

Technical Working Group Meeting

Proposed HFC Limit for Stationary Refrigeration Equipment

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Today's Presentation

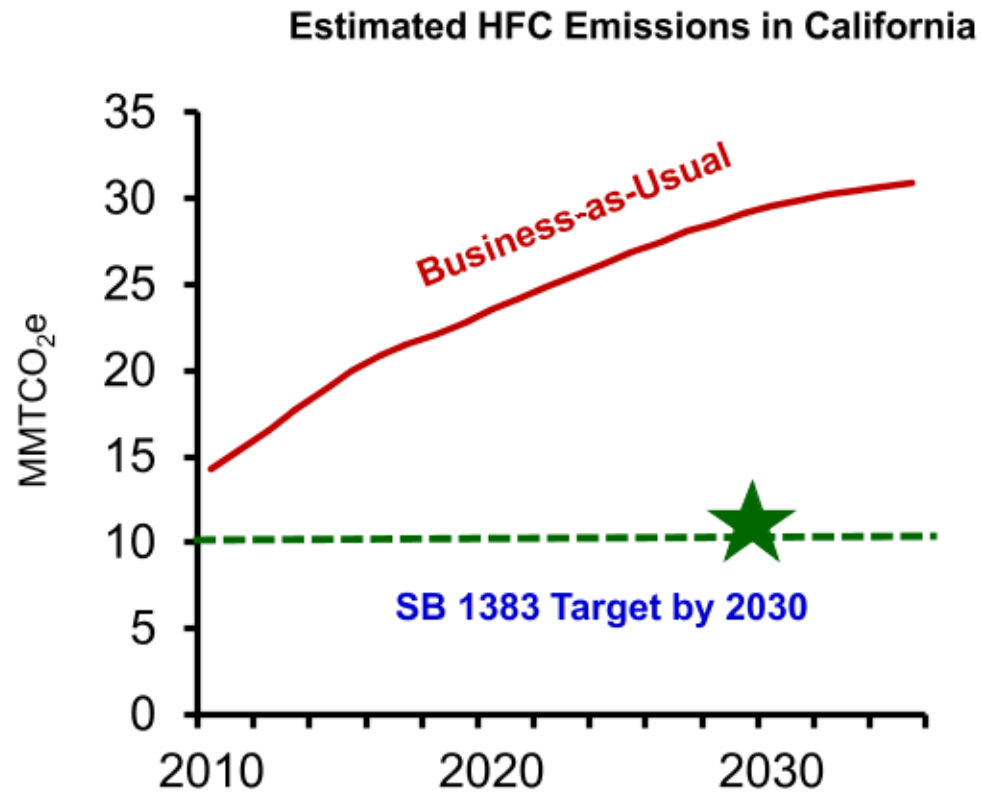


- Background
- Proposed HFC Regulations
- Regulatory Process Overview
 - Economic Analysis (SRIA)
- GWP Limit on Stationary Refrigeration Equipment
 - Discussion Topics – Seeking Stakeholder Input
- Next Steps and Anticipated Timelines

Background

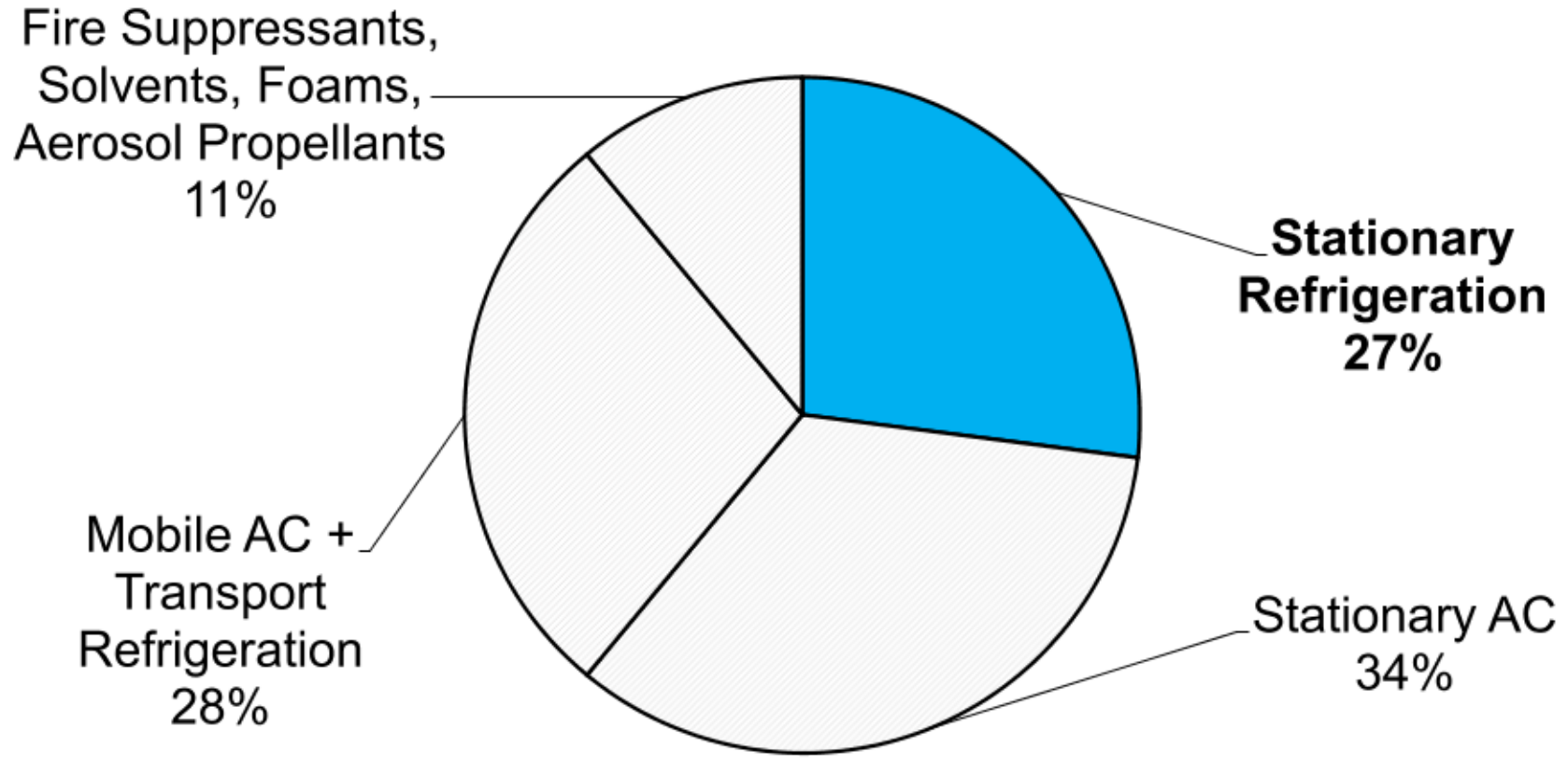
HFCs are the fastest growing greenhouse gases

- **Currently 4% of California GHG emissions** (Increasing to 10% by 2030 under BAU)
- **SB 1383 reduction goal: 40% below 2013 levels by 2030** (one-half of today's HFC emissions)



Source: CARB, 2018

Sources of HFC Emissions in California



Year 2018

Source: CARB, 2018

Majority of Emissions from Refrigeration and AC Sector



Proposed HFC Regulations

- **Proposed Equipment GWP Limits (Board Hearing, May 2020)**
 - **Stationary Refrigeration:** New equipment containing more than 50 lbs. of refrigerant, GWP < 150, starting January 1, 2022
 - **Stationary AC:** New Equipment, GWP < 750, starting January 1, 2023
- **Proposed Virgin Refrigerant Sales Prohibition (Separate Board Hearing, TBD)**
 - No sales, distribution, or import for use in California, of virgin refrigerants with a GWP of 1500 or greater (GWP threshold still under consideration)

Regulatory Process Overview

Rulemaking Overview



Stakeholder Meetings
and Public Workshops
Fall 2018 – 2019

45-day Comment Period
April – May 2020

Board Hearing
May 2020



Staff present regulatory concepts

Solicit stakeholder input

↓
**“Major”
Regulation
Econ
Analysis -
SRIA**

Staff publish proposal, costs, impacts, regulatory text in the Initial Statement of Reasons (ISOR or staff report)

Public may submit written or verbal comments on staff’s proposal to Board

Staff present proposal to Board

Board may accept proposal as-is or direct staff to make changes

Economic Analysis: Standardized Regulatory Impact Assessment (SRIA) Overview

- Required if estimated economic impact (costs and savings) exceeds \$50 million, i.e., “major” regulation
- Included in the economics chapter in the ISOR (released as part of the 45-day notice)

The SRIA includes:

- Direct Costs and Benefits to Businesses, Individuals, Environment
- Macroeconomic Impacts (jobs, investment, income) in California
- Fiscal Impacts
- Analysis of Regulatory Alternatives

CARB seeks and considers information given by stakeholders.

Proposed GWP Limit on Stationary Refrigeration Equipment

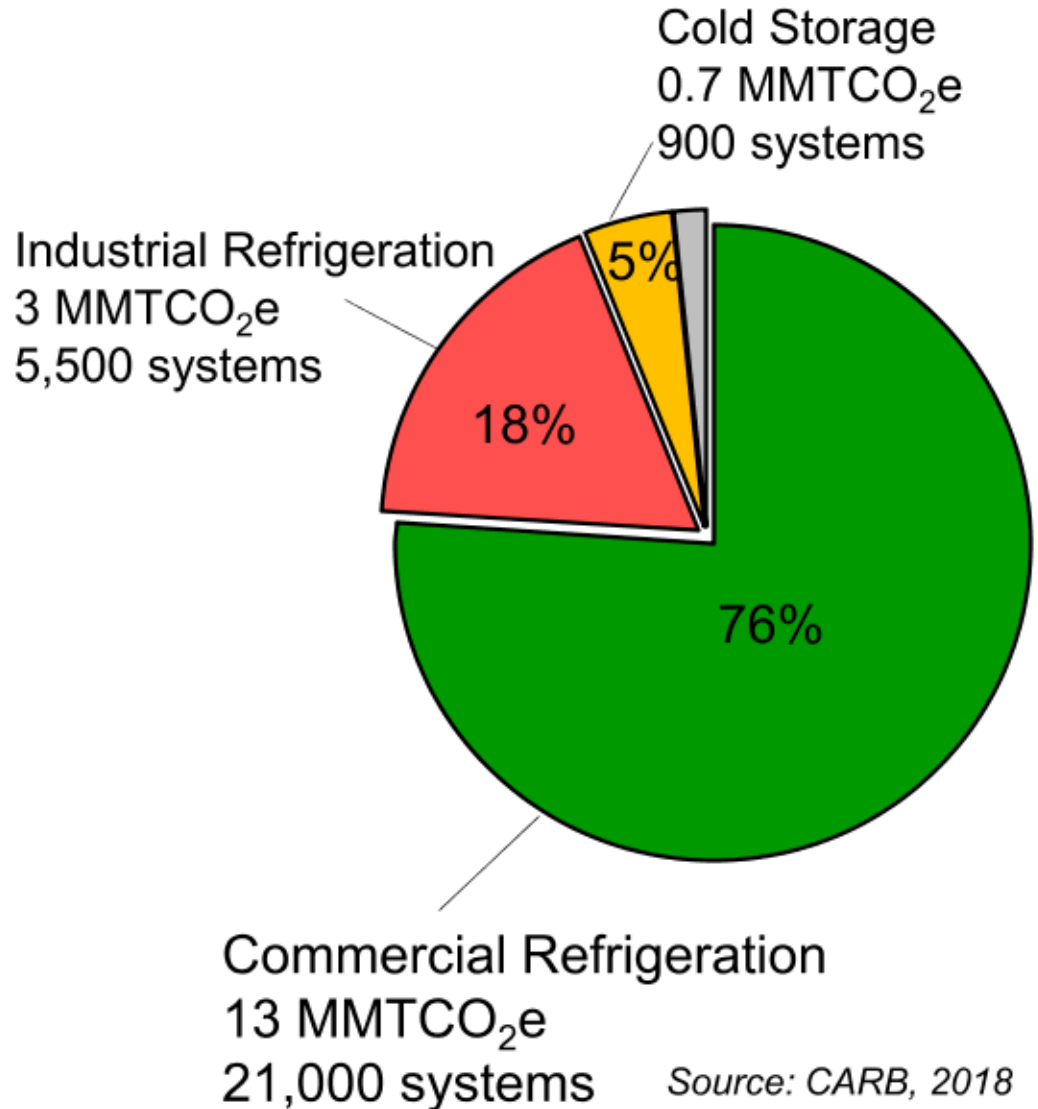
New equipment containing more than 50 pounds of refrigerant, GWP < 150, January 1, 2022

Affected End-uses

- Commercial Refrigeration – retail (supermarkets, grocery stores) + non-retail
- Industrial Process Refrigeration – manufacturing and/or processing
- Cold Storage – warehouses, packaging and storage facilities



Current HFC Use in Stationary Refrigeration > 50 lb. Systems in CA

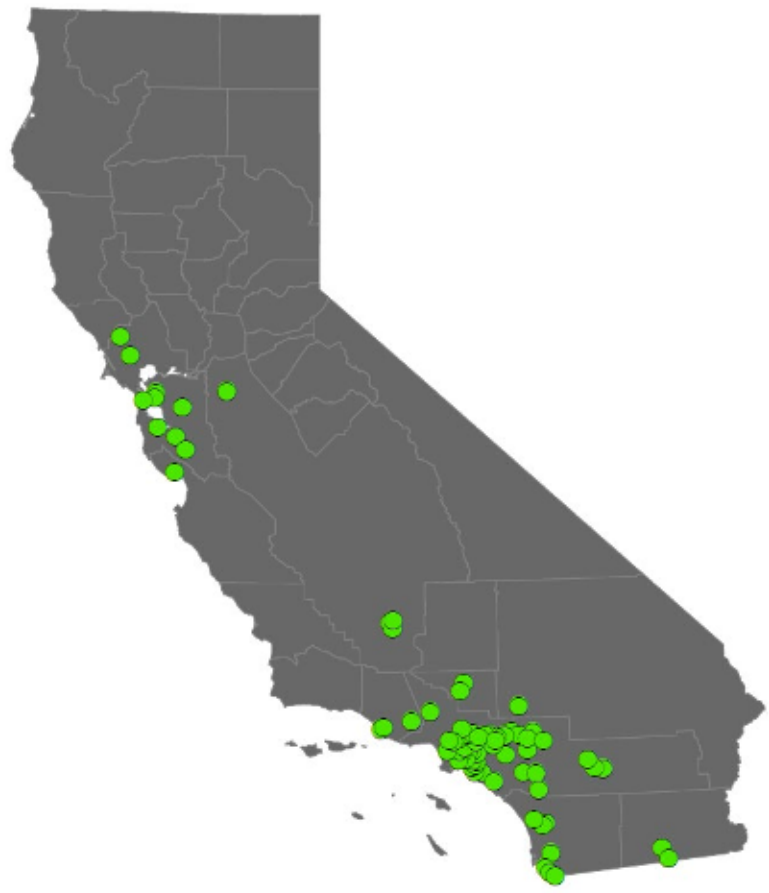


- RMP – largest systems reporting refrigerant purchase, use and leaks since 2012
- 6,600 facilities; ~28,000 systems
- Total banked refrigerant: 17 MMT CO_2e
- Average GWP: 2,700

Low-GWP options for Stationary Refrigeration



End-Use Sector	System Sizes	Low-GWP Options Currently Available
Supermarkets and grocery stores	Large (≥ 2000 lb)	t-CO ₂ , HC/CO ₂ , NH ₃ /CO ₂ , HFO?
	Medium (200 – 2000 lb)	
	Small (50 – 200 lb)	t-CO ₂ , HCs, HFO?
Cold storage warehouses, Industrial refrigeration	All Sizes	Majority already use NH₃ others: NH ₃ /CO ₂ , HFO?



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

Discussion Topics (Stakeholder Input Requested)

1. Economic Impacts
2. a) Enforcement Requirements; b) Definition of “New Refrigeration Equipment”
3. Feasibility of 150 GWP Limit for New and Existing Facilities
4. Feasibility of 750 GWP Limit on Refrigeration/Process Chillers
5. Regulatory Alternatives

Discussion Topics (Stakeholder Input Requested)

1. Economic Impacts

Data requested for SRIA:

- Growth rates of affected equipment
- Baseline costs – costs of traditional HFC systems (first + ongoing costs)
- Added costs – How much more does it cost for < 150 GWP systems compared to baseline?

End-user cost estimates will be discussed in this presentation

Commercial Refrigeration

Preliminary Cost Estimates (stakeholder input/reports)

- Supermarkets: 45,000 sq. ft. size, average charge 3,500 lb.
- Grocery stores: 15,000 sq. ft. size, average charge 1,000 lb.
- Other: Non-retail and other retail

End-Use	Equipment Costs \$		Installation Costs \$		Routine Maintenance \$/year		Refrigerant \$/lb.		Added Electricity \$/year
	Baseline	Added (%)	Baseline	Added (%)	Baseline	Added (%)	Baseline	Added (%)	
Supermarkets	600,000 to 1M	15% to 20%	250,000 to 450,000	-10% to +10%	5,000 to 7,000	TBD	5 to 10	-30% to -50%	Potential Savings
Grocery Stores	200,000 to 300,000		90,000 to 140,000		2,000 to 3,000				
Other	Baseline: 30% lower than retail Added: Same as above								

Industrial Process Refrigeration & Cold Storage Except Chillers

Preliminary Cost Estimates (stakeholder input/reports)



- Large Facilities, Average Refrigerant Charge 8,500 lb.
- Medium and Small Facilities: Average Refrigerant Charge 1,000 lb.

Facility Size	Equipment Costs \$		Installation Costs \$		Routine Maintenance \$/year		Refrigerant \$/lb.		Added Electricity \$/year
	Baseline	Added (%)	Baseline	Added (%)	Baseline	Added (%)	Baseline	Added (%)	
Large	800,000 to 1.2M	15% to 20%	200,000 to 300,000	-10% to +10%	5,000 to 7,000	TBD	5 to 10	-30% to -50%	-10% to -20%
Medium and Small	200,000 to 400,000		50,000 to 100,000		2,000 to 3,000				

Discussion Topics (Stakeholder Input Requested)

2a. Enforcement Requirements

Enforcement Requirements

Manufacturers

- Recordkeeping
- Date and refrigerant type included on label

MODEL FAMILY: _____ RL	DATE 01/16/2001	60 HZ
LIGHT CIRCUIT: _____	120 VOLTS	3.30 AMPS
DEFROST HEATER CIRCUIT: _____ 1 PH	208 VOLTS	22.80 AMPS
ADDITIONAL CONDENSATE HEATERS: _____	120 VOLTS	5.80 AMPS
FAN CIRCUIT (MAY INCLUDE CONDENSATE HTRS.): _____	120 VOLTS	2.50 AMPS
MINIMUM FAN CIRCUIT AMPACITY: _____		2.50 AMPS
MAXIMUM FAN CIRCUIT OVERCURRENT PROTECTION: _____		20.00 AMPS
REFRIGERANT: R507	LOW SIDE DESIGN PRESSURE:	200 PSIG

FOR SINGLE POINT CONNECTION – ADD LIGHT AMPERE AND ANTI – CONDENSATE AMPERE VALUES TO FAN CIRCUIT MINIMUM AMPACITY, IF THE TOTAL VALUE IS 16 AMPERES OR LESS, THEN THIS APPLIANCE MAY BE WIRED TO ONE 20 AMPERE NEC BRANCH CIRCUIT.

MADE IN THE
U.S.A.
2215 – 0399760

End-users

- One-time registration for <150 GWP facilities in RMP (no fee)

Q. Any challenges?

California Environmental Protection Agency
Air Resources Board

ARB RMP Home Page

R3 Home Reports & Forms Contact FAQ Survey Test Your XML Help

Welcome to Refrigerant Registration and Reporting System (R3)

Welcome to the Refrigerant Registration and Reporting System (R3). The R3 is a web-based tool for implementing the registration, reporting, and fee payment provisions of ARB's Refrigerant Management Program (RMP). In addition, the R3 offers the public a means to view select preformatted reports of refrigerant emissions. The R3 can be conveniently accessed on any computer with an internet connection.

The RMP is California's regulation for stationary, non-residential refrigeration systems using more than 50 pounds of a high global warming potential (high-GWP) refrigerant. The RMP seeks to reduce emissions of high-GWP refrigerants from leaking refrigeration equipment and the installation and servicing of refrigeration and air-conditioning appliances.

At the top of this page are links to the general ARB home web page and the home page of the RMP. Below that, on the red tab bar are links to preformatted reports and forms, important contacts for the RMP, and answers to frequently asked questions.

[RMP R3 Registration Check List](#) (information you will need before registering)

LOGIN

USERNAME:

PASSWORD:

(case-sensitive)

[Can't Access my Account?](#)

Companies with facilities with refrigeration systems, distributors, wholesalers, and reclaimers must first setup a user account and company profile in order to use R3.

[Sign Up for New Registration](#)

Discussion Topics (Stakeholder Input Requested)

2b. Definition of “New Refrigeration Equipment”
in Regulatory Text

Current definition of “New Refrigeration Equipment” in CARB’s 2018 Regulation¹:

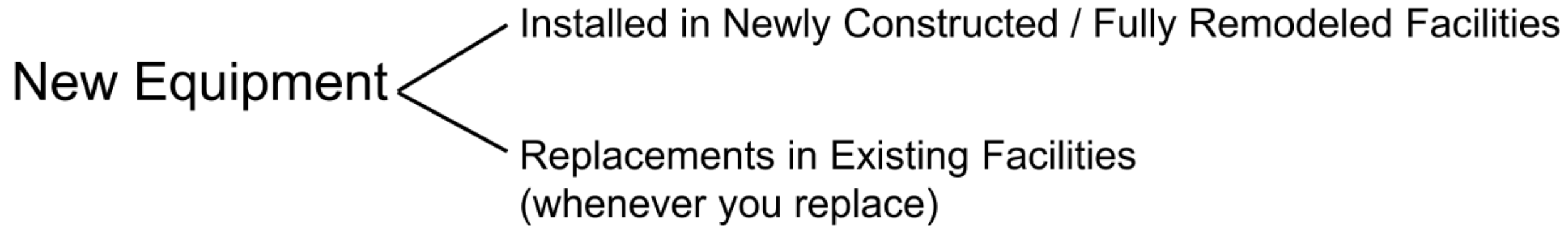
- (1) Any refrigeration equipment that is **first installed using new or used components**;
- or
- (2) Any refrigeration equipment that is **modified** such that it is: (i) Expanded after the date at which this subarticle becomes effective, to handle an expanded cooling load by the addition of components in which the **capacity of the system is increased**, including refrigerant lines, evaporators, compressors, condensers, and other components; or (ii) Replaced or cumulatively replaced after the date at which this subarticle becomes effective, such that the **capital cost of replacing or cumulatively replacing components exceeds 50 percent of the capital cost of replacing the entire refrigeration system.**

Q. Will this definition work for this proposed regulation?

¹ <https://ww2.arb.ca.gov/rulemaking/2018/high-global-warming-potential-refrigerant-emissions-reductions-regulation>

Discussion Topics (Stakeholder Input Requested)

3. Feasibility of 150 GWP Limit for New and Existing Facilities



Why is this important?

e.g., ~4,000 supermarkets in CA; New construction: Only 1 – 2% per year
Most of the new systems will go into existing stores

Q. Feasibility of low-GWP systems in existing stores, for all system sizes > 50 lb.?

Discussion Topics (Stakeholder Input Requested)

4. Feasibility of 750 GWP Limit on
Refrigeration / Process Chillers

4. Regulating New Process Chillers

- Approx. 50% of all registered IPR systems are chillers; 6 refrigerants are used in > 90% of all chillers
- AC chillers: Proposed 750 GWP limit, Jan 1, 2024; Benefit – provides clarity and uniform direction to industry

Refrigerant Type	R-22	R-134a	R-123	R-410A	R-404A	R-507
% Chillers using Each Refrigerant	34%	25%	11%	9%	9%	4%
< 750 GWP Alternatives	Ammonia / CO ₂	R-513A, R-450A, R-1234ze(E)	R-1233zd(E), R1224yd(Z), R-514A	R-32, R-452B, R-454B, R-466A,	Ammonia?	Ammonia?

Q. Any challenges with a GWP limit of 750 on process chillers?

Discussion Topics (Stakeholder Input Requested)

5. Regulatory Alternatives

Stakeholder Input Requested

Anticipated Timeline and Next Steps

Next Steps and Anticipated Timelines

Stationary Refrigeration Equipment	
Public workshops and Stakeholder meetings	1 st workshop: October 2018
	Meetings by request (Oct 2018 – present)
	Technical Working Group: August 6, 2019
	2 nd Workshop: Fall 2019
Staff Report (ISOR)	March/April 2020
Board Meeting	May 2020
Regulation Effective Date	January 1, 2022

To consider your input on the cost data in our economic analysis, we need your feedback by **September 1**

Incentive Funding

SB 1013 establishes an incentive program to promote adoption of “new refrigerant technologies” (i.e., low and lower-GWP)

- **\$1 million recently allocated in the FY 19-20 budget**
- Design the incentive program
 - ❖ Subject to CA Climate Investment Requirements
 - ❖ Benefit low income and disadvantaged communities
 - ❖ Stakeholder input welcome
- Will be discussed in a separate meeting



Image source: Depositphotos.com

Feedback and Questions – Contact Us

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For more information, please visit:
<https://ww2.arb.ca.gov/our-work/programs/stationary-hydrofluorocarbon-reduction-measures>

