



CALIFORNIA REPUBLIC



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**California Air Resources Board**

**Open Discussion on HFC Emissions Reductions Strategies**



*California Environmental Protection Agency*

**AIR RESOURCES BOARD**

June 7, 2017

# Open Discussion Overview

- Open back and forth dialogue encouraged
- ARB is requesting information/data on low-GWP refrigeration and AC to help with potential rule-making
- Your issues and concerns are welcome
- Feel free to request one-on-one talk with ARB

## Overview (continued)

1. Proposed HFC Reduction Measures
2. Ice-breaker multiple choice questions
3. Open-ended issue questions from ARB
4. Stakeholder-directed questions, comments, and feedback for ARB

- **Regulations adopted under AB 32:**
  - Refrigerant Management Program
  - Motor Vehicle AC: Advanced Clean Cars low-GWP AC, and Small Can Recycling for DIYers (now national)
  - Consumer product aerosol propellants
  - Semiconductor manufacturing F-gas reductions
- **Cap-and-Trade offset protocol** for ODS capture and destruction

# New Law in CA Requires HFC Reductions

- Senate Bill 1383 (2016) requires a 40 percent reduction in annual HFC emissions below 2013 levels by 2030
- The Short-Lived Climate Pollutant (SLCP) Strategy adopted March 2017 by CA Air Board includes four measures to reduce HFCs

# Proposed HFC Reduction Measures in CA

1) Incentive program (\$\$) for new low-GWP refrigeration. Status: Only utility rebates available. Sacramento Utility SMUD offers \$250K

2) HFC Phasedown in CA. Status: Will defer to the global phasedown

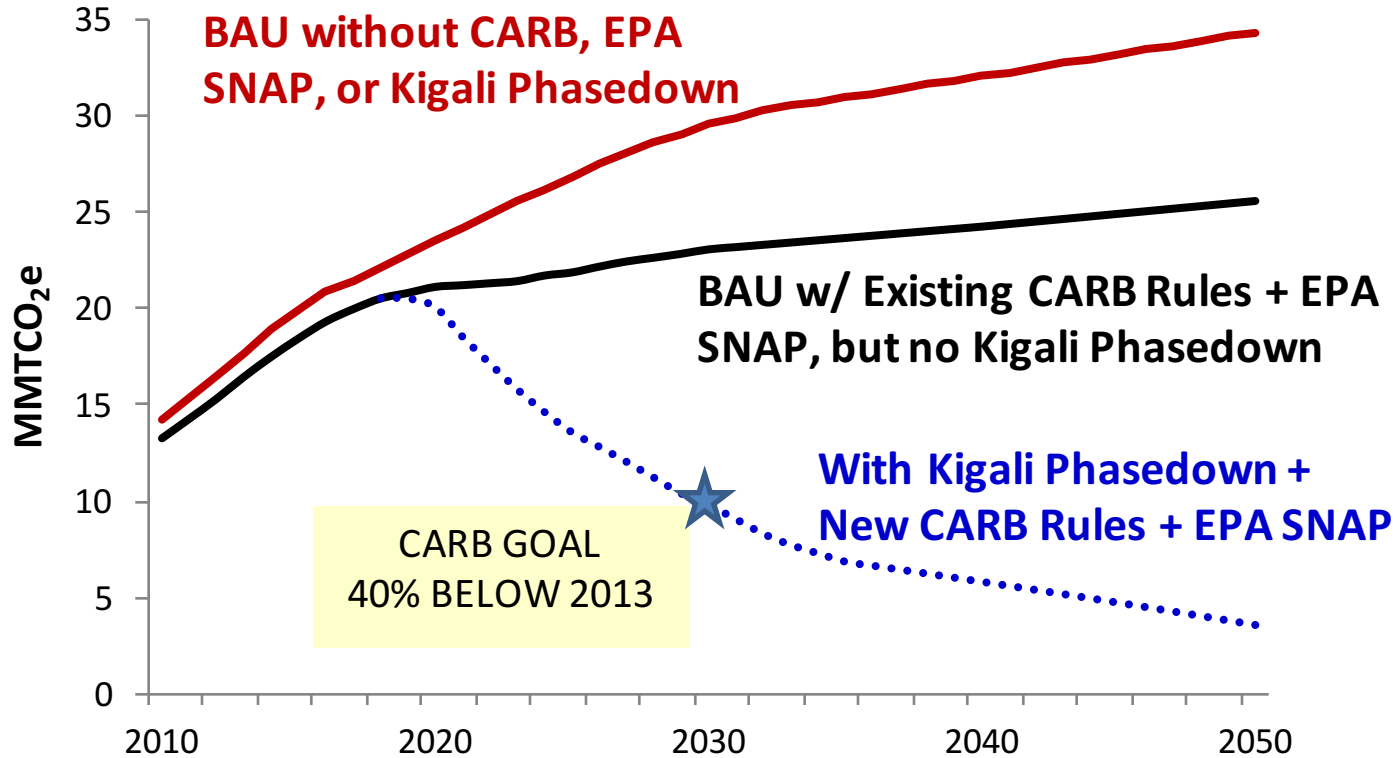


Flag of Rwanda

3) Prohibition on refrigerants > 150 GWP in new refrigeration equipment; and > 750 GWP in new air-conditioning equipment

4) Sales restriction on refrigerants > 2500 GWP; four years later, restriction on > 1500 GWP

# Estimated HFC Emissions in CA 2010-2050





- Low-GWP “energy penalty” concerns – better energy efficiency data needed for CA climate zones
- If added cost of low-GWP equipment is 15% greater on average, cost of regulation (before savings) in California could be \$150 million/year through 2030 (savings also  $\approx$  \$150 million/year) – better cost data needed
- Low-GWP feasibility for “smaller” units ( $>150$  grams), convenience store-sized remote condensing units, and larger – strategies to overcome barriers from codes, standards, and local permitting
- Are HFC-32 (GWP 675) and HFO-HFC blends (GWPs 400-700) the lowest-GWP refrigerants feasible for stationary air-conditioning?

# ARB Next Steps

- ARB currently assessing global phasedown impact on future CA HFC reductions, under scientific review, available to public Fall 2017
- Work with all interested parties to develop regulations to meet HFC reduction targets
- Needed: Feedback on cost, energy efficiency, codes/permitting barriers, and more on low-GWP refrigeration and AC

- Ongoing: Work on codes and standards updates allowing more low-GWP options
- Official Notice of HFC rulemaking – Summer 2017
- Workshops and public input 2017 – 2018
- Board Approval 2018-2019

# Multiple Choice Feedback for ARB

# 1. Should California pursue its own HFC reduction measures, in addition to the U.S. EPA SNAP Program and the global HFC phase-down?

- A. Definitely.
- B. Yes, if it's not too costly.
- C. No.
- D. Definitely not, defer to U.S. EPA and global HFC phasedown for reductions.

**2. California has proposed a ban on refrigerants with a GWP > 150 in new equipment. Please complete the following: “The GWP value of 150 is \_\_\_\_\_”.**

- A. Too low, should be more flexible.
- B. Too high, should be lower.
- C. About right.
- D. It depends upon the type of refrigeration equipment.

### 3. If a high-GWP refrigerant prohibition is mandated for refrigeration, what year should it start for new equipment?

- A. 2020 or earlier.
- B. 2021.
- C. 2022.
- D. 2023 or later.
- E. Depends upon the type of equipment.

**4. Stationary air-conditioning: California has proposed a ban on new refrigerants with a GWP > 750 in new equipment. Complete the following: The GWP maximum of 750 is \_\_\_\_\_”.**

- A. Too low, should be more flexible.
- B. Too high, should be lower.
- C. About right.
- D. It depends upon the type of air-conditioning equipment.



**5. If a high-GWP refrigerant prohibition is mandated for stationary AC, what year should it start for new equipment?**

- A. 2022 or earlier.
- B. 2023.
- C. 2024.
- D. 2025 or later.
- E. Depends upon the type of equipment.

**6. If a California sales restriction is placed on refrigerants with very-high GWPs (> 2500 followed by > 1500), in your opinion, what would be the most likely outcome:**

- A. Significant retrofits or early retirement of equipment leads to lower-GWP refrigerants used.
- B. Minimal impact, technicians will use stockpiled and surplus refrigerant.
- C. The refrigerant not used in California will just be used somewhere else (“leakage”).
- D. Widespread non-compliance: technicians buy the refrigerant out-of-state.

## 7. Should new refrigeration equipment containing between 1 and 50 pounds (0.45 to 22.7 kg) refrigerant charge be exempt from the low-GWP requirements?

- A. Definitely yes, it would be a burden to small businesses and it's not currently feasible.
- B. Yes, but only if the equipment is hermetically sealed or factory-filled (low leak rates).
- C. Yes, but only until such time as low-GWP reaches cost parity for these systems and codes and standards allow greater amounts of flammable refrigerants.
- D. No, low-GWP is feasible for all stationary refrigeration applications.

**8. The Kigali Amendment will increase the use of natural refrigerants. What is the most likely impact on natural refrigerant prices (CO<sub>2</sub>, ammonia, hydrocarbons)?**

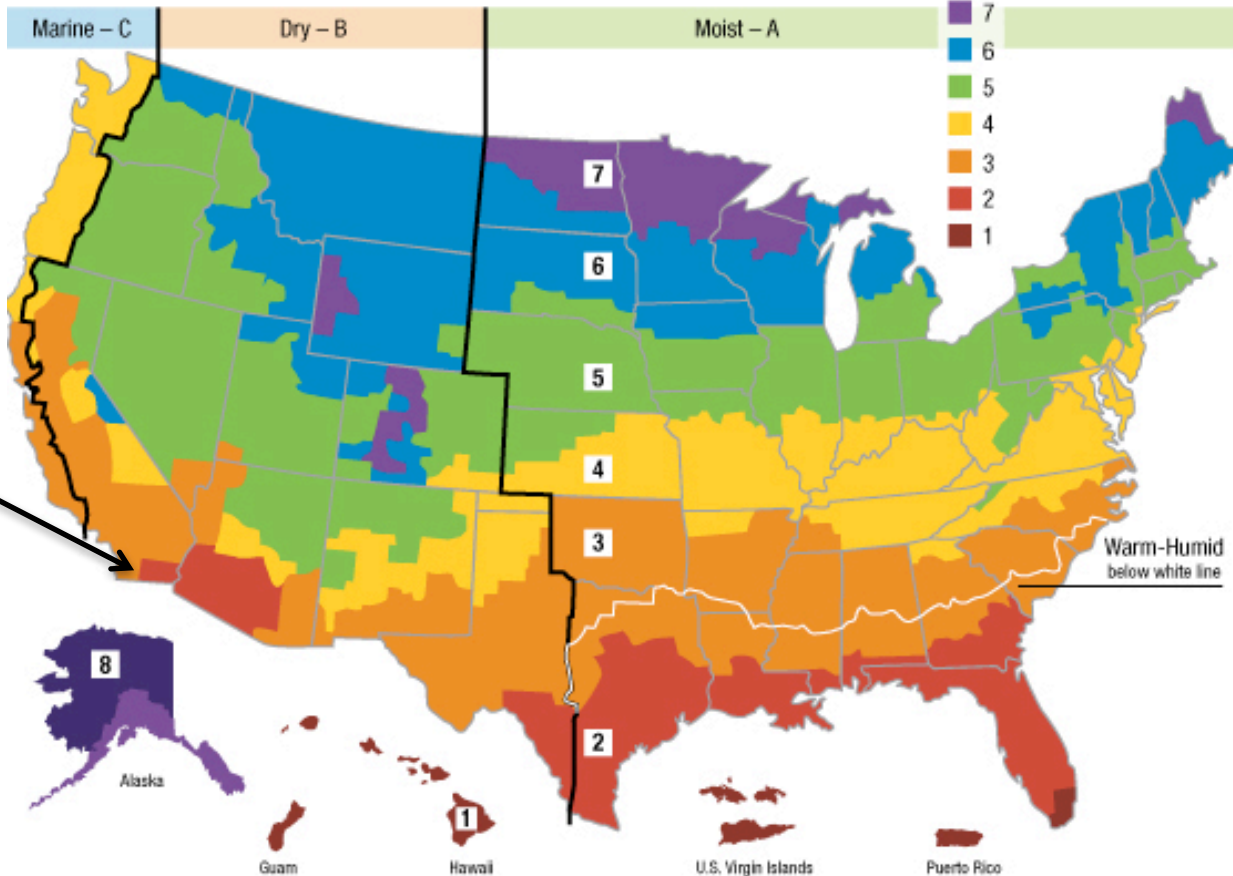
- A. Prices will increase due to higher demand.
- B. Prices will decrease due to greater production.
- C. Prices will stay about the same, neither increasing nor decreasing.

**9. CARB is evaluating allowing a small central charge of HFC or HFO-HFC refrigerant < 1500 GWP to cool a larger charge of refrigerant/heat transfer fluid, as long as the total average weighted GWP of all refrigerant/heat transfer fluid is < 150 GWP. In your opinion:**

- A. The allowance is not necessary because all low-GWP is feasible.
- B. The allowance should be provided only in the hottest climate zones of the state.
- C. The allowance should be provided to the entire state.

# Climate Zone Map

Climate Zones



**California's  
Hottest  
Climate Zone**



Warm-Humid  
below white line

**10. In the preceding climate zone map, DOE states that the hottest Climate Zone 2 in California is not ready for transcritical CO<sub>2</sub> with no energy penalty. Should this region of California be exempt from the 150 GWP limit if the local agencies do not allow ammonia?**

- A. Yes, they should be exempt.
- B. No, they can still use a hybrid system (HFC + low-GWP).
- C. No, CARB should work with local permitting agencies to educate them on ammonia safety to update their policy.
- D. No, by the time the regulation begins more than 3 years from now, technology improvements will move the “CO<sub>2</sub> equator” further south and all of CA will be north of the CO<sub>2</sub> equator.

## 11. If low-GWP regulations are enacted in CA, how far will California's influence reach on the greater adoption of low-GWP refrigeration in the next five to ten years?

- A. Only California will be affected.
- B. In California and eventually the rest of the U.S.
- C. Will influence the North American countries of U.S., Canada, and Mexico.
- D. Globally, because experience in the high ambient temperature climate zones in California will inform other high ambient temperature countries.



## **12. List in order of greater to lesser importance, the following actions California can do to influence global HFC reductions:**

- A. Provide financial incentives for low-GWP refrigeration prior to any regulations.
- B. Prohibit high-GWP refrigerants in new cooling equipment.
- C. Restrict the sales of very high-GWP refrigerants.
- D. Actively engage in codes and standards committees to update the allowable charge sizes of flammable refrigerants.

# Open-Ended Discussion on Issues Brought up by Stakeholders + ARB Requests for Data

# Issues and Questions from Stakeholders and ARB Data Needs Request

The two main questions  
on Low-GWP:

Energy Efficiency?

Cost?



## Issues and Questions from Stakeholders and ARB Data Needs Request

Why Set a Specific GWP Limit? Why not set a performance standard for “total carbon footprint” of the refrigeration or AC system? (Energy + Leaks)

(ARB needs more information for a GHG-emissions-based performance standard – what might this look like?)

# Issues and Questions from Stakeholders and ARB Data Needs Request

What's the best way to educate local permitting agencies on the safety of low-GWP refrigerants?



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