



**WEBINAR
SERIES**

Increasing the Adoption of Climate-friendly Refrigeration Systems in California's Supermarkets

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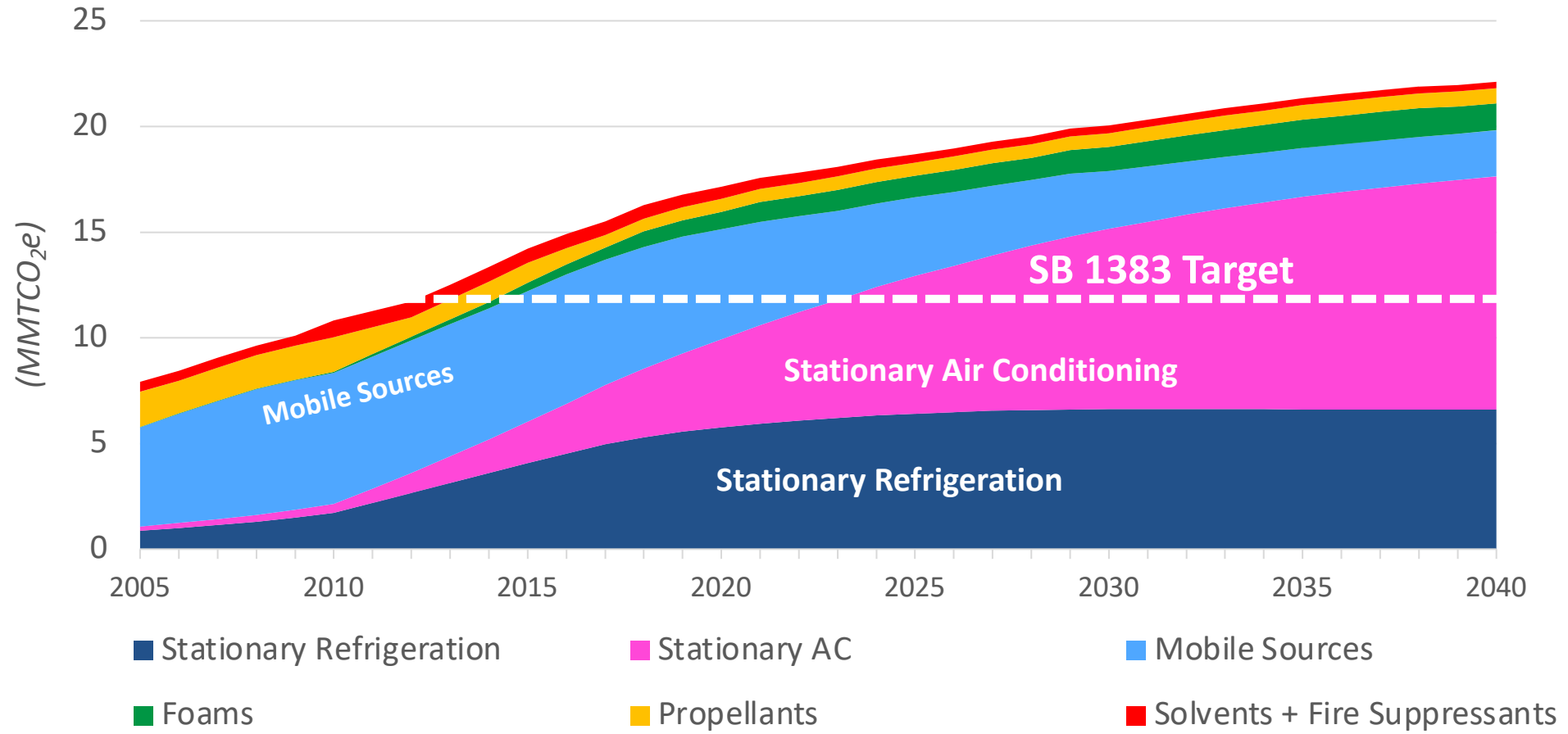
Hydrofluorocarbons (HFCs) are potent Short-Lived Climate Pollutants (SLCP)

- Common HFCs used as refrigerants in supermarket refrigeration systems have very high GWP values
- For example: 1 lb of refrigerant R-404A (GWP 3,922) = 3,922 lb of CO₂



SB 1383 requires CARB to reduce HFC emissions 40% below 2013 levels by 2030

HFC Emissions are Growing in California



Source: CARB F-gas Inventory

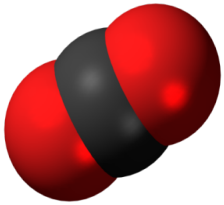
Supermarket Refrigeration Systems are a Source of Climate-Damaging Refrigerant Emissions



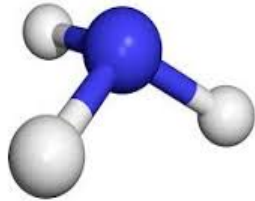
Refrigerant Emissions

- ~2000 lb of refrigerant per supermarket
- 15-25% annual refrigerant leak rates
- Thousands of MTCO₂e emissions over lifetime

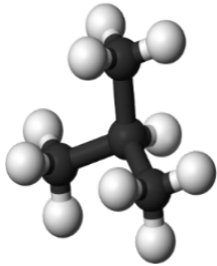
Commercially available Low-GWP Technologies



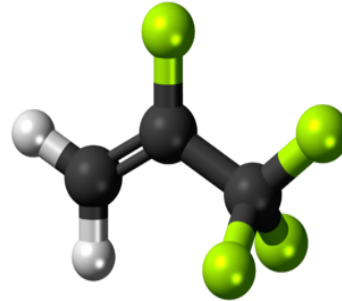
CO₂



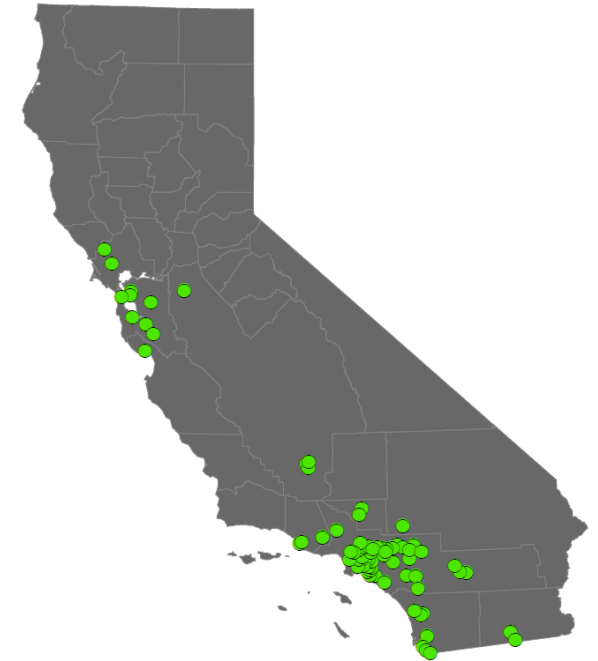
Ammonia



Hydrocarbons



HFOs



100+ supermarkets in California
using low-GWP refrigerants in 2018

F-Gas Reduction Incentive Program (FRIP)



SB 1013 (2018) established an F-Gas incentive program for which the legislature allocated \$1,000,000 in 2019-2020 budget

- FRIP focused on the retail food sector
- Addressing main barriers to low-GWP technologies
 - Higher cost premium
 - Lack of familiarity with technologies

FRIP Eligible Technologies and Funding Available

Funding Tiers	Funding available per project
Tier I: Innovative Technologies Ultra-low-GWP technologies (< 10 GWP)	\$150,000 for existing or \$50,000 for new facilities (\$200,000 for existing or \$75,000 for new facilities in LADWP territory)
Tier II: Conventional Technologies Refrigerant retrofits from very high-GWP to lower-GWP refrigerants	25% of retrofit cost or 50% of retrofit cost for stores located in low-income and disadvantaged communities

Tier I Scoring Criteria

Mandatory	Optional
• Cost-effectiveness of GHG reductions • Market Potential (Scalability) • Information Sharing Plan • Workforce Development Plan • Project Readiness	• Existing facility • Benefits to priority populations • Independent owner/operator • Energy efficiency

Utility Partnerships: The Emerging Technologies Program (ETP) and Los Angeles Dept. of Water and Power (LADWP)

- ETP providing comprehensive measurement and verification (M&V) support for Tier I projects
- Address the lack of performance data on low-GWP technologies
- LADWP allocated \$200,000 for Tier I projects in LADWP territory
- Higher funding awards for projects in LADWP territory

FRIP Applications Received

Tier I: Innovative Technologies	Tier II: Conventional Technologies
• 16 applications – 4 existing and 2 new stores • Retailers: Aldi, Costco, Grocery Outlet, Stater Brothers and Whole Foods Market	• 2 applications for existing stores • Retailers: Vallarta Market
\$1.2M requested (22% oversubscribed)	

FRIP Awards

Funding Tiers	Funding available per project
Awards	All applications received = 16 (2 withdrawn) some at reduced funding amounts
Located in low-income and disadvantaged communities	50% (8 out of 16)
Cities	Carlsbad, Lancaster, Murrieta, Palmdale, Petaluma, Rancho Cucamonga, Ramona, San Diego, San Francisco, Sebastopol, Thousand Oaks, Torrance, Ventura, Whittier

Technologies Funded

- Transcritical CO₂ with adiabatic condensers
- Transcritical CO₂ with gas ejectors
- Microdistributed propane with a water loop
- Hybrid HFC/CO₂ system

GHG Reductions and Cost-effectiveness

Funding Tiers	Funding available per project
GHG Reductions over 15 years	Tier I: 29,618 MTCO₂e Tier II: 7,860 MTCO₂e Tiers I & II combined: 37,478 MTCO₂e
Cost-effectiveness of monies (\$/MTCO ₂ e)	Tier I: 31 \$/MTCO₂e Tier II: 9 \$/MTCO₂e Tiers I & II combined: 27 \$/MTCO₂e

Need for Market Transformation

- **Incentives.** Upfront cost major barrier to adoption, particularly for existing stores
- **Training.** Skilled technician availability
- **M&V.** Publicly available information on system performance
- **Utility partnerships.** Incorporation of refrigerant emissions in utility energy efficiency programs as per SB 1013
 - California Energy Commission
 - California Public Utilities Commission
 - Dept. of Community Services and Development

FRIP is part of California Climate Investments



What is California Climate Investments?

A statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment—particularly in disadvantaged communities.

The F-gas Reduction Incentive Program (FRIP) is part of [California Climate Investments](#), a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment — particularly in disadvantaged communities. The California Emerging Technologies Program is a partner for the FRIP.

For more information, contact **Aanchal Kohli** at Aanchal.Kohli@arb.ca.gov.

More information can be found at <https://ww2.arb.ca.gov/our-work/programs/FRIP>.

You can find more information about the F-gas Reduction Incentive Program at <https://ww2.arb.ca.gov/our-work/programs/FRIP>

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