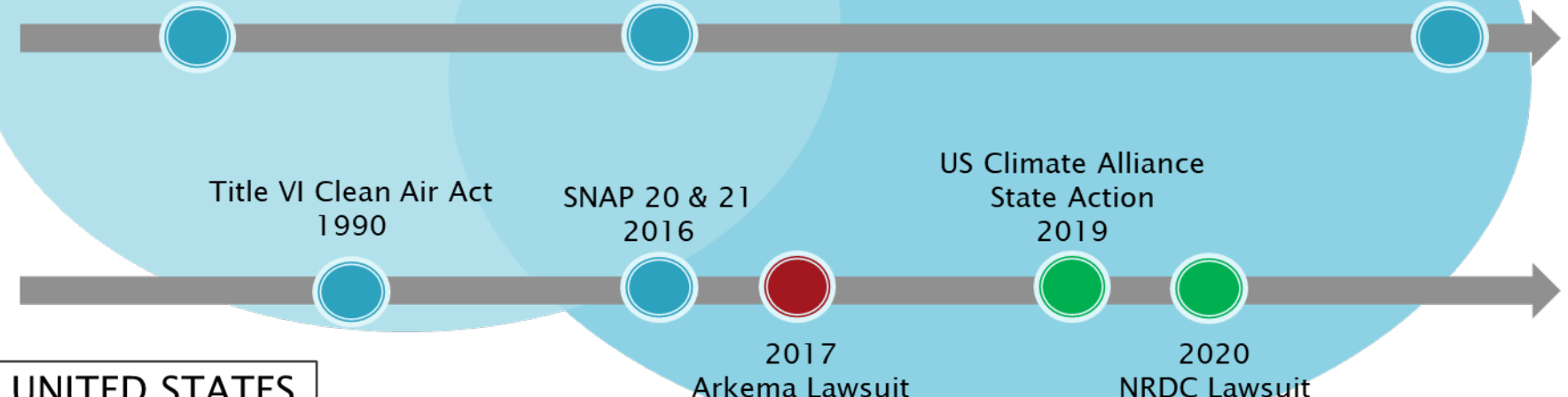
Kigali Amendment
2016

85% Reduction HFCs
2036

Title VI Clean Air Act
1990

SNAP 20 & 21
2016

US Climate Alliance
State Action
2019

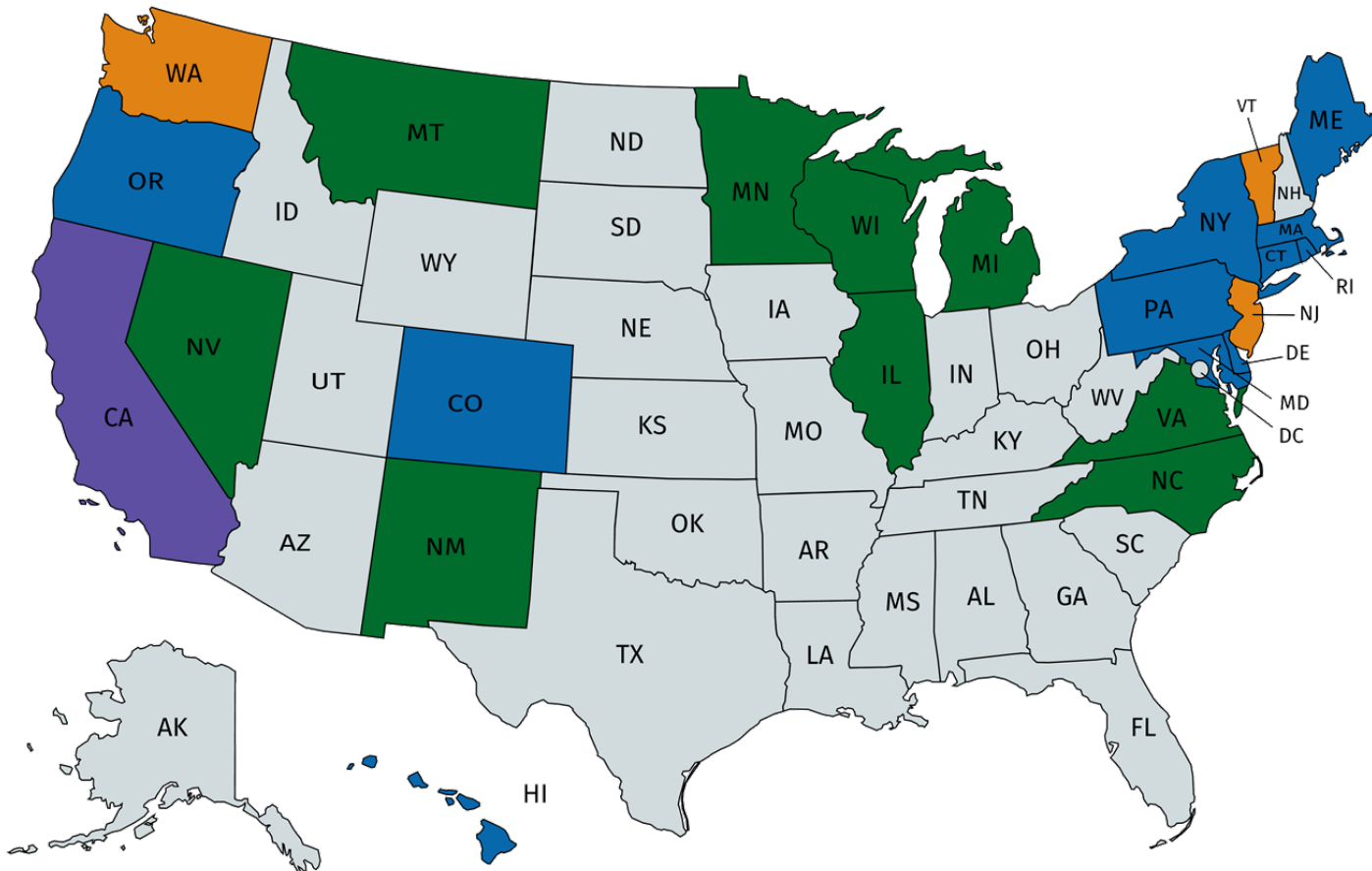


UNITED STATES

2017
Arkema Lawsuit

2020
NRDC Lawsuit

The US Climate Alliance



24 states +
Puerto Rico

55% of US
POPULATION























\$11.7
trillion economy

- US Climate Alliance
- SNAP 20/21 Pending
- SNAP 20/21 Signed Into Law
- SNAP + Additional GWP Limits



US Climate Alliance HFC Regulations

 = Established  = In Progress

HFC Commitments	SNAP Rules 20 & 21	Section 608 Ref. Mgmt.	Additional GWP Limits	Effective Date	Incentive Program
California				Jan 1, 2022	
Colorado				Jan 1, 2021	
Connecticut				TBA	
Delaware				Jan 1, 2021	
Hawaii				Jan 1, 2021	
Maine				Jan 1, 2021	
Maryland				Jan 1, 2021	
Massachusetts				TBA	
New Jersey				July 1, 2020	
New York				Jan 1, 2021	
Oregon				Jan 1, 2021	
Pennsylvania				TBA	
Rhode Island				Jan 1, 2021	
Vermont				Jan 1, 2021	
Washington				Jan 1, 2020	

CARB HFC Reduction Measures

New Construction

GWP < 150
Jan 1, 2022

- New equipment in new facilities /major remodels
- Stationary refrigeration >50 lbs.

Existing Facilities

Two Compliance Pathways:

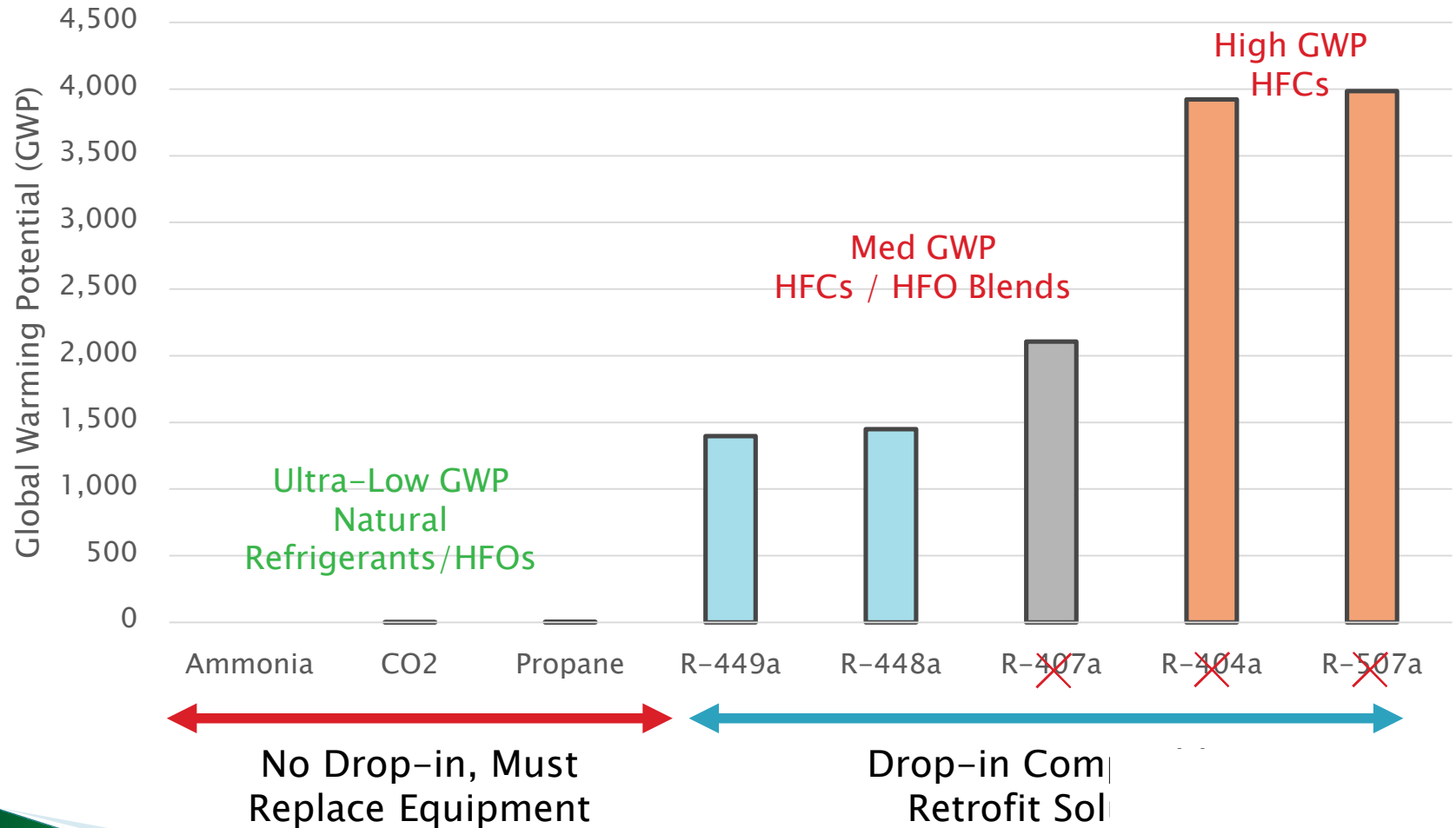
Reduce GHG Potential
by 55% by 2030

or


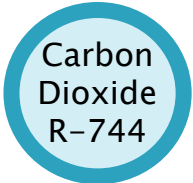
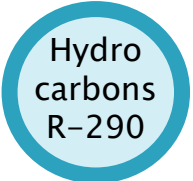
Weighted GWP < 1400
by 2030

- Per-company target, not per-store
- Flexibility to plan over 8-10 years
- Prepares sector for future HFC phase-down / sales ban

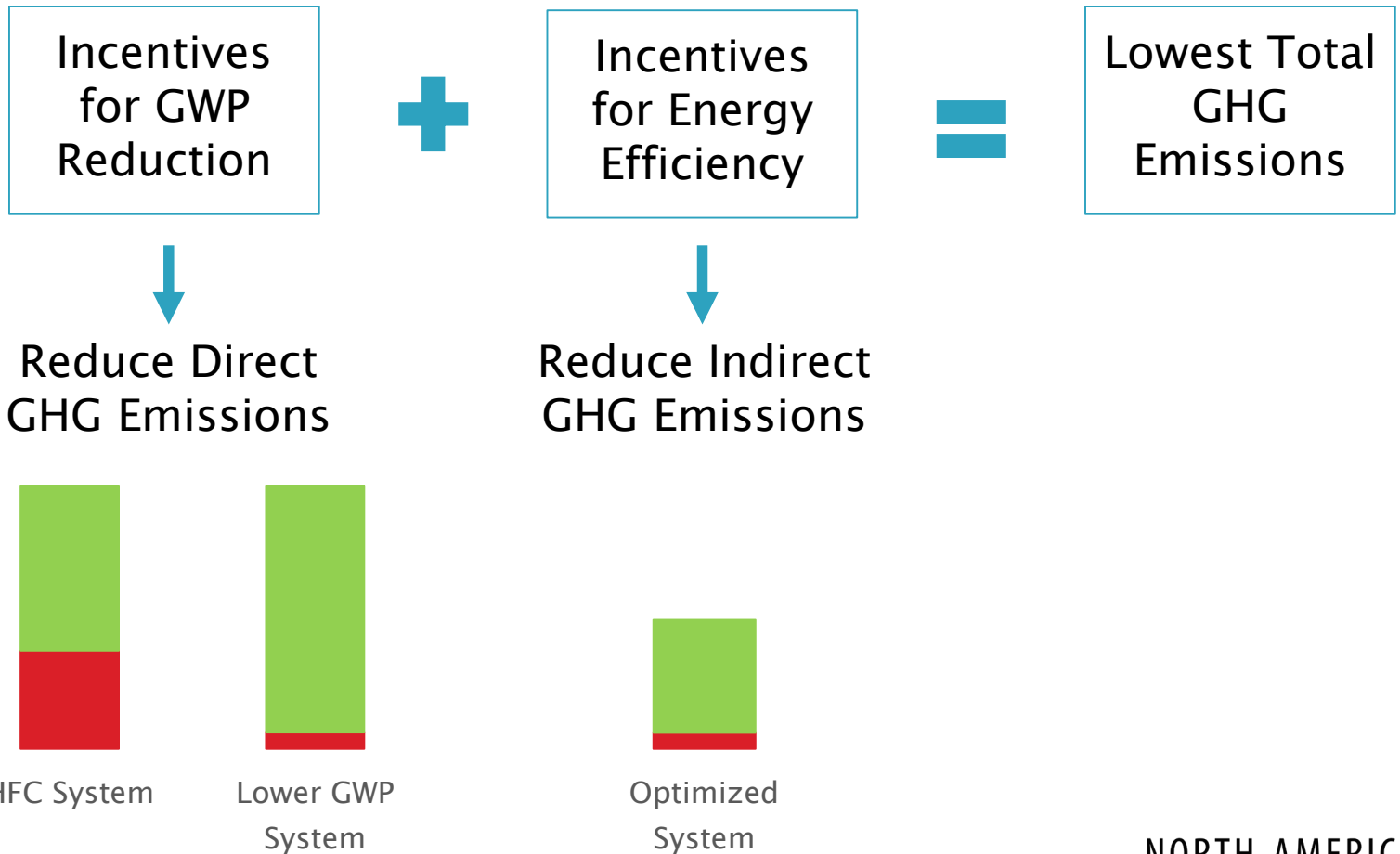
Refrigerant Global Warming Potential



<150 GWP New System Options

	GWP	US Installs	Applications	Advantages	Challenges
 <p>Ammonia R-717</p>	0	5	<ul style="list-style-type: none"> Industrial sector Remote systems 	<ul style="list-style-type: none"> Energy efficient Low-charge Long history, well-known safety features 	<ul style="list-style-type: none"> High initial costs Public perception – toxic if not handled properly
 <p>Carbon Dioxide R-744</p>	1	550+	<ul style="list-style-type: none"> Remote systems Transcritical or Cascade 	<ul style="list-style-type: none"> Potential for efficiency gains Non-toxic, non-flammable 	<ul style="list-style-type: none"> High pressures Initial costs North/South divide
 <p>Hydrocarbons R-290</p>	3	500,000+	<ul style="list-style-type: none"> Self-contained cases 	<ul style="list-style-type: none"> Energy efficient Low-charge Flexibility 	<ul style="list-style-type: none"> Charge limit of 150 grams Flammable if used improperly

Driving the Lowest GHG Emissions



NASRC Aggregated Incentives Program

Free platform to coordinate and maximize funding for natural refrigerant projects

▶ Benefits

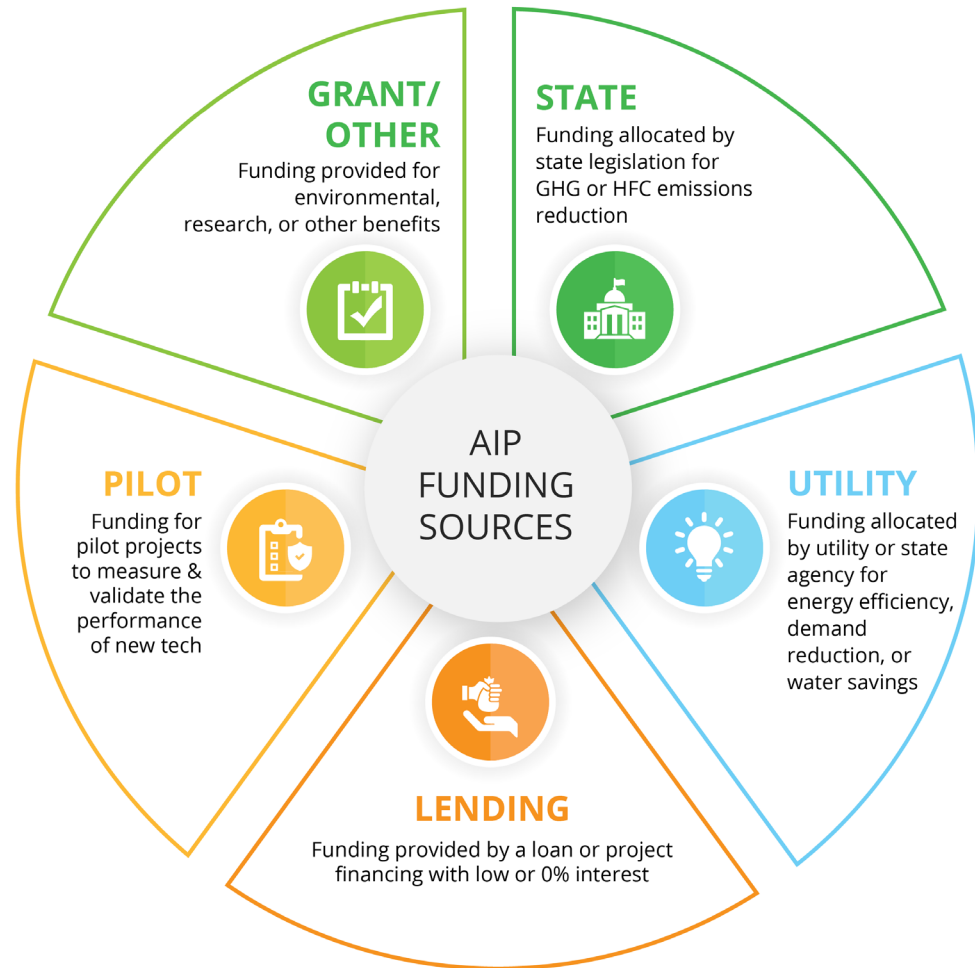
- Streamlined funding process, one-stop-shop application
- Drive additional benefits (efficiency, water savings, etc.)
- No-cost for pilot phase

▶ Timeline

- Phase I: California Pilot, Summer 2020
- Phase II: National Program, Quarter 2 2021

▶ More information:

- nasrc.org/aggregated-incentives-program



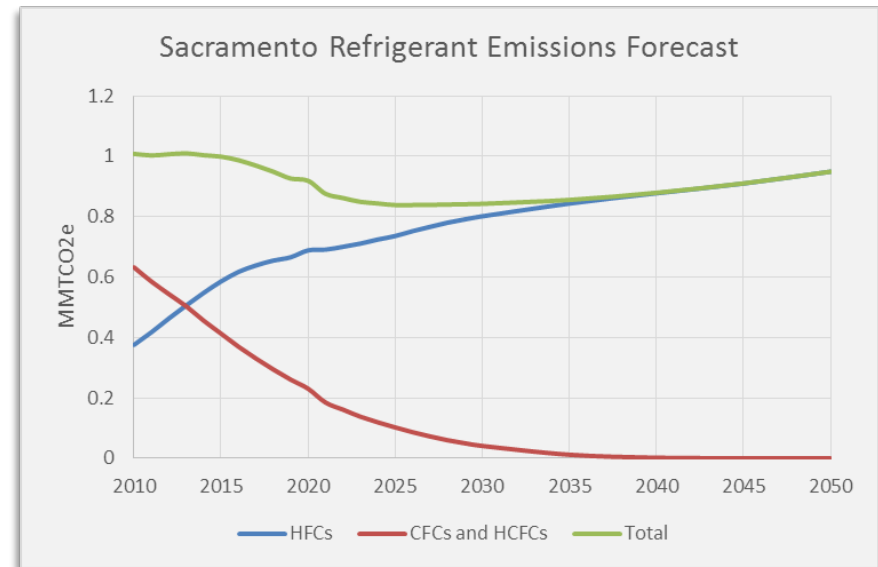
About SMUD



- 626,000 meters
- 1.5 million population
- \$1.5 billion in revenues
- 900 mi² (2,304 km²) service territory
- 2nd largest muni in California, 6th largest in the U.S.
- 3,299 MW peak load (2006)
- 2,219 employees
- Independent, elected Board of Directors
- Not-for-Profit Utility

Introducing the SMUD Pilot Natural Refrigerant Incentive Program

- Builds on SMUD's existing Custom Incentive and Savings By Design programs
 - Maintains incentive for energy (kWh) and demand (kW)
- **Additional incentive for direct GHG emission reductions from new or retrofitted low-GWP systems**
 - SMUD pays for energy performance metering and data collection to understand performance of low-GWP systems



High-GWP refrigerants are projected to result in annual GHG emissions of over 1 million MtCO₂e in Sacramento alone by 2050

SMUD Program Objectives

- Spur market transformation to support SMUD's Environmental Leadership Directive (SD-7)
- Establish a cost-effective pathway for Natural Refrigerants
- Create a model incentive for others to reference
- Build a network of manufacturers, engineers, technicians, and customers
- Position SMUD to leverage potential state funding on our customer's behalf
- Support transition to a carbon metric for program evaluation

“SMUD will provide leadership in the reduction of the region's total emissions of greenhouse gases through proactive programs in all SMUD activities and development and support of national, State, and regional climate change policies and initiatives.” SMUD Strategic Directive 7



Customer Benefits

- **End the expensive cycle** of refrigeration system upgrades and retrofits due to refrigerant phase outs and replacements with a permanent long term solution
- **Assist with the initial cost** of new equipment installation
- **Support emerging technologies** that enable customers to improve energy efficiency and reduce direct GHG reductions
- **Lower customer energy bills and refrigerant costs**
- **Eliminate liability** associated with leak inspections, fines, and enforcements
- **Provide Access** to network of equipment manufacturers, engineers, technicians, and successful project implementations

Incentive Eligibility and Structure

Program Parameters	Existing Program Requirements	Refrigerant Incentive Requirements
Retrofit	Meet the existing requirements of the Custom Incentive Program	System uses natural refrigerant (CO ₂ , ammonia, hydrocarbon)
New system	Meet the existing requirements of the Savings By Design Program	System uses natural refrigerant (CO ₂ , ammonia, hydrocarbon)
Required system monitoring	None	Three years, SMUD pays installation/integration
Permanent Change	Permanent physical system change required so operation doesn't revert to the baseline technology	Physical system component or change must be made that prevents reverting to high-GWP refrigerant

Incentive Eligibility and Structure

Custom Program Incentive

Incentives are based on decreasing your energy use:

- \$0.10/kWh Energy Reduction Incentive and
- \$200/kW Demand Reduction Incentive
- Total incentive limited to 30% of project cost or \$150,000, whichever is less

Direct GHG Emissions Reductions Incentive

Incentives are based on decreasing direct emissions from refrigerants over the system lifetime:

- \$25/MtCO₂e emissions reduction from refrigerants
- Total incentive limited to 30% of project cost or \$150,000, whichever is less

All projects located in disadvantaged communities (with preference for those in the top 10%) and implemented by small-to-medium sized business owners will receive a 25% incentive bonus

Combined incentive limited to 50% of project cost or \$250,000, whichever is less

Developing an Appropriate Direct Incentive Rate Level

Direct incentive rate was evaluated in two ways, both supported a valuation of approximately \$25/MtCO₂e

1. Based on SMUD current energy incentives (Custom Incentive and Saving By Design)
 - \$0.10/kWh converted to \$/MtCO₂e using marginal emission factor for 15 year life
2. Based on California GHG Allowance Price Floor
 - Average of price floor for 15 years based on annual escalation of 5% plus inflation

Current Status

- Pilot program announced March 30, 2017 at North American Sustainable Refrigeration Council workshop at SMUD headquarters
- Announcement by California Air Resources Board May 11, 2017
- MANY calls from around the State from interested parties (stores, food processors)
 - There is clear demand for similar programs in from other utilities
- Two active projects utilizing the incentive

For More Information Contact:

R. Ryan Hammond, P.E.

Senior Mechanical Engineer, Integrated Design Solutions
w. 916-732-5647

Ryan.Hammond@smud.org

Kathleen Ave

Climate Program Manager, Energy Research &
Development

w. 916-732-5302

Kathleen.Ave@smud.org



Grocery Outlet

- ▶ Publicly owned company
 - 352 stores, independently owned and operated, in 6 States.
- ▶ Project drivers
 - CARB regulation: <150 GWP starting in 2022
 - Gather data and see how the system worked for future new stores.
 - Also installing a micro-distributed R290 system later this year in a new Southern CA site.
 - Aggressive growth plan and commitment to comply with all state & federal requirements in future new stores



System selected: CO₂ Transcritical with Adiabatic Condenser



Incentive Overview



▶ SMUD Program

- Incentive played a huge role.
- Presented additional cost of system to our chief financial officer and showed how incentives would offset the increase.
- Locked-in budget a year before formal capital expenditure request.

Funding Source	Amount
SMUD Natural Refrigerant Incentive Program (GHG savings)	\$78,728
SMUD Savings by Design (Energy savings)	\$13,294
American Public Power Association's Demonstration of Energy & Efficiency Developments Grant (SMUD & NASRC)	\$125,000
Grand Total	\$217, 022

- 100% of incremental system cost covered (based on initial quote)

Project Status

- ▶ Opening date
 - January 15, 2020
- ▶ Benefits
 - Too new to see any benefits yet, other than benefit of reducing greenhouse gases.
- ▶ Challenges
 - Installation and start up went well.
 - Maintenance challenging lately for Independent Operator, more calls than traditional system. Mainly, oil failure issues and lost frozen product from his coffin cases.



Future Projects



- ▶ Role of Incentives in Meeting CARB Regulations
 - **New construction** – Very important with rising construction costs overall. Incentives allow us to be more aggressive on our approach before new rule officially in place.
 - **Existing stores** – Also, very important because we track return on investment to any remodels minus end of life replacements.
- ▶ Choosing CO₂ Again
 - I believe we would choose this system again at this point. Only 4 months in, but Independent Operator has good feedback and installer has been working diligent to respond to existing system errors. Also, manufacturer is improving system as technology allows.



Raley's #415 Project Overview

- ▶ Raley's is privately owned Northern California Grocer
 - 130 stores in Northern Cal and Northern Nevada
 - Wanted to be ahead of January 2022 regulations that require <150 GWP refrigerants
 - Choices were NH₃/CO₂, Trans-critical CO₂ or Micro Distributed
- ▶ Replacement store
 - 55,164 square feet (footprint)
 - 1,897,000 BTUH refrigeration system load
 - Flagship store

Raley's Sustainable Refrigeration System (SRS) (NH₃ with liquid pumped CO₂)

- ▶ Most similar to existing system
- ▶ Estimated lower utility usage, elect, gas, water
- ▶ Maintenance issues
- ▶ Incentive summary
 - Expected total incentive = \$250,000
 - \$150K for <150 GWP refrigerant
 - \$100K for energy measures.
 - Estimate \$250,000 will only cover half added costs

Sustainable Refrigeration System Features

- ▶ Provides cooling for every load, air conditioner to ice machine
- ▶ Uses waste heat for space heating and domestic hot water
- ▶ Uses Dual Medium Condensing System, combination air water that saves on average 5000 gallons of water daily
- ▶ 140 pounds total NH₃ charge (27.2 gallons)
- ▶ 650 pounds CO₂ low temperature charge
- ▶ 2600 pounds CO₂ medium temperature charge

SRS System Description

- ▶ 4 Carlyle 5H-81 high stage compressors
- ▶ 2 Carlyle 5H-61 low stage compressors
- ▶ Medium temperature liquid overfeed rack
- ▶ Low temperature liquid overfeed rack
- ▶ ROSCH Rack (plate heat exchanger condenser, receiver, oil and desuperheater)
- ▶ Pump station for condenser water
- ▶ Open tower
- ▶ Air fluid cooler for condenser water circuit
- ▶ Air fluid cooler for de-super heater water circuit

Future Projects

- ▶ Second store in planning stages and should start construction in spring or fall 2021
- ▶ Incentives are essential for the first 5 or 6 installations. It takes that many stores to work out the technical issues and to drive down costs.
- ▶ Cost should come down with multiple installations
- ▶ At best we figure a 15% premium for <150 GWP Systems









Contacts and Additional Information

Contact Information

- ▶ Danielle Wright, NASRC
503-869-4191
Danielle.wright@nasrc.org
- ▶ Kathleen Ave, SMUD
Kathleen.Ave@smud.org
- ▶ Megan Rodriguez, Grocery Outlet
mrodriguez@cfgo.com
- ▶ Edward Estberg, Raley's
eestberg@winfirst.com

GreenChill Contact Information

- ▶ Kirsten Cappel, U.S. EPA
202.343.9556
cappel.kirsten@epa.gov
- ▶ Gerald Wozniak, U.S. EPA
202.343.9624
wozniak.gerald@epa.gov

Date	Webinar Topic
Oct 27	Defense Commissary Agency's Experience with Transcritical Carbon Dioxide

Join our webinar invitation list or request today's slides: EPA-GreenChill@abtassoc.com

View past GreenChill webinars: www.epa.gov/greenchill/events-and-webinars