



California Environmental Protection Agency

**AIR RESOURCES BOARD**

# ARB Update on HFC Emissions Reductions Efforts

California Air Resources Board



May 2017  
Glenn Gallagher

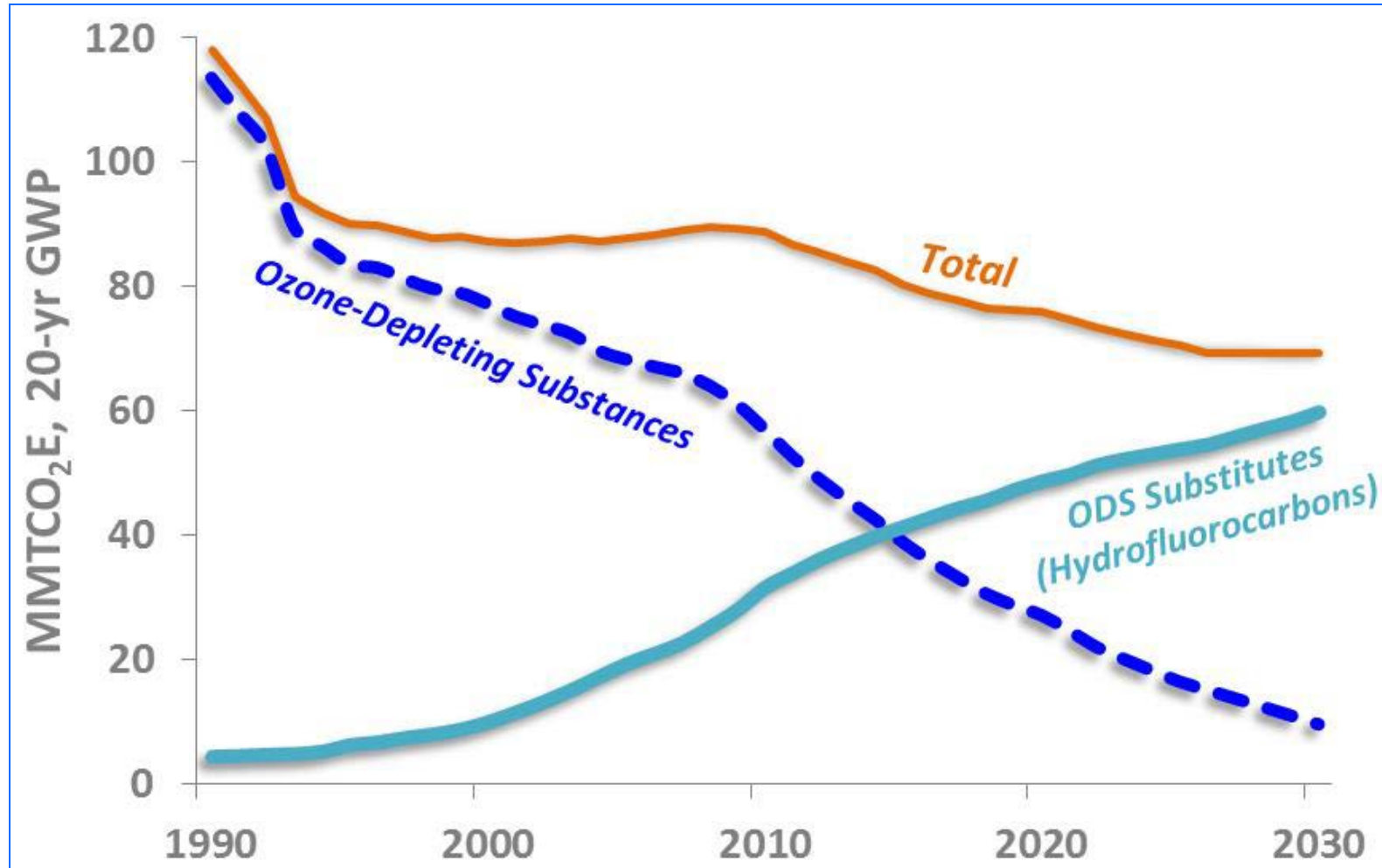


# The Future of Refrigerants is Low-GWP

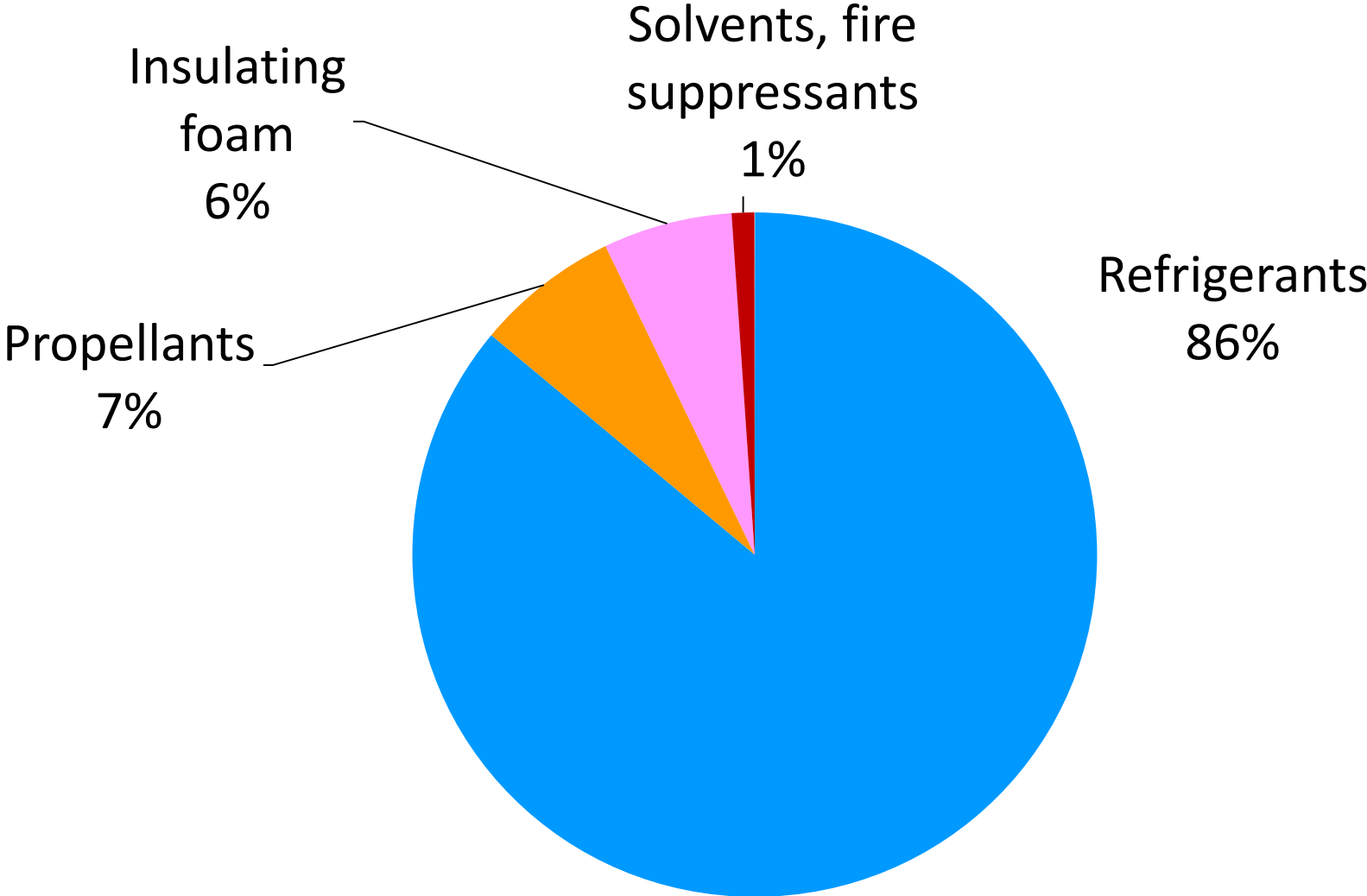
- U.S. EPA SNAP Program, European Union, Kigali Amendment signatories, and ARB agree: Refrigerants will be low-GWP.
- Very low-GWP or “sort of” low-GWP?
- When will this happen?
- Natural or synthetic?

# Problem: HFC emissions are growing

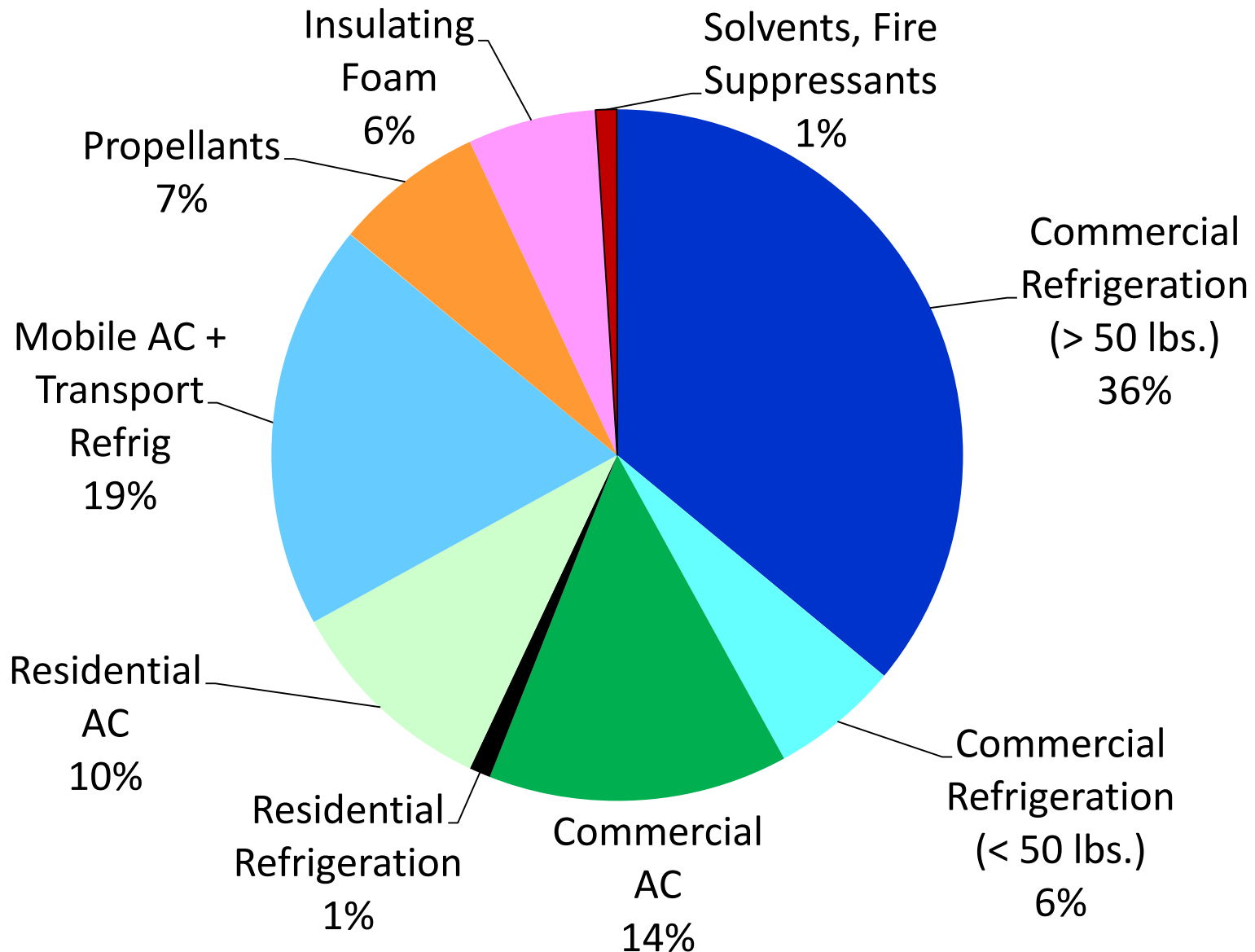
Emission Trends of ODS and ODS substitutes  
(hydrofluorocarbons) – (as ODS are phased out, HFCs increase)



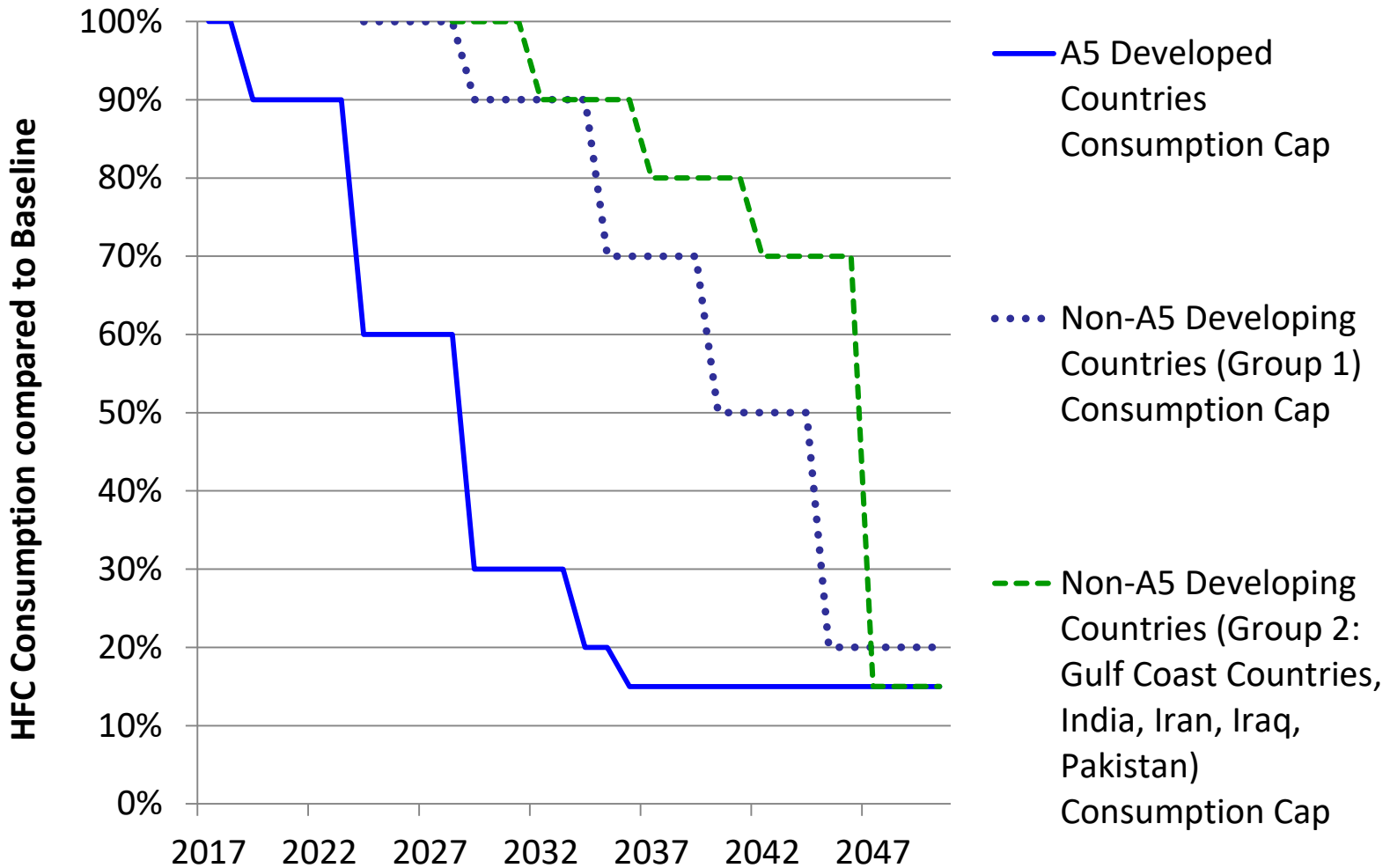
# HFC Emissions in CA



# HFC Emissions in CA by Sector



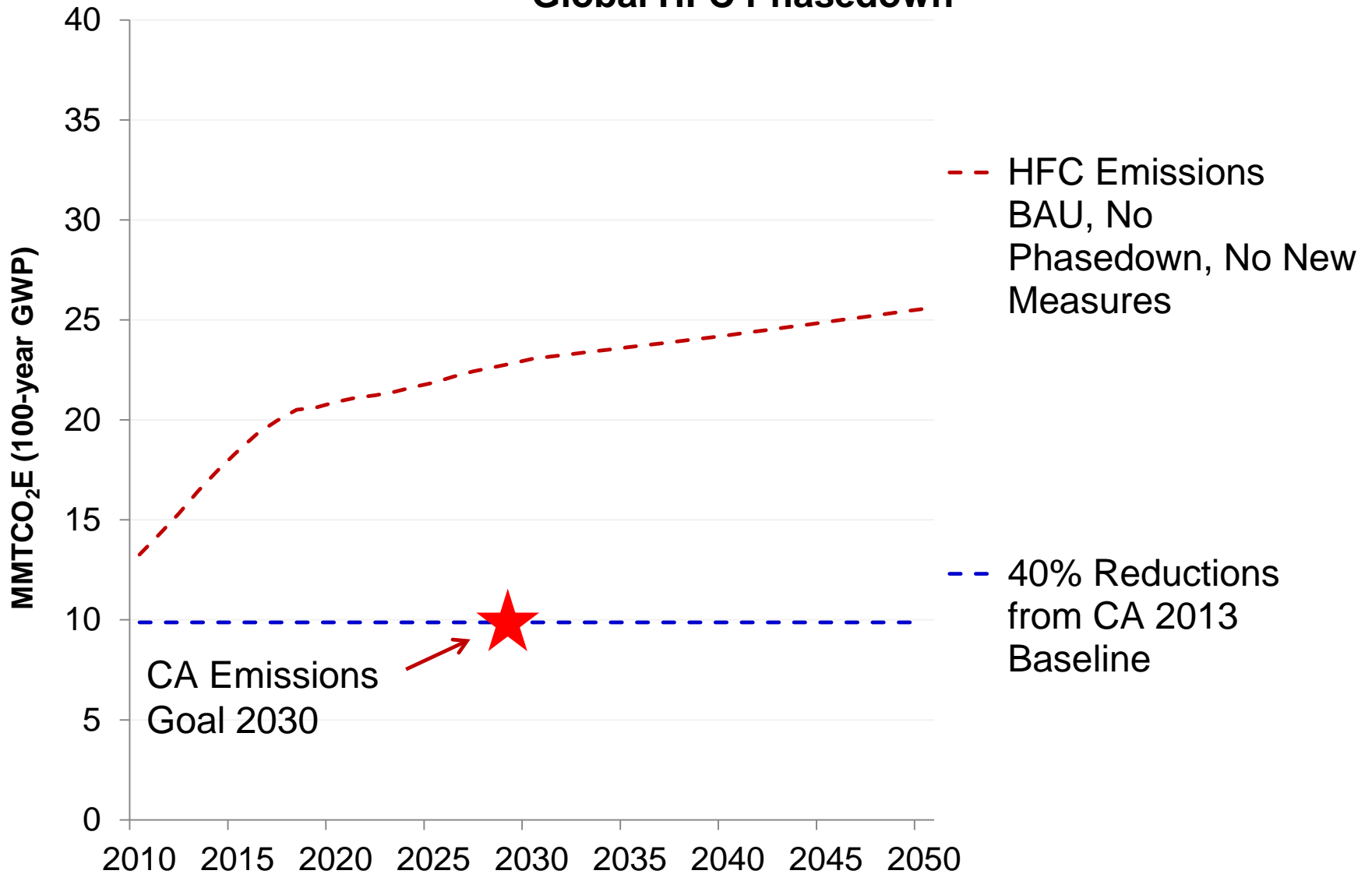
# HFC Production/Consumption Global Phasedown Schedule



# Impact of Global Phasedown on California HFC Reduction Goals

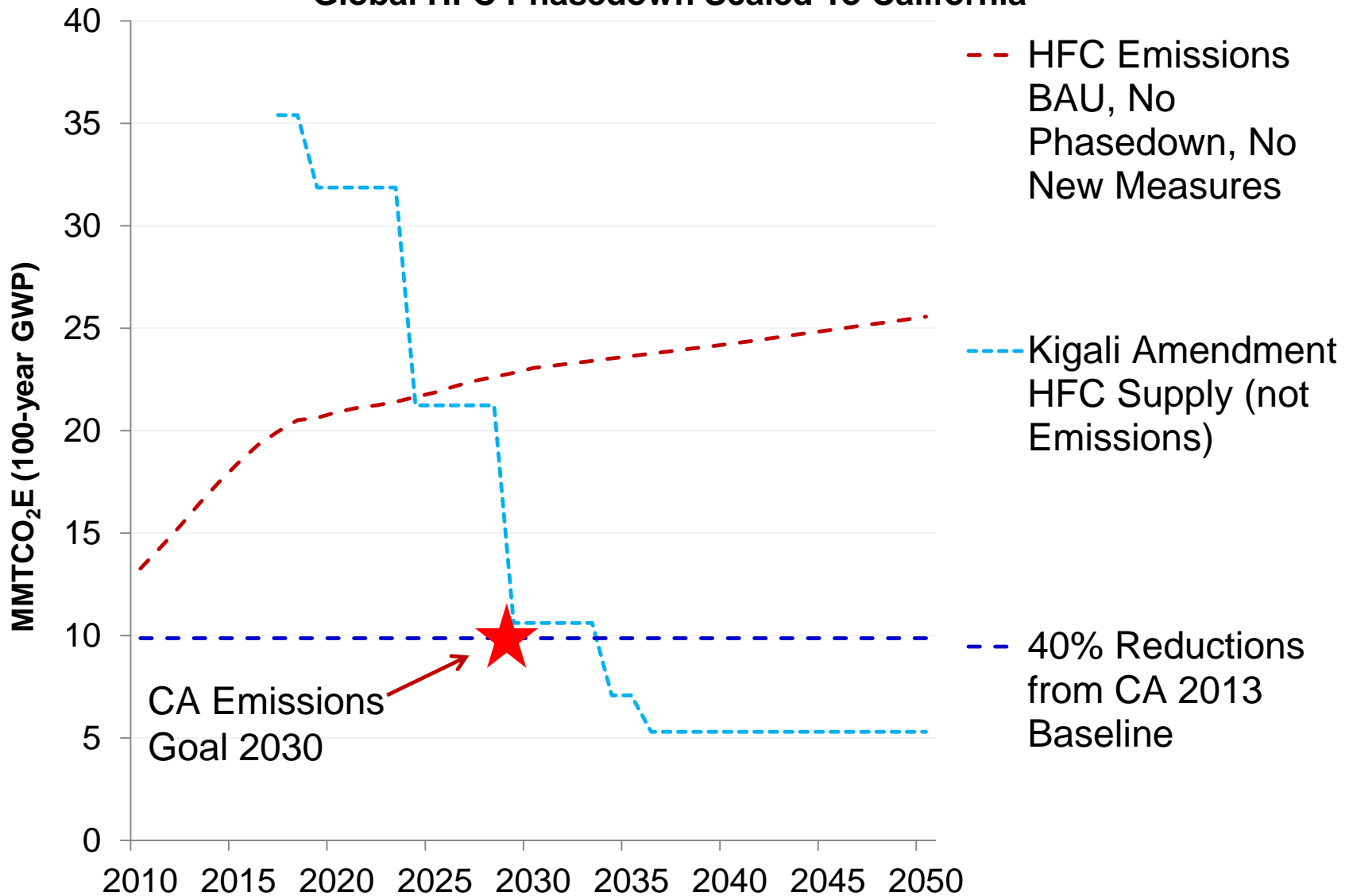
- Phasedown alone will not reach the 40% HFC reductions required in CA by 2030 by Senate Bill 1383
- Lag time 8-20 years between reductions in production and actual emissions reductions (*installed base of existing equipment with slow turnover*)
- Need additional HFC reductions

# HFC Projected Emissions (MMTCO<sub>2</sub>E) in CA 2010 - 2050 with Global HFC Phasedown

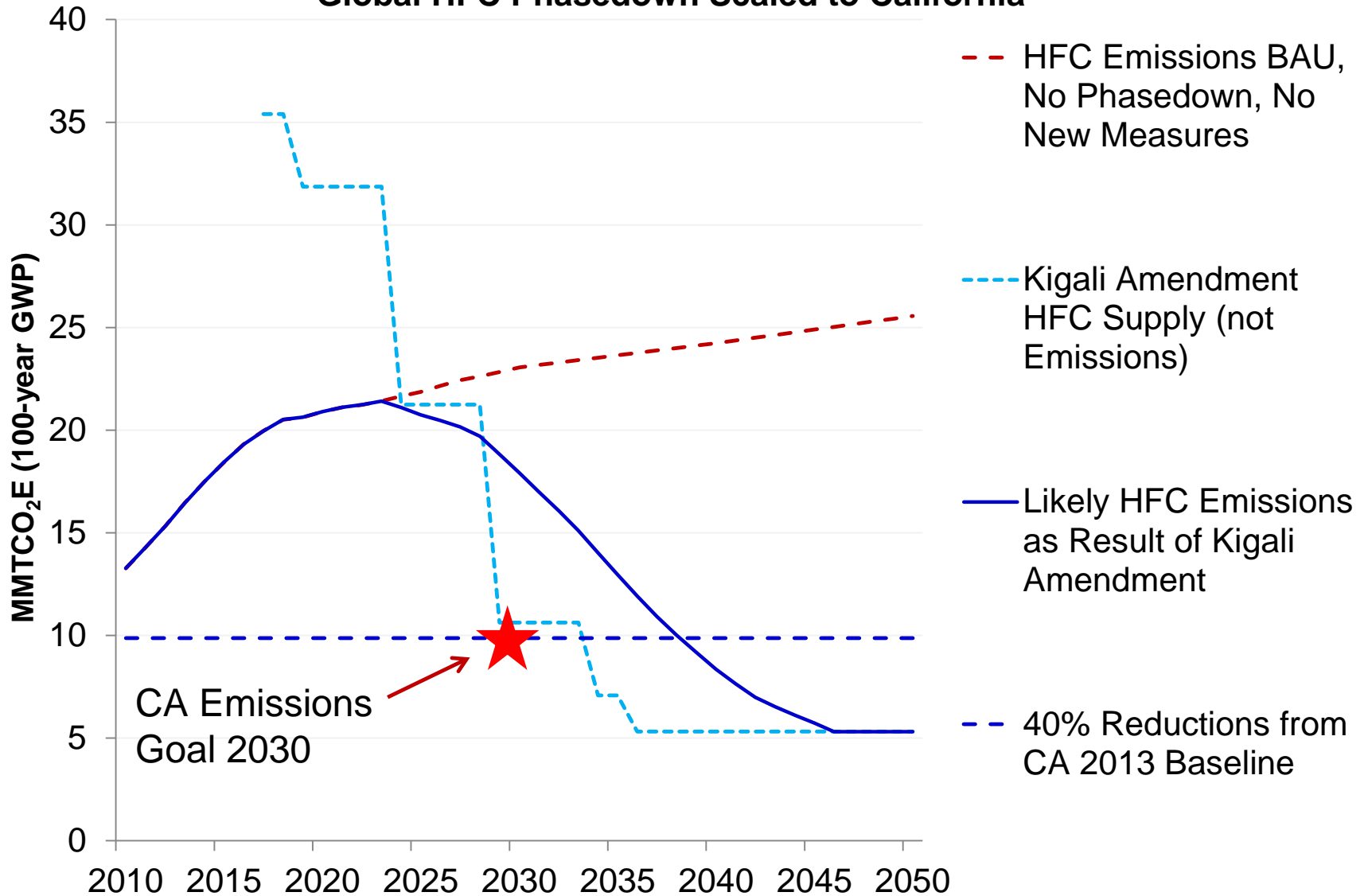




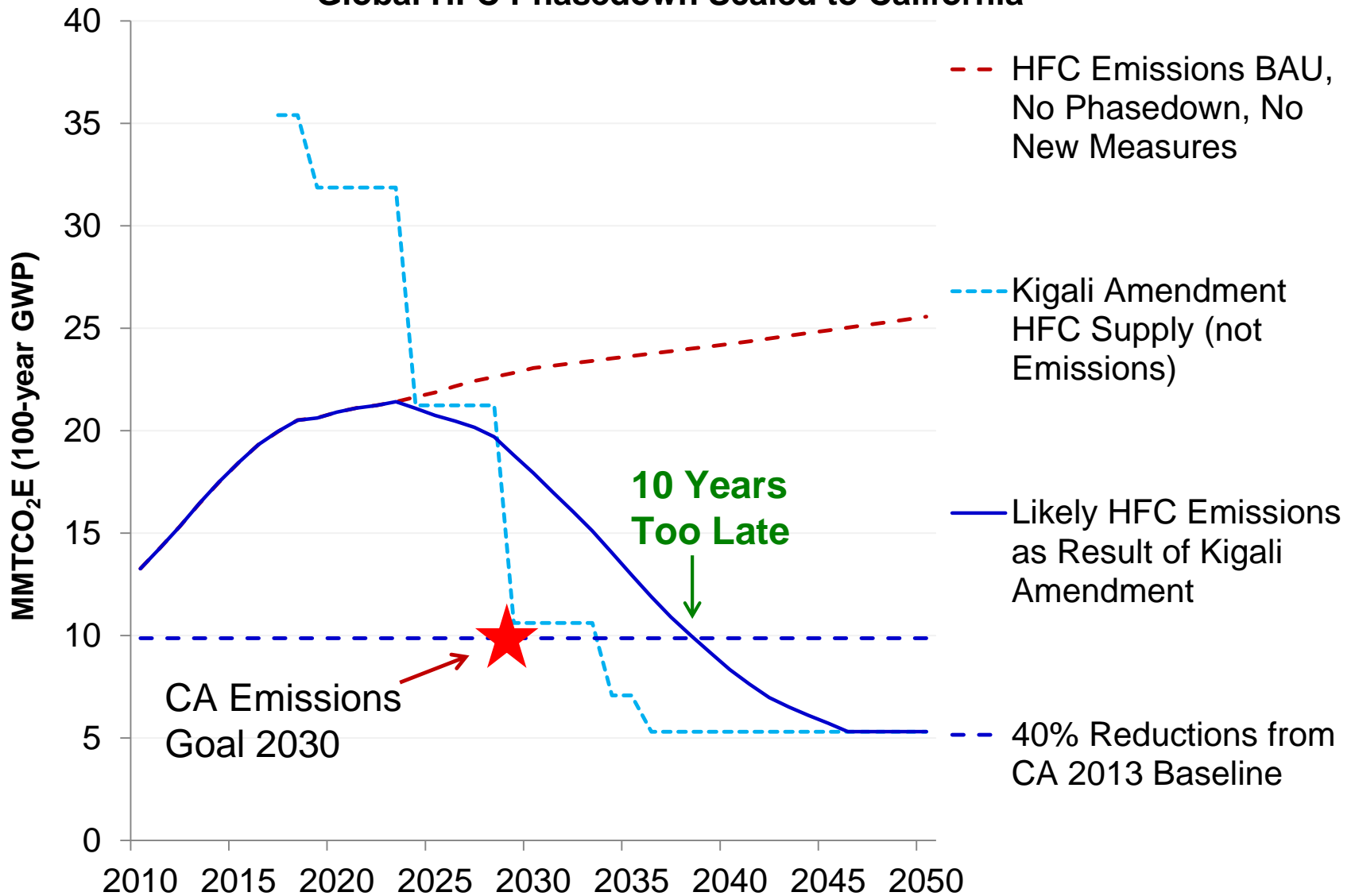
## HFC Projected Emissions (MMTCO<sub>2</sub>E) in CA 2010 - 2050 with Global HFC Phasedown Scaled To California



## HFC Projected Emissions (MMTCO<sub>2</sub>E) in CA 2010 - 2050 with Global HFC Phasedown Scaled to California



## HFC Projected Emissions (MMTCO<sub>2</sub>E) in CA 2010 - 2050 with Global HFC Phasedown Scaled to California



# HFC Rulemaking to begin Summer 2017

- Prohibit refrigerants with GWP 150 or greater in new non-residential stationary refrigeration equipment
- Sales restriction on refrigerants with  $\text{GWP} \geq 2500$ ; followed four years later by restriction on  $\text{GWP} \geq 1500$

# HFC Regulations (cont.)

## Potential Exemptions for New Equipment:

- Refrigeration systems < 50 pounds
- Very-low temperature < -50° C (-58° F)

## Exemption to High-GWP Sales Restriction:

- Recycled or reclaimed refrigerants

# Stationary Air-Conditioning

ARB has proposed  $< 750$  GWP  
in new AC systems

Not in rulemaking 2017  
(codes & standards are not ready)



# To Achieve Lower-GWP for AC, Codes & Standards Must Be Updated

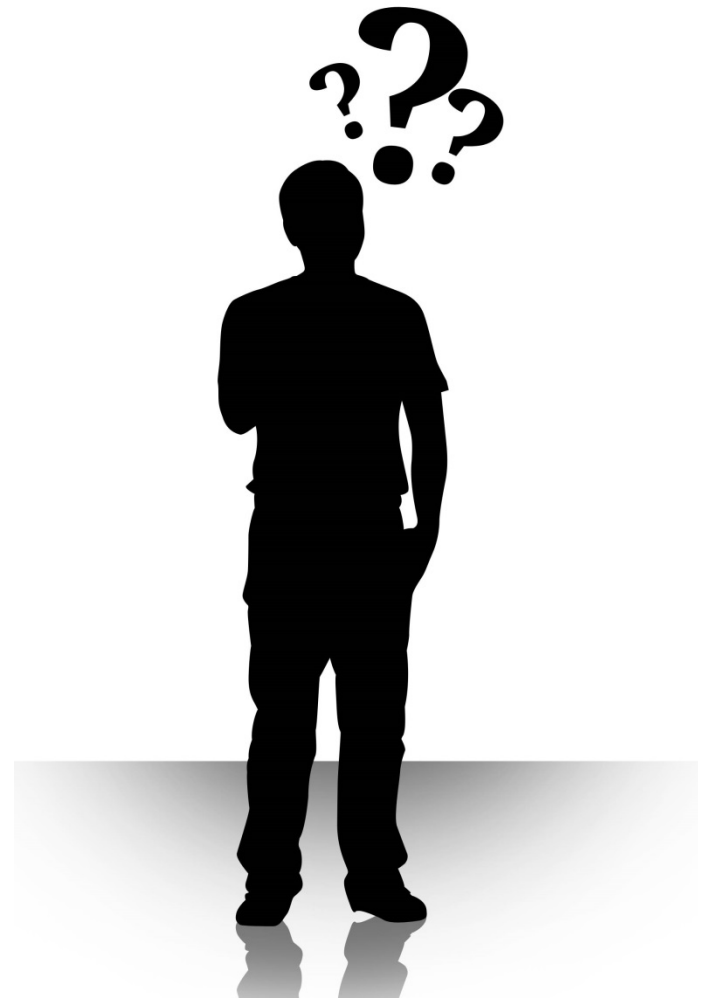
- Lower-GWP (<750) candidates for AC are A2L (very slightly flammable).
- A2L is functionally not allowed right now.
- ASHRAE, AHRI, UL, DOE, all working together to update codes & standards.
- Updated codes may not be in force until 2020-2022.

# ARB Next Steps

- Continue to work on codes and standards updates to allow more low-GWP refrigerants
- Research contract for low-GWP feasibility of convenience-store size refrigeration
- Notice of HFC rulemaking Summer 2017
- Workshops and public input 2017 – 2018
- Board Approval 2018-2019



A few questions that ARB hears from end-users somewhat skeptical of the need for low-GWP requirements:



# If the Refrigerant Does Not Leak or Is Managed Properly, Then What's the Problem?

- Leaks happen.
- Annual leak rates have been reduced, but not all leaks are preventable.
- End-of-life losses are significant.
- Use the “better” refrigerant at the start.

# Why GWP Limits? Why Not Set a Performance Standard for “total carbon footprint” of system?

- Great idea, however .....
- Difficult to set standards for facilities and systems that differ greatly.
- What is the right baseline system?  
R-22, R-404A, R-407A, R-410A?
- Enforcement challenges anticipated.

# Why not just let the global HFC phase-down work?



- Takes too long, too much excess GHG emitted in the meantime.
- California must follow its own HFC reductions regulations (SB 1383) which cannot be met through a phase-down alone.



## A few more questions...

Q: Are HFOs Environmentally Friendly?

A: ARB defers to U.S. EPA acceptance; we do not have a separate refrigerant approval program.

Q: What about the TFA issue?

A: TFA, or trifluoroacetic acid, is a breakdown product of HFOs in the atmosphere. TFA is a known toxin to aquatic life. We are monitoring the effects of TFA. So far, water concentrations are below toxic levels.

Q: Aren't HFOs just going to be phased out like the other F-gases?

A: Yes, if TFA concentrations ever build up to toxic levels. Such conditions would likely take many decades.

Q: Are any refrigerants regulation-proof?

A: About 30-40 years from now, think water vapor, air, and magnetic refrigeration.

**Thank you,**

**Questions?**



# SLCP, Contact Information

## SLCP Strategic Plan at:

<https://www.arb.ca.gov/cc/shortlived/shortlived.htm>

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