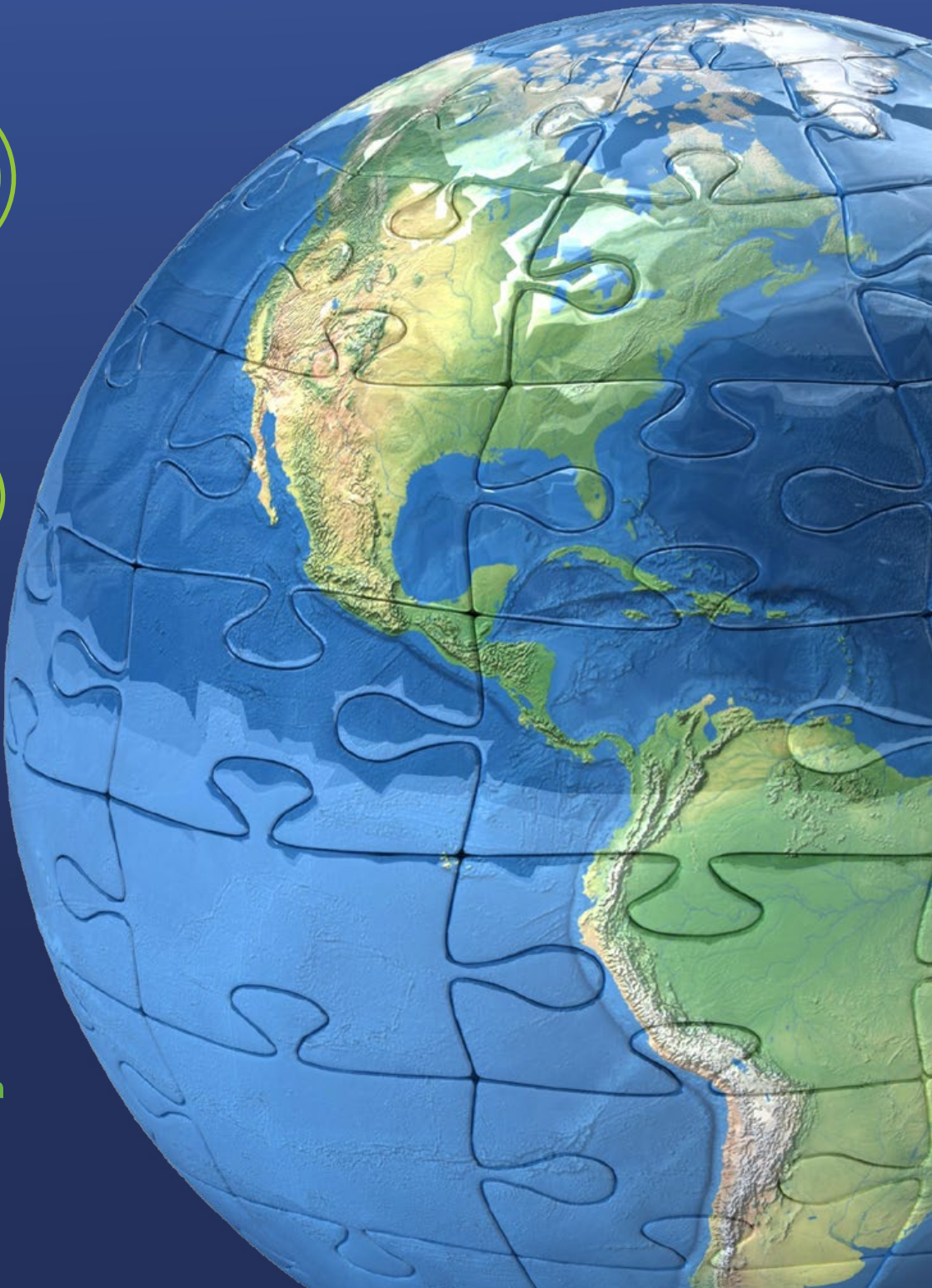


# Connecting the Pieces

for Sustainable Supermarket Refrigeration Solutions

2022 Annual Report



NORTH AMERICAN  
**Sustainable  
Refrigeration  
Council**



2022 marked a distinct shift in the industry’s approach to natural refrigerants. While refrigerant regulations continued to drive the transition away from Hydrofluorocarbons (HFCs), unprecedented growth in corporate climate goals emerged as an equally important driver.

The overall sentiment of food retailers shifted from “if” to “when” they would transition to naturals. For many, the real question was how they could go further, faster. This change marked the start of a new chapter for NASRC, shifting our focus from removing barriers to accelerating adoption and meeting the fast-growing demand for natural refrigerants.

We launched a new suite of educational resources to help navigate the changing regulatory landscape and improve understanding of technology options and best practices. We mobilized our network to increase funding sources that offset the cost of natural refrigerants and enable new installations, especially for small and independent grocers.

Most importantly, we set out to address the shrinking technician workforce, by far the most significant challenge to the scaled adoption of natural refrigerants, let alone ongoing operations and servicing. To better understand this problem, we conducted an assessment to evaluate challenges and opportunities to grow the technician workforce. The findings translated to data-driven recommendations to improve technician recruitment, training, and retention, which will inform our key strategies in 2023.

While we celebrate these milestones, we also recognize that the road ahead will not be easy. As we enter this new phase—transitioning from removing barriers to scaling and accelerating the widespread adoption of naturals—we know that all stakeholders will need to come to the table. But we are steadfast in our commitment to our mission because our community is stronger than ever. The strength of our network is and always has been the driving force behind all that we do.

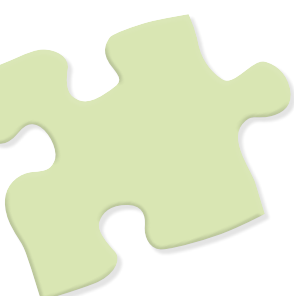
Thanks to tremendous support from our members and partners, we have the momentum and experts needed to solve the puzzle of sustainable refrigeration once and for all. When all the pieces come together, we can build a sustainable future for supermarket refrigeration.

I look forward to continuing to solve this puzzle together.  
Sincerely,

Danielle Wright  
Executive Director  
NASRC



**As we enter this new phase—transitioning from removing barriers to scaling and accelerating the widespread adoption of naturals—we know that all stakeholders will need to come to the table.**



## Board of Directors



**Bryan Beitler**  
President/CEO  
CoolSys



**Paul Conlon**  
Chair  
BITZER US



**Todd Washburn**  
Secretary  
True Manufacturing



**Brad Person**  
Chief Financial Officer  
SEER2



**Keilly Witman**  
Chief Governance Officer



**Frank Davis**  
Grocery Outlet



**Peter Dee**  
Danfoss



**Mike Ellinger**  
Whole Foods Market



**Todd Ernest**  
Climate Pros



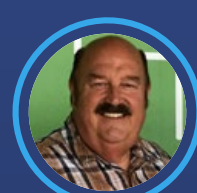
**Derek Gosselin**  
Hillphoenix



**Amber Hardy**  
ALDI



**James McClendon**  
Walmart



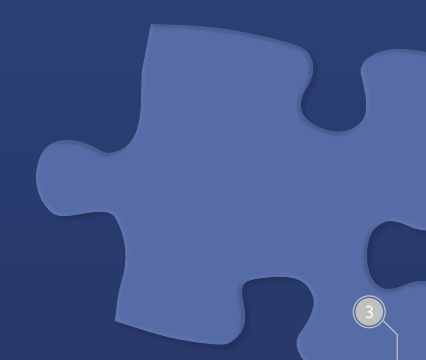
**Doug Milu**  
Publix Super Markets



**Clay Rohrer**  
Hussman



**Dustin Searcy**  
Parker Hannifin - Sporlan Division





**Grocery refrigeration is considered one of the most impactful and cost-effective opportunities to reduce HFC emissions.**

Natural refrigerants—including carbon dioxide (CO<sub>2</sub>), ammonia, and hydrocarbons—are the most climate-friendly refrigerant alternatives and offer a future-proof solution to the high global warming potential (GWP) Hydrofluorocarbon refrigerants (HFCs) commonly used in grocery stores.

Once considered a suitable replacement for ozone-depleting substances, HFCs are super-polluting greenhouse gases (GHGs) and one of the most potent drivers of climate change. Pound for pound, HFCs trap thousands of times more heat in the atmosphere than CO<sub>2</sub>. Scientists estimate that HFCs alone could contribute to up to 0.5°C of global warming by the end of the century. Classified as short-lived climate pollutants, **HFCs have a disproportionate impact on warming in the near term, making their mitigation significantly more urgent than other GHGs.**

Grocery refrigeration is considered one of the most impactful and cost-effective opportunities to reduce HFC emissions. **The average grocery store uses large quantities of HFC refrigerant** in each system and has a **very high leak rate of approximately 25%** of the refrigerant charge annually (about 875 lbs). The climate impact from grocery refrigeration leaks alone is estimated to be 55 million metric tons of CO<sub>2</sub> equivalent emissions (MTCO<sub>2</sub>e) annually or more than half a billion MTCO<sub>2</sub>e over 10 years.

A growing body of policymakers has identified addressing HFCs in grocery stores as a “low-hanging fruit” to achieve their climate targets, leading to unprecedented regulatory pressures currently stimulating the industry’s transition from HFC refrigerants. At the same time, more companies are setting corporate climate targets that will require a shift away from HFC refrigerants.

Natural refrigerants have zero or near-zero GWP and are considered a technically viable and future-proof solution. Still, a unique set of market barriers—such as upfront cost premiums, technology limitations, and service workforce readiness—have prevented widespread adoption in U.S. grocery stores. By our estimates, **less than 2% of U.S. grocery stores use HFC-free natural refrigerant systems.**

The North American Sustainable Refrigeration Council (NASRC) is a 501(c)(3) environmental nonprofit working in partnership with the grocery refrigeration industry to advance climate-friendly natural refrigerants and reduce GHG emissions caused by traditional HFC refrigerants. We collaborate with stakeholders from across the industry—including service contractors, equipment manufacturers, engineering firms, consultants, utilities, trade organizations, and over 40,000 food retail locations—to eliminate the barriers to natural refrigerants in grocery stores.

The central principle of our work is to bring together the stakeholders needed to solve the puzzle of sustainable refrigeration in grocery stores. **We believe that when the pieces come together, we can build a sustainable future for grocery refrigeration.**



#### OUR MISSION:

NASRC is an environmental 501c3 nonprofit taking action to advance natural refrigerants and shape a more sustainable future for grocery refrigeration.

#### OUR VISION:

To significantly lessen the environmental impact of refrigeration through widespread adoption of natural refrigerants and other innovative technologies.

### The Barrier

Natural refrigerant systems and equipment are typically associated with upfront cost premiums compared to traditional HFC technologies. What’s more, because natural refrigerants are not a “drop-in” solution, they require an extraordinarily costly and logistically challenging system replacement in existing stores. The cost burden of transitioning existing stores to natural refrigerants is often millions of dollars for a larger grocery refrigeration system, compared to tens of thousands of dollars to retrofit the system with a drop-in medium-GWP refrigerant. Too often, the cost barrier is insurmountable for small and independent grocers.

### NASRC Solutions

Funding mechanisms to offset the cost of natural refrigerant technologies can accelerate the transition from HFC refrigerants and drive volumes of adoption toward achieving economies of scale. Funding support is crucial for small and independent grocers disproportionately impacted by the refrigerant transition and other regulatory pressures. NASRC cost solutions focus on coordinating incentive funding and developing new financial mechanisms to support the transition from natural refrigerants.

## OUR PROGRESS IN 2022

### State Funding


 Helped secure a total of \$65 million in California to support the transition to low-GWP refrigerants:


**\$25 million (2022-23)**


to continue funding for the F-gas Reduction Incentive Program (FRIP)

**\$40 million (2022-24)**


to accelerate the adoption of ultra-low GWP refrigerants


 Supported the launch of the MassDEP’s \$2.5 million Commercial Refrigeration Grant Program, which will provide incentives for low-GWP refrigerants in Massachusetts.

 Secured a \$250,000 grant from the New York State Department of Environmental Conservation to coordinate a full or partial remodel to a natural refrigerant system in an existing store serving a disadvantaged community.

 Worked with other states to share lessons learned and inform future incentive programs.

### Other Funding

 Successfully implemented our Refrigerant Carbon Financing Pilot Program, which provided funding for five natural refrigerant projects.

 Supported new programs to incorporate refrigerant GWP as a metric for utility incentives, allowing utilities to provide funding for emission reductions from low-GWP refrigerants and energy efficiency improvements.

## The Barrier

A swift transition from HFC refrigerants will require various technology options for food retailers because no single technology will be the right solution for all grocery facilities. This is especially true for existing stores, which represent both the most significant opportunity for emissions reduction and the greatest challenge for grocers.

Additionally, due to the low installation rates of natural refrigerant technologies, there is a shortage of credible data on their energy performance and other ongoing costs, further contributing to uncertainty for grocers.

## NASRC Solutions

Technology solutions enabling the modular transition of existing stores to natural refrigerants over time offer a cost-effective alternative to a total system replacement. NASRC is uniquely positioned to leverage our network to accelerate the introduction of new technology solutions to the U.S. market by aligning the goals of different industry stakeholders and participating in efforts to update codes and standards. We also help fill data gaps by facilitating performance studies on natural refrigerant technologies.

## OUR PROGRESS IN 2022

### Modular Technology Solutions

Participated in codes and standards activities to approve higher propane (R-290) charge limits and increase self-contained solutions.

Published a fact sheet on R-290 applications in supermarkets and the need for higher charge sizes.

### Performance Validation Data

Facilitated measurement and verification (M&V) studies at over ten grocery sites as part of the CARB FRIP grant program to better understand energy performance and other ongoing costs of natural refrigerant systems.

Published a CO2 case study comparing the costs, energy performance, and total emissions of a new CO2 transcritical system to an existing HFC system.

### Leak Reduction

Published a leak reduction guide outlining significant sources of refrigerant leaks in existing systems and proposing equipment specification measures for new refrigeration systems to minimize leaks and reduce overall GHG emissions.

## The Barrier

The grocery refrigeration industry faces an increasingly critical technician shortage. There are simply not enough grocery refrigeration technicians to keep up with essential operations, let alone enable the transition away from HFCs and meet regulatory timelines. The technician shortage has led to demanding, unsustainable schedules, causing some technicians to leave the field and further exacerbating the workforce shortage. Moreover, the growing workforce gap and the low adoption rates of natural refrigerants have limited training opportunities on natural refrigerant technologies. The industry must address technician recruitment, training, and retention to enable the widespread adoption of natural refrigerants.

## NASRC Solutions

Companies working in isolation will not address the persistent workforce shortage. NASRC solutions center on a coordinated, industry-wide approach to implementing recruitment, training, and retention solutions. Our strategy focuses on filling training gaps and growing the technician workforce to prevent training gaps or technician shortages from further bottlenecking the transition from HFC refrigerants.

## OUR PROGRESS IN 2022

### Workforce Development

Completed a workforce development assessment to evaluate challenges and opportunities to grow the technician workforce and identify data-driven recruitment, training, and retention solutions.

### HVACR School Curriculum

Drafted a CO2 curriculum for trade schools and community colleges with ESCO Group, industry stakeholders, and Heating, Ventilation, Air Conditioning, and Refrigeration (HVACR) schools to expose students to natural refrigerants before entering the field and improve access to natural refrigerant training.

### Technician Training Resources

Connected technicians with existing natural refrigerant training resources through our virtual [CO2](#) and [R290](#) training libraries.

# Education & Awareness

## Policymaker Engagement

NASRC continued to facilitate industry engagement with state and federal policymakers throughout 2022 to inform effective strategies that achieve HFC reduction goals. Over 70 state and federal policymakers attended our Sustainable Refrigeration Summit. These new and strengthened relationships positioned us to help inform new refrigerant regulations that achieve the goals of government agencies while supporting the industry's transition.

## Sustainable Refrigeration Summit

In 2022, we hosted our second-annual Sustainable Refrigeration Summit, convening **1,000+** stakeholders from the commercial refrigeration, policy, energy, and environmental sectors to solve the puzzle of sustainable refrigeration in supermarkets. Attendees gained insights on the latest regulatory and industry trends from 45 leading food retailers, industry experts, and policymakers.



## Educational Resources

Throughout 2022, NASRC developed a new suite of educational resources that support the industry and raise awareness about key natural refrigerant challenges and solutions.

# 5 KEY TAKEAWAYS

1

**Retailers need solutions for existing stores.** While natural refrigerants are becoming the standard for new stores, existing stores remain the biggest challenge to transitioning from HFCs.

2

**The technician shortage is the most significant limiting factor** in the transition from HFCs. We do not have the service and installation workforce to meet regulatory timelines.

3

**Ongoing innovation is needed** to transition from HFCs effectively and meet regulatory timelines. No single solution will meet the needs of all retailers.

4

**Effective policies can be a crucial solution** to enable a swift and successful transition by offsetting upfront costs, accelerating technology advances, supporting workforce development, and more.

5

**Success will require collaboration,** and solutions to these challenges will require a coordinated effort across all stakeholder groups, which NASRC is well-positioned to lead.

**CO2 Case Study**

Category	Baseline	Current	Target
CO2 System	0	1	2
Energy Efficiency	100 kWh	80 kWh	60 kWh
Carbon Footprint	1000 lbs	800 lbs	600 lbs

**Natural Refrigerants Factsheet**

U.S. supermarkets are a leading source of HFC emissions. 3,500 lbs. Average GWP. 25% of total emissions. 38,000+ refrigerators.

**Fact Sheet: Natural Refrigerants In Supermarkets**

**Propane Refrigerant Factsheet**

Propane is safe, cost-effective, and climate-friendly. Global Warming Potential (GWP) Comparison: R-344a CO2 (1), R-290 (Propane) (3), R-600a (HFC) (1500).

**Fact Sheet: Propane Refrigerant In Supermarkets**

**HFC Policies & Refrigerant Regulations By State**

US Climate Alliance Member: CA, HI, IL, IN, MD, MI, MN, NY, OH, RI, VT. SNAP 20/21 Pending: WA, WI. SNAP 20/21 Signed Intentional: AZ, CO, IA, KS, KY, LA, NE, NC, ND, OR, PA, SC, TN, VA, WV.

**HFC Policy Tracker**

**Leak Reduction Initiative & Guide**

A proactive approach to reducing leaks over the lifetime of commercial refrigeration systems.

**Natural Refrigerant Technology Library**

Browse the recordings below and feel free to contact us with questions.

**Natural Refrigerant Technology Library**

**Refrigerant Transition Hub**

Check out our free refrigerant transition hub, filled with key lessons learned from top-performing HFCs to climate-friendly natural refrigerants.

**Refrigerant Transition Hub**

Category	Current Refrigerant / GWP	Future Low GWP Alternative (GWP, Class)	US Approval Status
Stationary, Full-Load	R-404A (2021, A1)	R-450B (2021, A1)	Approved
Stationary, Full-Load	R-507A (2021, A1)	R-507A (2021, A1)	Approved
Stationary, Full-Load	R-401A (2021, A1)	R-401A (2021, A1)	Approved
Stationary, Full-Load	R-407C (2021, A1)	R-407C (2021, A1)	Approved
Stationary, Full-Load	R-410A (2021, A1)	R-410A (2021, A1)	Approved
Stationary, Full-Load	R-513A (2021, A1)	R-513A (2021, A1)	Approved
Stationary, Full-Load	R-422B (2021, A1)	R-422B (2021, A1)	Approved
Stationary, Full-Load	R-422A (2021, A1)	R-422A (2021, A1)	Approved
Stationary, Full-Load	R-438A (2021, A1)	R-438A (2021, A1)	Approved
Stationary, Full-Load	R-438B (2021, A1)	R-438B (2021, A1)	Approved
Stationary, Full-Load	R-438C (2021, A1)	R-438C (2021, A1)	Approved
Stationary, Full-Load	R-438D (2021, A1)	R-438D (2021, A1)	Approved
Stationary, Full-Load	R-438E (2021, A1)	R-438E (2021, A1)	Approved
Stationary, Full-Load	R-438F (2021, A1)	R-438F (2021, A1)	Approved
Stationary, Full-Load	R-438G (2021, A1)	R-438G (2021, A1)	Approved
Stationary, Full-Load	R-438H (2021, A1)	R-438H (2021, A1)	Approved
Stationary, Full-Load	R-438I (2021, A1)	R-438I (2021, A1)	Approved
Stationary, Full-Load	R-438J (2021, A1)	R-438J (2021, A1)	Approved
Stationary, Full-Load	R-438K (2021, A1)	R-438K (2021, A1)	Approved
Stationary, Full-Load	R-438L (2021, A1)	R-438L (2021, A1)	Approved
Stationary, Full-Load	R-438M (2021, A1)	R-438M (2021, A1)	Approved
Stationary, Full-Load	R-438N (2021, A1)	R-438N (2021, A1)	Approved
Stationary, Full-Load	R-438O (2021, A1)	R-438O (2021, A1)	Approved
Stationary, Full-Load	R-438P (2021, A1)	R-438P (2021, A1)	Approved
Stationary, Full-Load	R-438Q (2021, A1)	R-438Q (2021, A1)	Approved
Stationary, Full-Load	R-438R (2021, A1)	R-438R (2021, A1)	Approved
Stationary, Full-Load	R-438S (2021, A1)	R-438S (2021, A1)	Approved
Stationary, Full-Load	R-438T (2021, A1)	R-438T (2021, A1)	Approved
Stationary, Full-Load	R-438U (2021, A1)	R-438U (2021, A1)	Approved
Stationary, Full-Load	R-438V (2021, A1)	R-438V (2021, A1)	Approved
Stationary, Full-Load	R-438W (2021, A1)	R-438W (2021, A1)	Approved
Stationary, Full-Load	R-438X (2021, A1)	R-438X (2021, A1)	Approved
Stationary, Full-Load	R-438Y (2021, A1)	R-438Y (2021, A1)	Approved
Stationary, Full-Load	R-438Z (2021, A1)	R-438Z (2021, A1)	Approved

**Summary of Alternative Refrigerants for Commercial Refrigeration**

**NASRC Membership**

NASRC members make up a powerful network of experts from across every sector of the grocery refrigeration industry. They are the driving force behind our work to advance natural refrigerants in grocery stores, and they consistently demonstrate the power of bringing all stakeholders together to connect the pieces for sustainable refrigeration.

Throughout 2022, we experienced unprecedented member support for NASRC initiatives and engagement in member activities, such as Progress Group meetings and monthly End-User Roundtable meetings. See a complete list of 2022 NASRC members at the end of this report.

**150+**  
Member  
Organizations

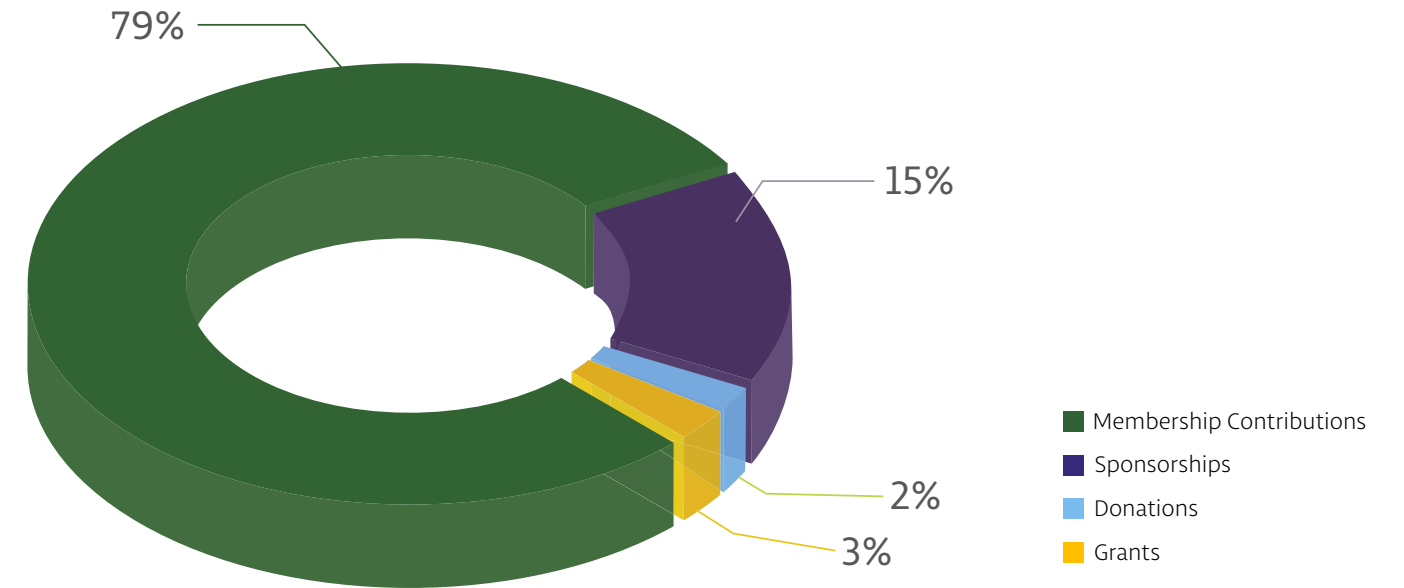
**40,000+**  
Food Retail  
Locations

**83%**  
Growth  
Since 2017

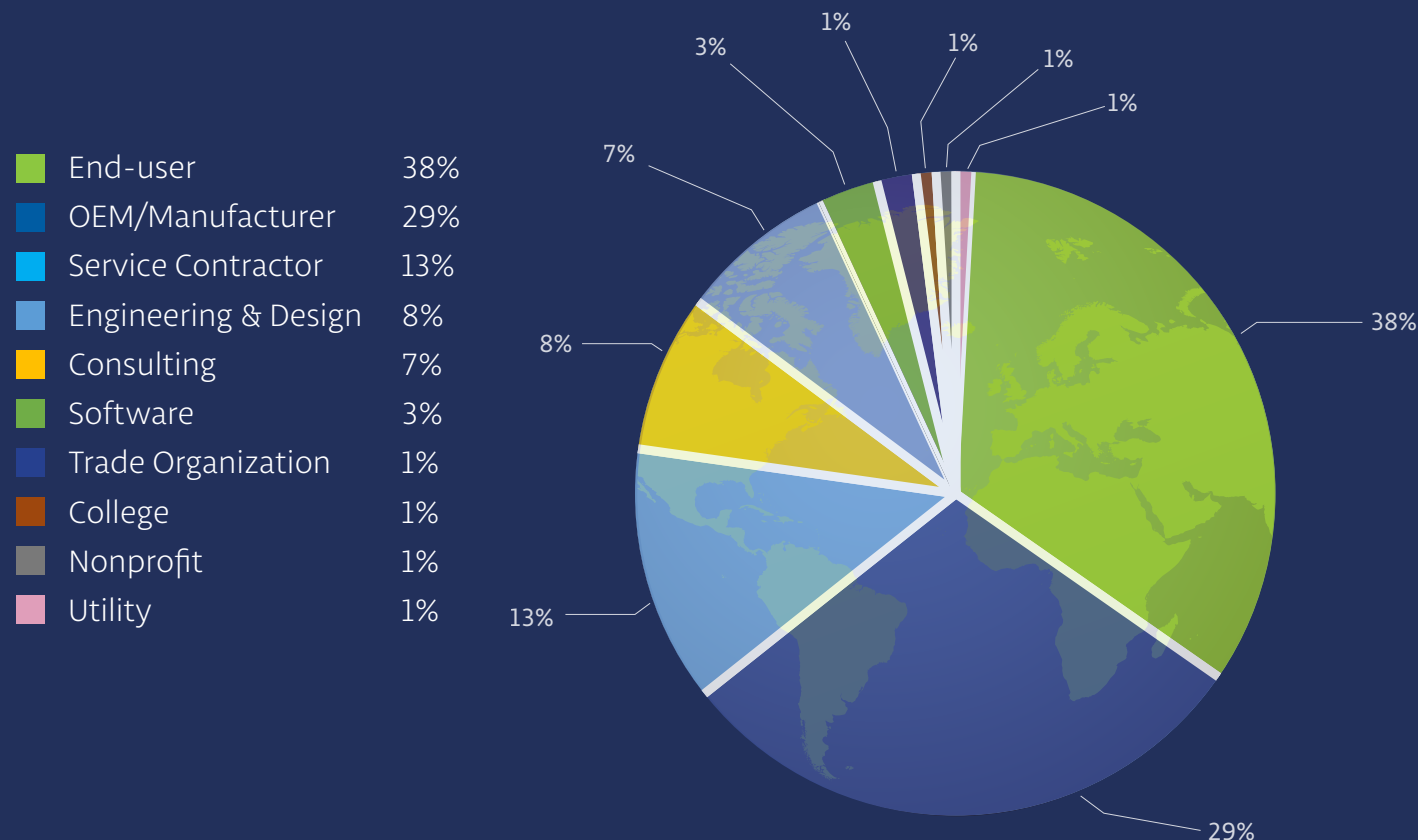
**63%** of US Supermarket Locations

**FINANCIAL OVERVIEW**

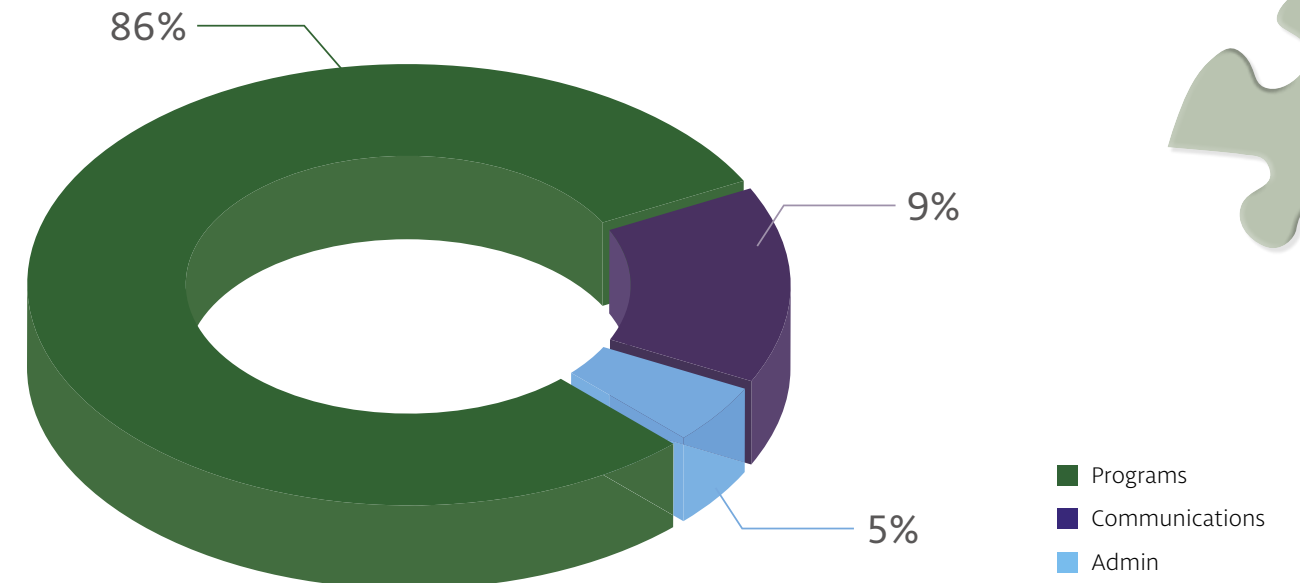
**2022 Revenue**



**MEMBERSHIP BY TYPE**



**2022 Expenses**



# Our Esteemed Members

Thank you to our 2022 members!  
None of this would be possible without your support.

## TITANIUM MEMBER



## PLATINUM MEMBER



## GOLD MEMBER



### END USER

Ahold Delhaize  
Albertson's  
ALDI  
Arizona Grand Resort  
Ashland Food Coop  
Boulder Organic Foods  
Brattleboro Food Coop  
BriarPatch Food Co-op  
Brookshire Brothers  
Campbell Soup Company  
Chavez Supermarkets  
Coborn's Inc.  
Cook County Whole Foods Co-op  
Costco  
Draeger's Supermarkets  
East Aurora Co-op Market  
Food Lion  
Genentech, Inc.  
Giant Eagle  
Grocery Outlet  
H-E-B  
Hannaford  
Harp's Food Stores  
Harris Teeter LLC  
Holiday Market  
Loblaws  
Longo's  
Lowe's Market  
Mom's Organic Market  
National Co-op Grocers  
Nature's Path Foods  
New Leaf Markets  
New Seasons Market  
Nugget Market  
Palace Market  
Park Slope Food Coop  
PCC Community Markets  
Publix Super Markets  
Raley's Family of Fine Stores  
Red Bull North America  
Sprouts Farmers Market  
Stater Bros. Markets  
Sugar Creek Packing Co  
Target  
The Fresh Market  
The Kroger Co.  
The North West Company  
United Natural Foods  
Vallarta Supermarkets  
Walmart  
Weis Markets  
Whatley Convenience Stores  
Whole Foods Market

### SERVICE CONTRACTOR

Accutherm Refrigeration  
Arctic Cooling Systems

Classic Refrigeration SoCal

- **Climate Pro**  
Compass Refrigeration, Inc.
- **CoolSys**  
Crosby-Brownlie, Inc.  
Fazio Mechanical Services  
Key Mechanical  
Omni Mechanical Solutions  
Professional HVAC/R Services  
Refrigeration Systems Construction & Service Co.
- **Remco, Inc.**  
RMC Refrigeration  
South-Town Refrigeration & Mechanical  
St. Cloud Refrigeration
- **The Arcticom Group**  
Turner Piping & Refrigeration

### ENGINEERING & DESIGN

- Benchmark Group  
Cushing Terrell
- **DC Engineering**  
Emanuelson Podas  
Energy Efficiency Services (e2s)  
Enreps LLC  
Henderson Engineers  
kW Engineering
- **SEER2**  
Singh 360 Inc.  
VaCom Technologies

### CONSULTING

- 2050 Partners, Inc.  
Certified Energy Consultants  
CLEARResult
- **effecterra**  
Optimized Thermal Systems  
PSD Associates  
Ratio Institute  
Refrigerant Management Solutions  
Therm Solutions, Inc.  
Tradewater  
VEIC

### OEM/MANUFACTURER

- **AHT Cooling Systems USA, Inc.**
- **Alfa Laval US**  
Area Cooling Solutions  
Arneg
- **Baltimore Aircoil Company**
- **BITZER Canada**
- **BITZER US**
- **CAREL USA**  
Carlyle Compressor
- **Danfoss**
- **Embraco-Nidec Global Appliance**
- **Emerson**

- **Energy Recovery**  
Evapco Inc.  
Evapco LMP
- **Fascold USA**
- **Güntner US LLC**  
Heatcraft Worldwide Refrigeration  
Heat Transfer Product Group
- **Hillphoenix**
- **Howe Corporation**
- **Hussmann**  
KE2 Therm Solutions
- **Kysor Warren**
- **LEER INC.**  
M&M Carnot  
Matelex  
Mitsubishi Electric US, Inc. Cooling & Heating Division
- **Modine Climate Solutions**  
MSA Safety Sales, LLC  
Nitto Inc
- **Officine Mario Dorin**
- **Parker Sporlan**
- **Phononic**
- **Rivacold America, Inc.**
- **Secop**  
Southern CaseArts  
Tecumseh Products Company LLC
- **Temprite**
- **True Manufacturing**
- **Viessmann Refrigeration Solutions**  
Westermeyer Industries, Inc.  
Zero Zone, Inc.

### COLLEGE

Mt. San Antonio College

### UTILITY

- **Southern California Edison**

### NONPROFIT

Center for Energy & Environment

### SOFTWARE COMPANY

Axiom Cloud Inc.  
Bueno  
ServiceChannel  
Trakref

### TRADE ORGANIZATION

- ConnexFM
- **HARDI**

### Membership Levels

- Titanium
- Gold
- Platinum
- Silver

## The North American Sustainable Refrigeration Council (NASRC)

The NASRC is a 501(c)(3) environmental nonprofit working to advance climate-friendly natural refrigerants and reduce greenhouse gas emissions caused by traditional hydrofluorocarbon (HFC) refrigerants. We collaborate with stakeholders from across the industry, including over 40,000 food retail locations, to eliminate the barriers to natural refrigerants in supermarkets.



[nasrc.org](http://nasrc.org)