

ET Summit 2019

Presented by



Super Solutions for Super Pollutants

The Commercial Refrigeration Dream Team

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The NASRC

OUR MISSION

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

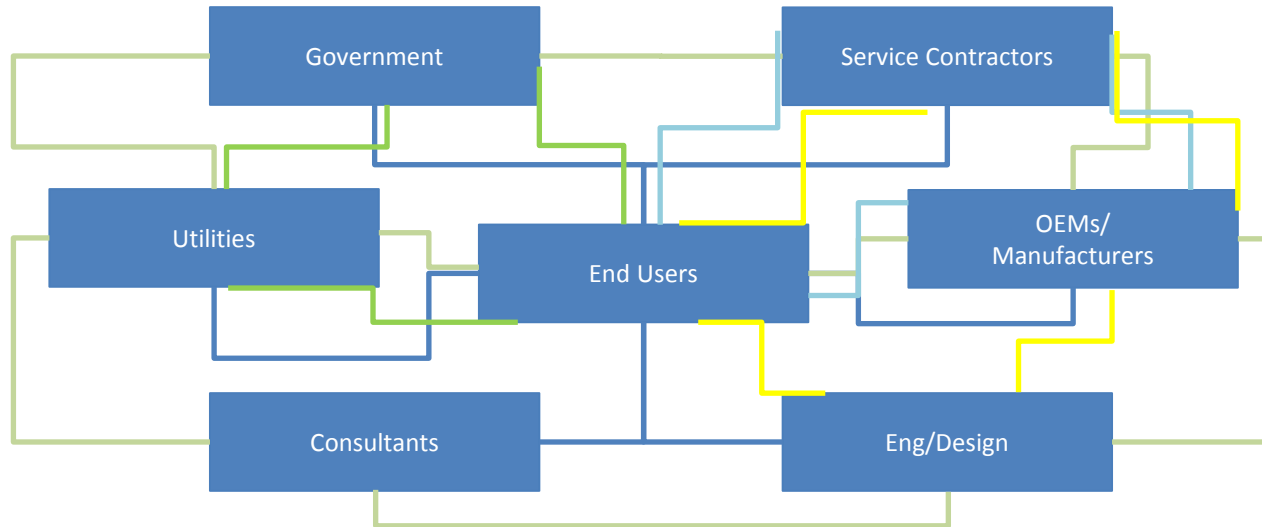
OUR MEMBERS

24,000 supermarket locations
+125 supermarket stakeholders
Equipment manufacturers,
contractors, Eng. & design firms,
consultants, utilities

OUR GOALS

- Natural refrigerants are ON PAR with other refrigerant options
- Leverage stakeholder collaboration to drive action
- Provide information, tools, & resources for the industry

NASRC Stakeholders



GOALS

- Technology
- Energy
- Training
- Standards
- Data

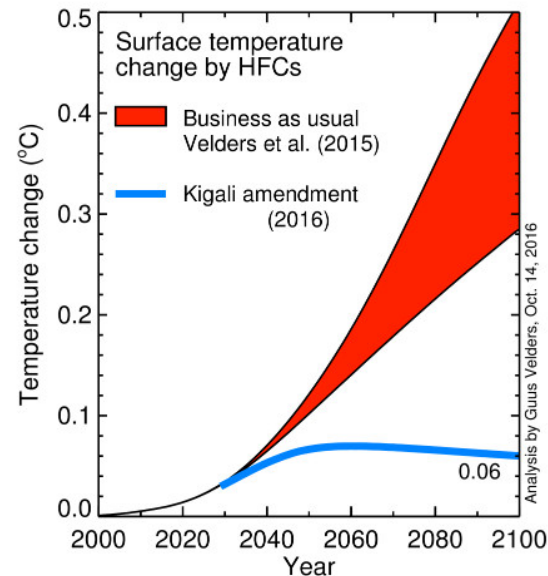
NASRC Members



Climate Impacts of Refrigerants

Hydrofluorocarbons (HFCs) are Powerful Greenhouse Gases (GHGs):

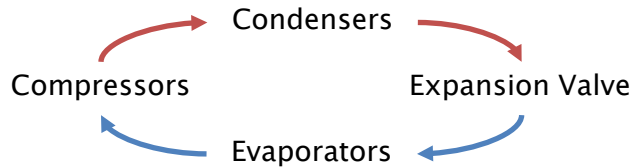
- +1,000 times more heat-trapping power than CO₂
- Short Lived Climate Pollutants (SLCPs)
- Fastest growing GHG globally
- Mitigation can avoid 0.5 degree C of warming by 2100



Supermarket Refrigeration

SYSTEMS

Direct Expansion
Centralized or Distributed



38,000+
US Locations

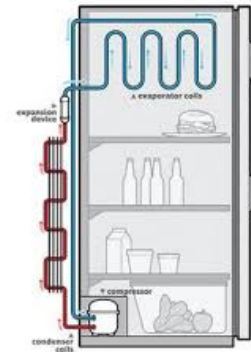
3,500
Avg. Refrigerant
Charge (lbs)

41,000
Avg. Square Ft.

25%
Avg. Annual
Leak Rate

EQUIPMENT

Self-contained
or Plug-in



Supermarket Systems Emissions

Annual Direct Emissions

38,000

x 25%

x R-404A GWP

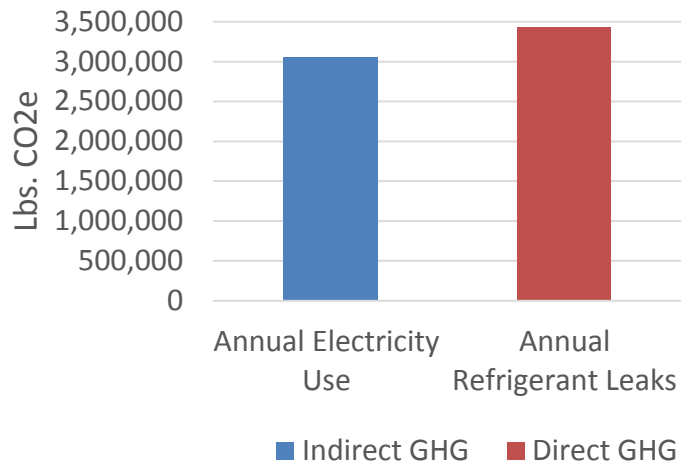
152,000,000,000 lbs. of
CO₂e Annually



EPA Greenhouse Gas Equivalencies Calculator: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

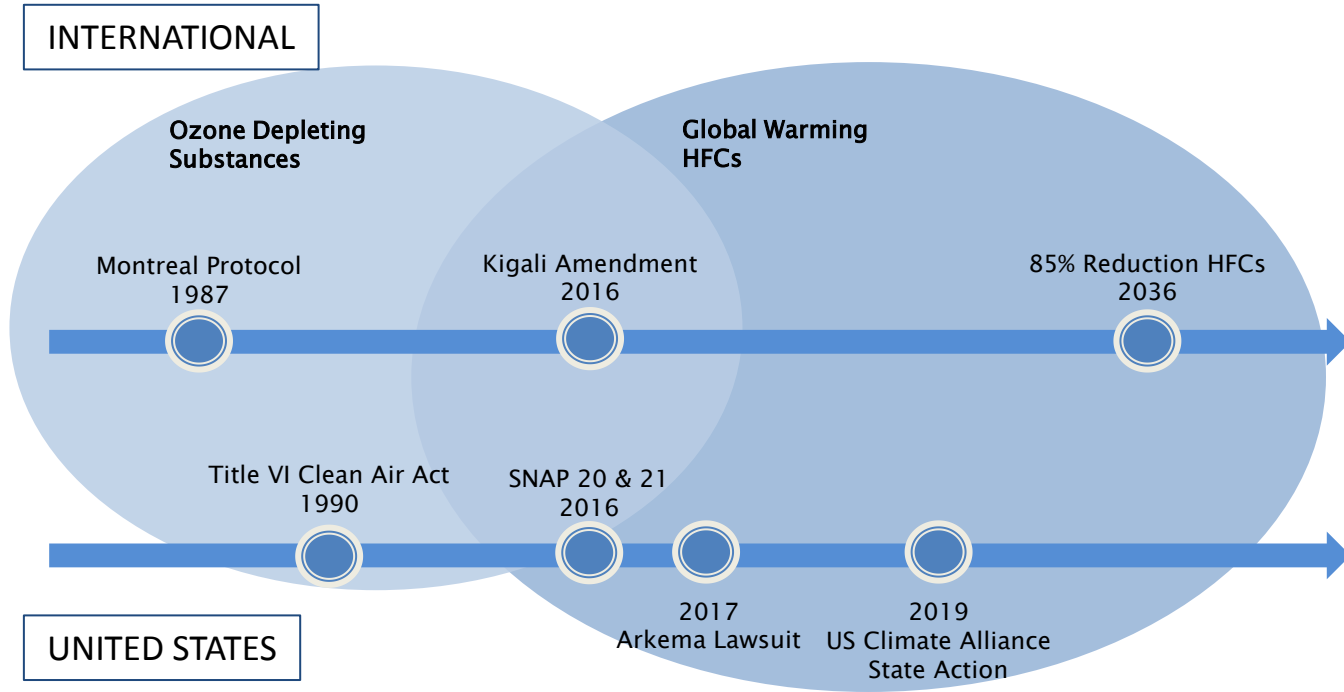
Electricity Use vs. Refrigerant Emissions

Typical Supermarket

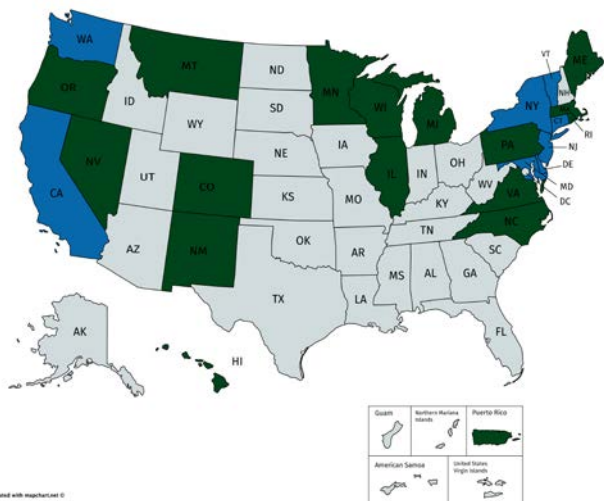


EPA Average Supermarkets GHG Impact: <https://www.epa.gov/greenchill/average-supermarkets-greenhouse-gas-impacts>

Refrigerant Regulations



The US Climate Alliance



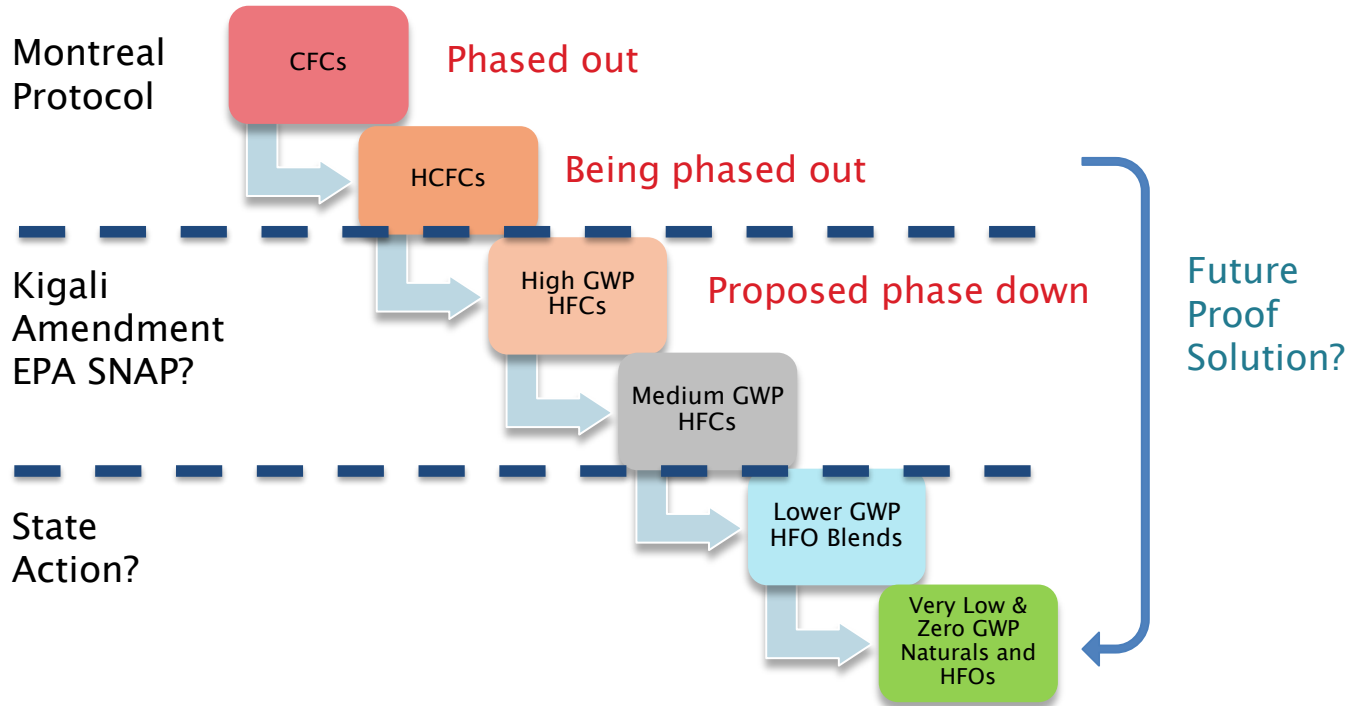
55% of US POPULATION

\$11.7 trillion economy

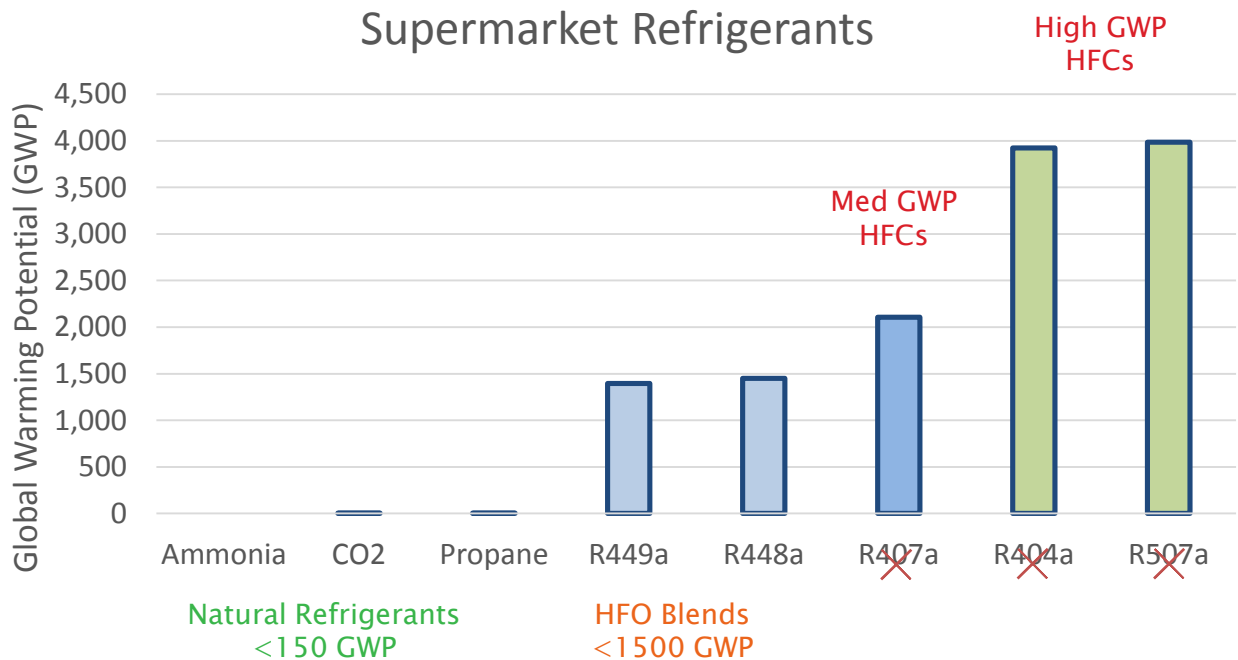
HFC Regulations

	HFC Commitment	SNAP Rules 20 & 21	Section 608 Refrig. Mgmt.	<150 GWP Limit - New Systems	>150 GWP Sales Ban
California	✓	✓	✓	✓	✓
New York	✓	✓			
Washington	✓	✓			
Vermont	✓	✓			
New Jersey	✓				
Connecticut	✓				
Maryland	✓				

US Refrigerant Transitions



What Refrigerants are Compliant?



What are Natural Refrigerants?

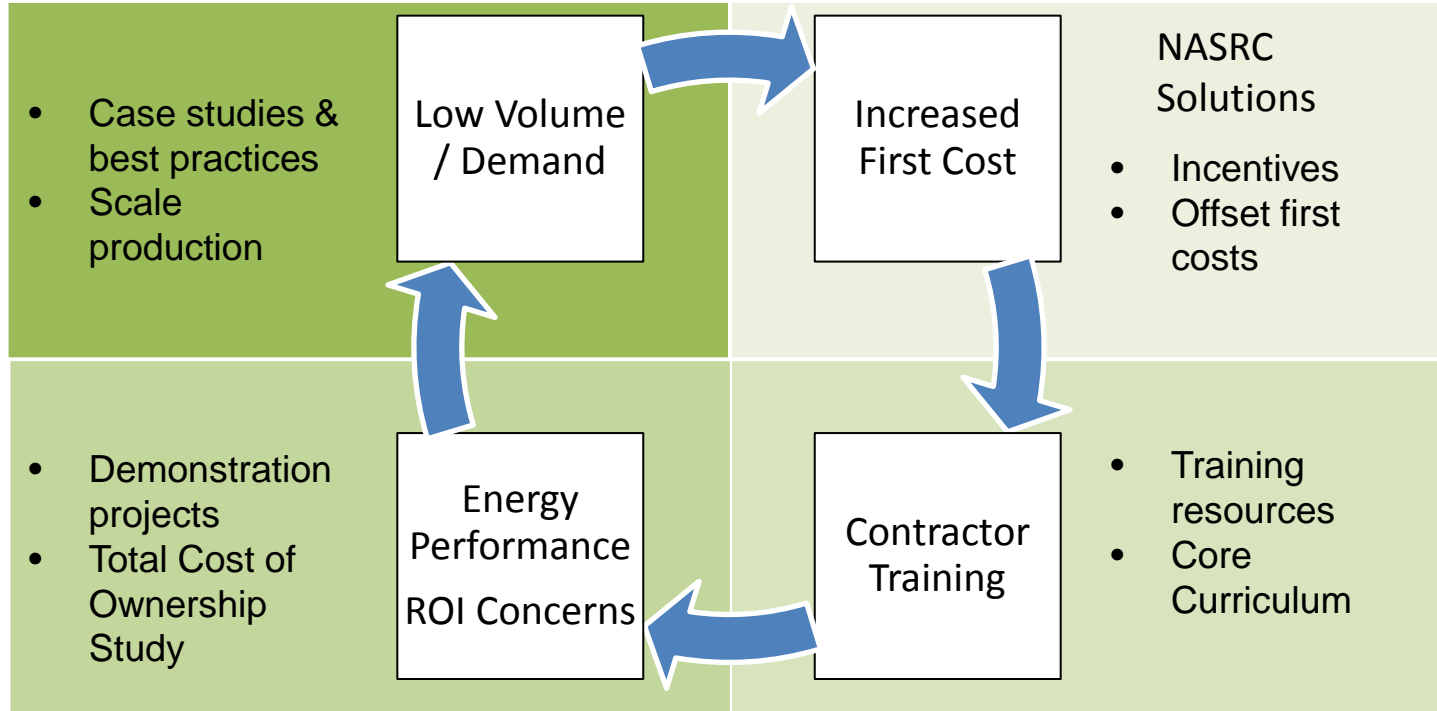
Ammonia
R717

Carbon
Dioxide
R744

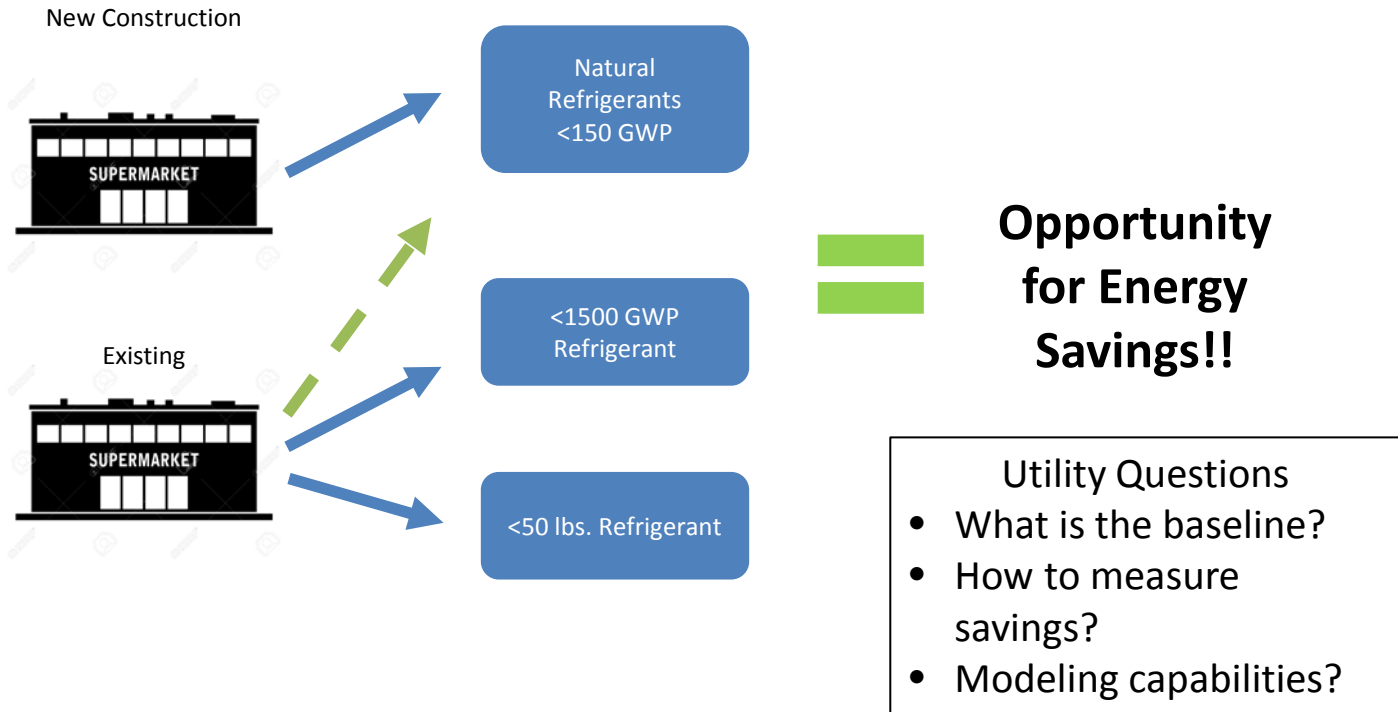
Hydro
carbons
R290

GWP	US Installations	Applications	Advantages	Challenges
0	4	<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
1	400	<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
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

Natural Refrigerant Challenges

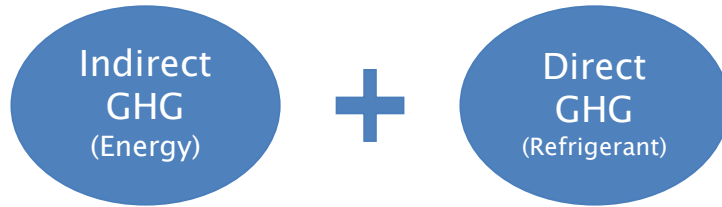


California Supermarket Options

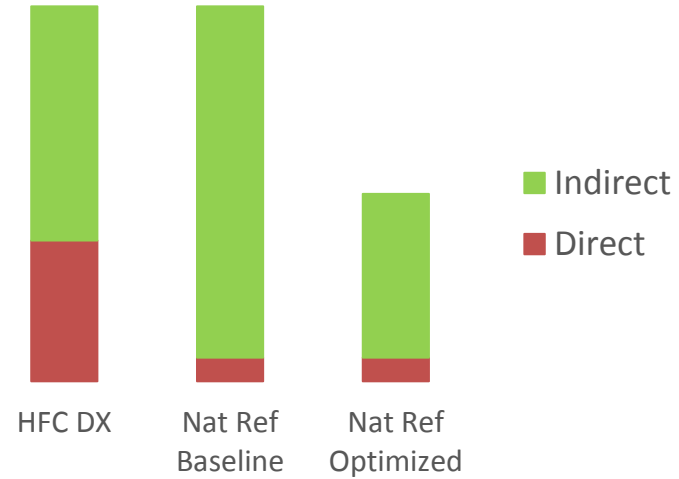


Supermarket Total Emissions

TEWI = Total Equivalent Warming
Impact



TEWI Comparison



Thank You!

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North American Sustainable Refrigeration Council

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