

Technical Working Group Meeting: Stationary AC Rulemaking

March 6, 2019

9:00 am to 11:30 am

Training Room 1



Outline

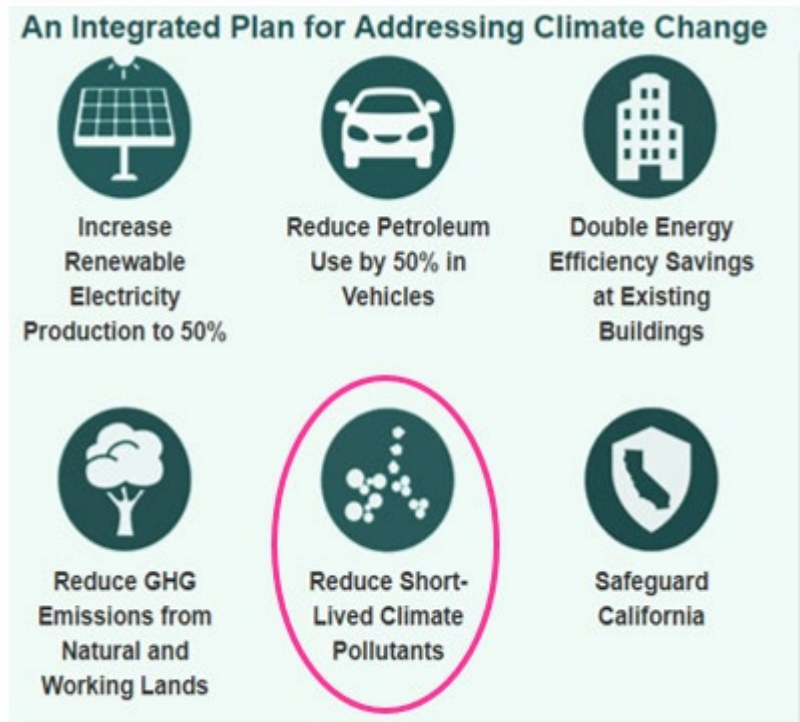
- Background
- Proposed GWP Limit and Date
- Enforcement
- Economic Analysis
- Timeline and Next Steps

Background

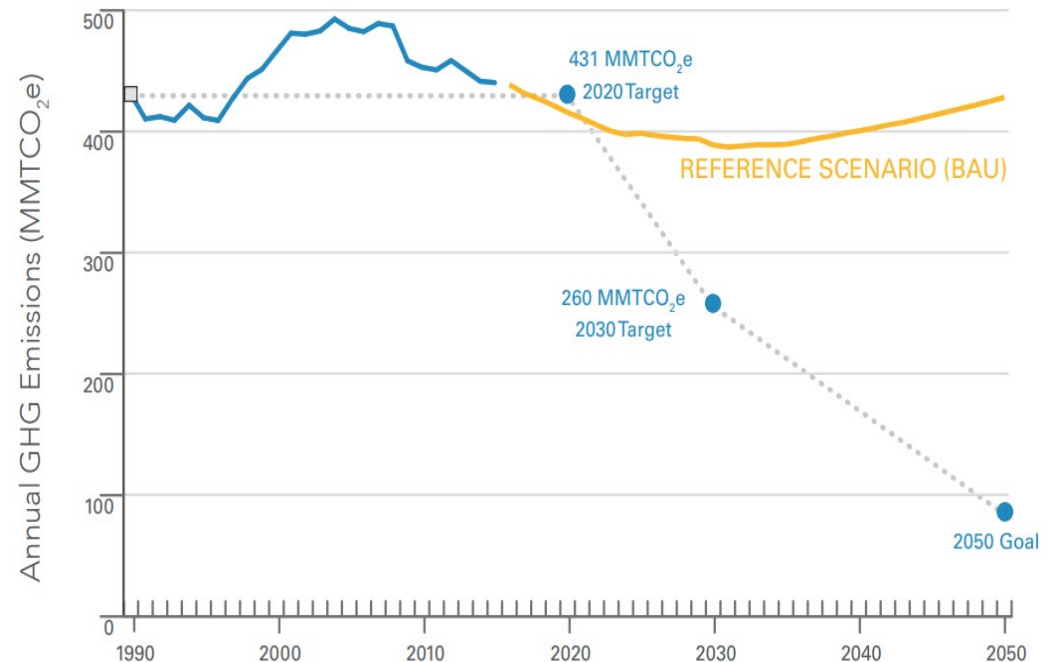
- California's Climate Targets
- Emissions from the Stationary AC Sector
- CA SNAP Adoption
- Industry Commitment

California Climate Targets and HFCs

- **SB 32** – Reduce GHG emissions 40% below 1990 levels by 2030
- **EO B-55-18** – Carbon Neutrality by 2045
- **SB 1383** – Reduce HFC emissions 40% below 2013 levels by 2030



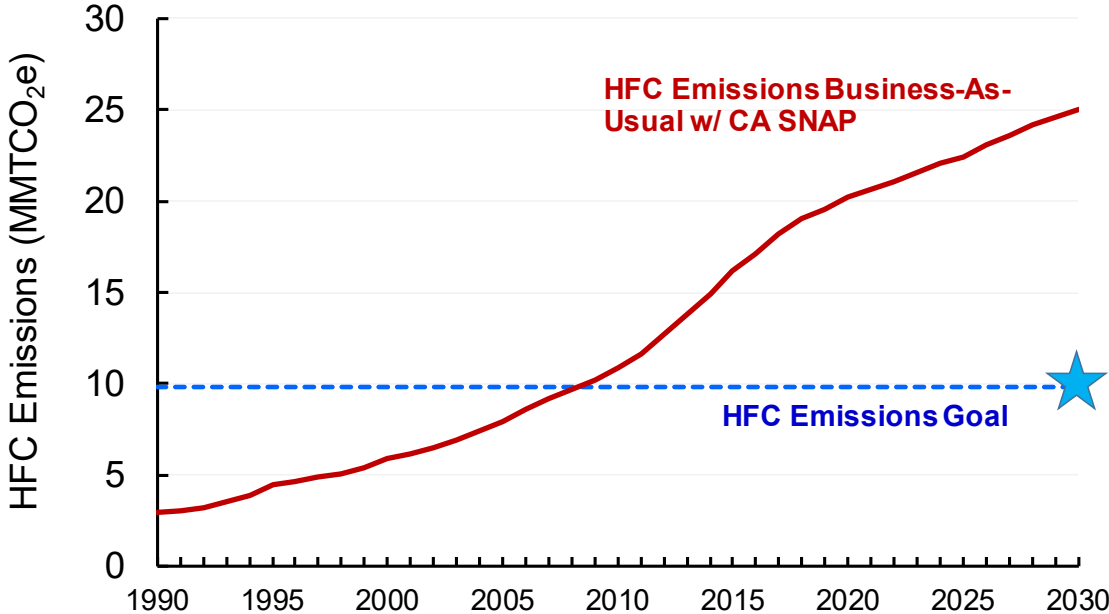
[Source: <https://www.climatechange.ca.gov/>]



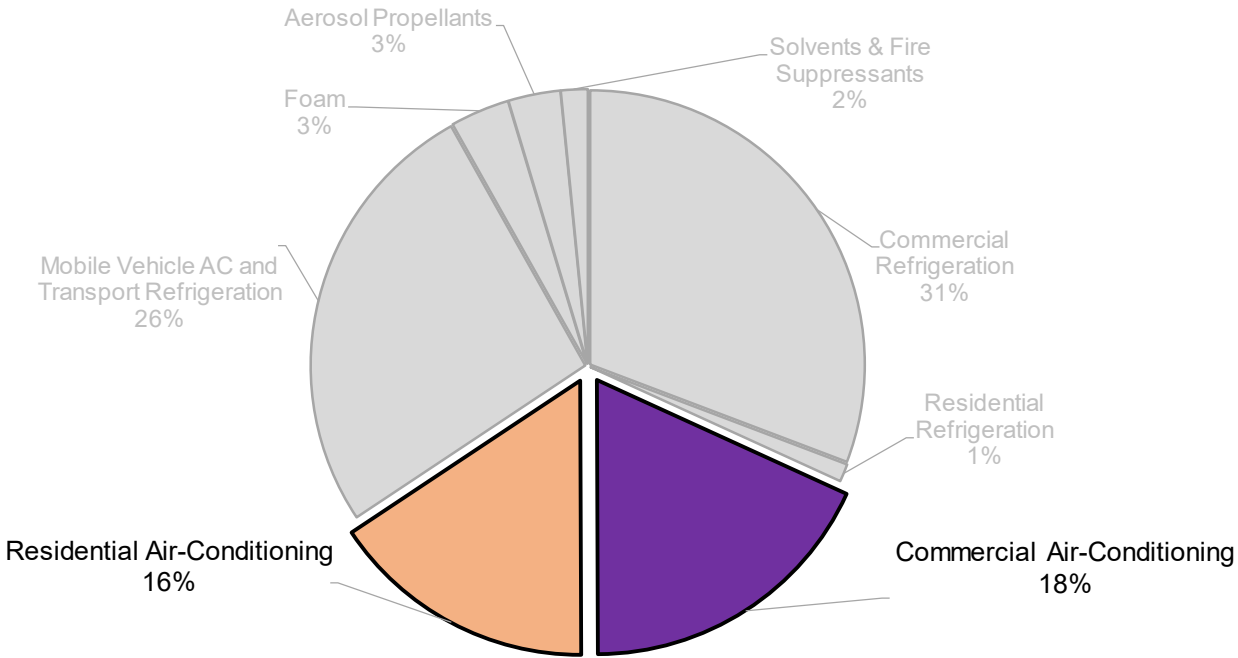
[Source: CARB 2017. California's 2017 Climate Change Scoping Plan]

HFC Emissions from Air Conditioning

HFC Emissions in California (Million Metric Tonnes of Carbon Dioxide-Equivalents) with CA SNAP Measures in Place



2017 Hydrofluorocarbon Emissions in California by Source (19.7 million metric tons CO₂-equivalents)



[CARB F-Gas Inventory, 2018]

Adoption of SNAP Prohibitions in California

CARB Regulation

- Retail Food End-Uses
- Vending Machines
- 5 Foam End-Uses



*Recordkeeping and
Disclosure Requirements*

CA Cooling Act (SB 1013)

- Retail Food End-Uses
- Vending Machines
- *All Foam End-Uses*
- *Chillers*
- *Cold Storage Warehouses*
- *Aerosols*

Effective January 1, 2019

Industry Coalition and NRDC Agree to < 750 GWP by 2023



September 14, 2018

Chair Mary Nichols
California Air Resources Board
1001 I Street
PO Box 2815
Sacramento CA 95812

Dear Chair Nichols,

The signatories to this letter support pragmatic, predictable, and cost-effective measures that allow the California Air Resources Board (CARB) to meet the state's hydrofluorocarbon (HFC) emissions reductions target as defined in California Senate Bill 1383 – a 40 percent reduction in 2030 from 2013 levels. The following measures provide industry with certainty and sufficient time to comply with the new obligations.

We support policies to limit use of HFCs in air conditioning technologies provided they include the following. CARB should:

- Implement California Senate Bill 1013 limits on HFCs in air conditioning technologies, namely the bans on certain refrigerants in building chillers in 2024.
- Adopt an additional regulation prohibiting refrigerants with a global warming potential (GWP) in excess of 750 in all new air conditioners of all other types and capacities, excluding those covered by SB 1013, starting January 1, 2023. Implement this prohibition based on the date of manufacture, with a sell-through period of six (6) months.
- Allow the distribution of products from California to other states in which they are legal for sale in cases in which California's regulations differ from those of other states.

In addition to supporting the policies above, we also:

- Support robust enforcement and strong disincentives for non-compliance for HFC measures.

Signed by:

- National trade group representing equipment and chemical manufacturers, American Heating & Refrigeration Institute (AHRI)
- Natural Resources Defense Council (NRDC)
- Six major manufacturers
- Two major chemical companies

Proposed GWP Limit and Date

§ XXXX. Sales Prohibition for New Stationary Air Conditioning Systems

(a) Equipment Sales Prohibition. On or after January 1, 2023, no person shall sell, offer for sale, install, use, or enter into commerce, in the State of California any new air conditioning system that either contains or is designed to use a refrigerant with a global warming potential (GWP) value greater than or equal to 750^a.

^a*100-Year GWP Values, IPCC AR4*

End-Uses Affected

- **ALL** types of stationary AC and Heat Pumps (HP):
 - Room and Portable AC
 - Packaged Terminal AC/HP (PTAC/PTHP)
 - Single Package Vertical AC/HP (SPVAC/HP)
 - Central AC/HP (ducted and ductless)
 - Commercial AC/HP
 - Variable Refrigerant Flow (VRF) AC/HP
 - Dedicated/High outdoor air system (DX-DOAS/DX-HOAS)
 - **Computer Room AC**
 - **Dehumidifiers**

<750 GWP by 2023

- **Chillers**] **GWP limit in 2024?**

Enforcement

- How should new equipment be defined?
- Should CARB set a GWP limit for chillers?
- Sell through period?
- What mechanism(s) best support enforcement?

How should “New AC Equipment” be defined?

- New Construction
- **Modified Systems**
 - What about when major components are replaced or added?
 - Should repairs over a certain cost trigger reclassification as “new”?

Should CARB set a GWP limit for chillers (2024)?

- SB 1013 banned specific high-GWP HFCs for **new** chillers starting **2024**
- Should CARB add a GWP limit for chillers for 2024?
 - What GWP limit? 750?
 - What types of chillers?

HFC-134a
GWP 1430



R-410A
GWP 2088



R-407C
GWP 1744



R-404
GWP 3922



Should there be a sell through period?

Options:

- No sell through period?
- 6-month sell through period?
- 1-year sell through period?
- Or, allow equipment manufactured before the effective date?

Equipment Distribution

- Is production largely in the US?
- How many OEMs have manufacturing facilities in CA?
- What is the sales pathway from OEM to end-user in CA?
 - OEM → Distributor (CA) → Contractor → End-User
 - OEM → Online Retailer → End-User

What Mechanism Best Supports Enforcement?

- Labeling
- Disclosure
- Recordkeeping
- Reporting
- Other?

Labeling

- **Are the Existing Labeling Requirements Sufficient?**

- Refrigerant Type
- Model and Serial Number → Date

- **Additional Labeling Requirements?**





- *“CA HFC Compliant” or “CA Compliant CCR XXXX”*

- **What are the costs associated with labeling?**

- **What are OEM’s plans for labeling new A1/A2L equipment?**

Model and Serial Number →

Refrigerant →

M/N 13HPX – 048 – 230 – 18			
S/N 1913H18804			
CONTAINS HFC – 410A		DESIGN PRESSURE	
FACTORY CHARGE		HI	446 PSIG
9 LBS 11 OZS		LO	236 PSIG
ELECTRICAL RATING		NOMINAL VOLTS: 208/230	
1 PH	60 HZ	MIN 197	MAX 253
COMPRESSOR		FAN MOTOR	
PH	1	PH	1
RLA	21.8	FLA	1.7
LRA	99.0	HP	1/4
MIN. CKT. AMPACITY AMPERAGE MINIMUM	28.8	MAX FUSE OR CKT. BKR. FUSIBLE/COUPE CIRCUIT (HACR PER NEC)	
50			
			
1913H18804			
			
Listed Small HP AHRI Standard 219/240		Intertek 4002783	
		CONFORMS TO UL STD 1995 CERTIFIED TO CSA STD C22.2 NO. 234	
		FOR OUTDOOR USE	
			
		9 - 16105F-18	

Disclosure

- **Language for Manual or Website:**
 - *“The refrigerants R-410A, HFC-134a, R-407A, R-407C and other refrigerants used in air conditioning systems which are highly impactful on the climate are prohibited from use in new air conditioning equipment in the State of California as of January 1, 2023...”*
- **What are the costs associated with the proposed disclosure?**

Recordkeeping

- **Who is required to keep records?**
- Any person who sells new equipment → OEMs and Distributors?
- **What records must be kept?**
 - a) Name and address
 - b) Telephone number or email
 - c) Model and serial number
 - d) Date of manufacture
 - e) Date of sale
 - f) Refrigerant type(s)
 - g) Charged amount or full charge capacity of the equipment

Reporting

- **Who is required to report?**
 - Any person who sells new equipment → OEMs and Distributors?
- **What are the costs associated with reporting?**

What are the costs associated with this proposed regulation?

- CARB Economic Analysis
- AHRI Survey
- Data Sources
- CA Specific Product Lines
- How much more will equipment cost to buy?
- How much more will equipment cost to install?
- How much more will equipment cost to maintain?

Economic Analysis at CARB

- CARB is required to analyze the economic impact of proposed regulations on Californians and the California economy
- For major regulations, the economic analysis is contained in the Standardized Regulatory Impact Assessment (SRIA) (required by SB 617) and released two months prior to the Initial Statement of Reasons (ISOR)
- The economic analysis will also be included in the economics chapter in the ISOR and released as part of the 45 day notice
- CARB considers information supplied by stakeholders and interested parties
- Some of the considerations the SRIA will quantify include:
 - Costs and benefits to businesses, individuals, and the environment
 - Macroeconomic effects (GDP, jobs, investment, income) in California
 - Costs or benefits to State and Local government agencies
 - Costs and benefits for regulatory alternatives

How much more will equipment cost to buy? (5-15%?)

- **Costs to OEMs → Cost to end-users**
- **Average Cost \$21M per OEM**
- **Design Change**
 - Change of refrigerant
 - Component compatibility
 - New Production Line
 - Additional Safety Features (sensors for A2Ls)
 - Transportation Cost
 - California market
- **What percent of OEM cost goes to R&D, labor, equipment?**
- **Will OEM costs be recouped in the first 2-5 years?**
- **Learning curve—how many years for the cost to go down?**

How do these Costs Vary by Equipment Type?

- Self Contained (room/portable) – **0 to 1%**
- PTAC/PTHP – **1 to 2%**
- Central AC/Heat Pumps (<65,000 Btu/h) – **5 to 15%**
- SPVAC/HP – **5 to 15%**
- Commercial AC/HP ($\geq 65,000$ Btu/h) – **5 to 15%**
- Computer Room AC – **5 to 15%**
- Dehumidifiers – **?**

How much more will equipment cost to install? (5-10%?)

- Technician training (A2Ls)
- Different tools for technicians (e.g. non-sparking)
- Infrastructure changes (ventilation)
- Longer installation times
 - New technology
 - Extra steps for A2Ls

How much more will equipment cost to maintain?

- Sensor lifetime?
- Additional leak checks/inspections?
- Cost compatible versus more expensive refrigerant?

AHRI Survey Response

AC Equipment Category ¹	Cooling Capacity (Btu/h)	Refrigerant ²	Current Equip. Cost for End-Users	<750 Refrigerant ²
Split System AC/HP	24k-65k	R-410A	?	R-32, R-452B, and R-454B
Single Package Unit AC/HP	35.8k-165k	R-410A	?	<div style="border: 1px solid blue; padding: 5px; display: inline-block;"> <p style="margin: 0;">\$3,000 - \$9,000</p> <p style="margin: 0;">50% A2L, 50% A1</p> </div>
Ductless – Single and Multi Split	22k-65k	R-410A	?	
Commercial package AC/HP – single package and split	18k-760k	R-410A and R407C	\$2,049 - \$90,000 Average: \$26,142	
DX-DOAS	14k-760k	R-410A	\$12,470- \$57,192 Average: \$24,102	

¹Other categories not listed here include: Room AC, Portable AC, PTAC, PTHP, SPVAC/HP, VRF, Computer Room AC, DX-HOAS and Dehumidifiers

²R-410A and R-407C are \$2.40 - \$9.05 per pound; ~\$3.00 on average.

California Specific Product Lines

- 2023 aligns with DOE standard timelines (align redesign)
- What are you doing that is over and above DOE redesign?
- In 2023, how much more will equipment cost in CA compared to other states?
- Will added efficiency from refrigerant help meet DOE standards for 2023?

AC Sales to California

- **Are sales to CA proportional to population? (12% US sales)**
- **Are shipments a good proxy for sales to CA?**
 - What percent of shipments to CA are sold in CA?
 - What percent of shipments are for replacements vs. new construction?

Data Sources for Economic Analysis

- AHRI Survey Data
- AHRI Shipment Data
- DOE Technical Support Documents
- CEC Technical Support Documents
- 2018 AHRI Report, “Consumer Cost Impacts of U.S. Ratification of the Kigali Amendment”
- US Census Bureau
- Energy Information Administration

Timeline and Next Steps

- Future Technical Stakeholder Meetings
- Draft Regulatory Text
- CARB's Economic Analysis
- Notice Package (Fall 2019)
- December 2019 Board Hearing

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