

DOCKETED

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CALIFORNIA
AIR RESOURCES BOARD

BUILDING DECARBONIZATION

UPDATE ON CARB PROGRAMS

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CEC STAFF WORKSHOP: ASSEMBLY BILL 3232

BUILDING DECARBONIZATION UPDATE ON CARB PROGRAMS

- Hydrofluorocarbon (HFC) Mitigation
- Oil and Gas GHG Mitigation
- SB1371-Natural Gas Transmission and Distribution (T&D) Leak Abatement
- Commercial Cooking Model Rule
- Zero Carbon Building Research
- Climate Neutrality Effort



HYDROFLUOROCARBON (HFC) MITIGATION

Rulemakings to Reduce HFC Emissions from
Stationary Air-Conditioning and Refrigeration

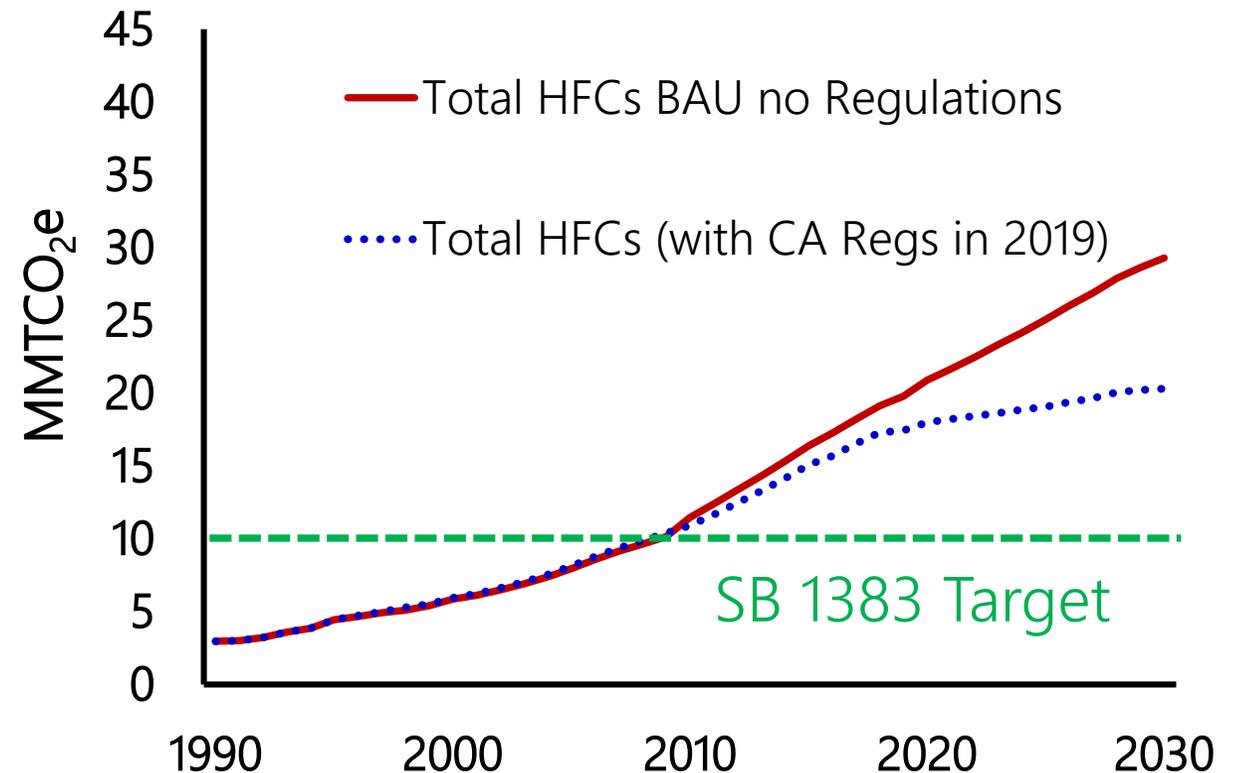


HFCs ARE THE FASTEST GROWING GHGs

- Currently 4% of CA 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)

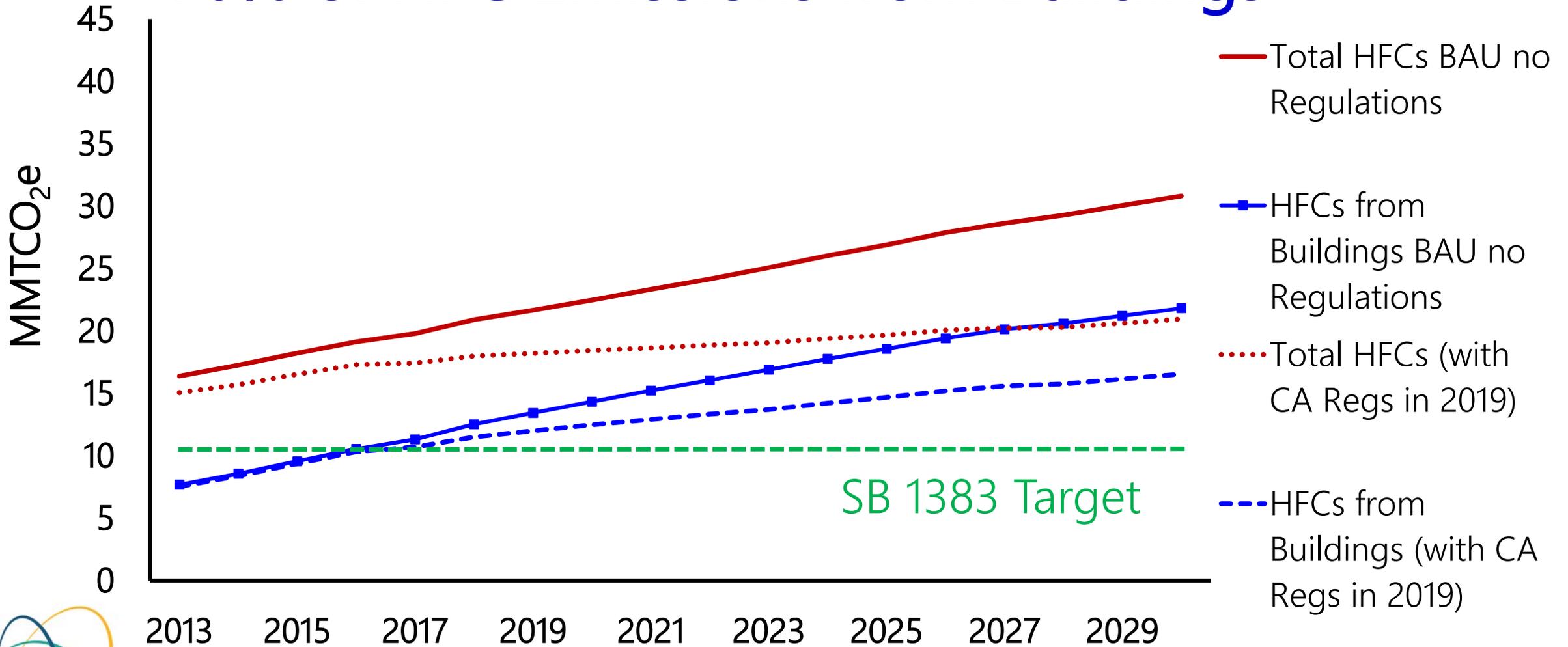


HFC Emissions in CA



Source: CARB F-gas Inventory 2017

70% of HFC Emissions from Buildings

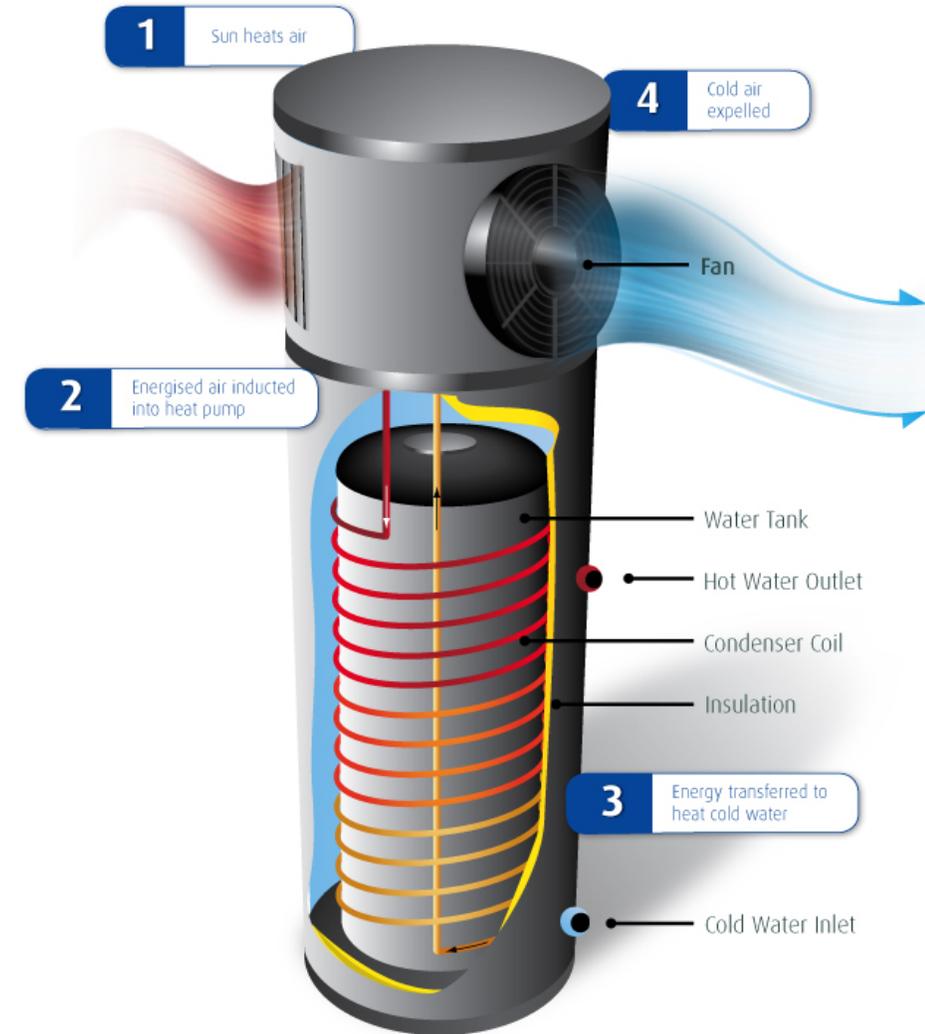


CHALLENGES TO REDUCING HFC EMISSIONS

- Need **innovation** in heat pump technology using lower-Global Warming Potential (GWP) refrigerants or HFC-free technologies
- Need **updated building codes** for the safe use of lower-GWP HFC alternatives
- **Improved installation** by trained technicians (being tackled in part by SB 1414)
- HFC **Recovery, Reclamation and Destruction** programs

DECARBONIZATION: POTENTIAL INCREASE IN HFCs

- Heat pumps expected to grow rapidly as they replace fossil fuels → **New Sources of HFC emissions!**
 - Heat pump space conditioners
 - Heat pump water heaters
 - Heat pump clothes dryers
- Consider and manage impact of HFCs in heat pumps with electrification
 - Lower-GWP solutions commercially available for some heat pumps



OIL AND GAS GHG MITIGATION

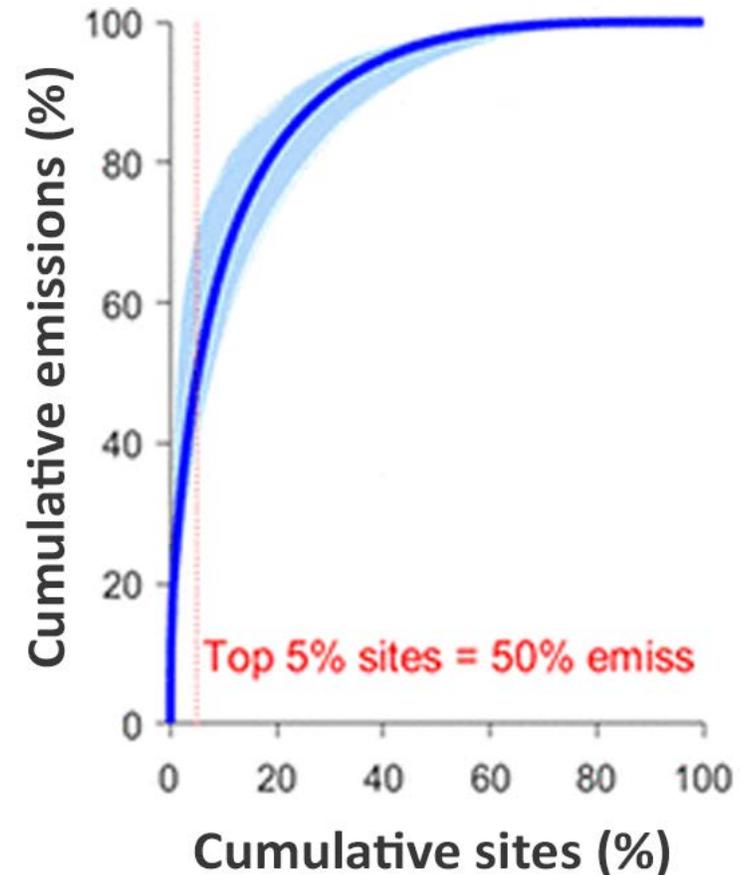
Estimating fugitive methane leaks from upstream natural gas



NATURAL GAS FUGITIVE EMISSIONS

- Natural gas is mostly methane (CH₄)
 - 100-yr GWP = 25*
 - 20-yr GWP = 72*
- Fugitive leak rate impacts overall GHG emissions of natural gas use
- Estimates of leak rate vary widely
 - Most large-scale studies and inventories find leak rates between about 1% to 3%
- Large leaks at small percentage of sites are responsible for 80% of fugitive gas volume

Methane Emissions from Natural Gas Production Sites (Omara et al. 2018)



SB1371: NATURAL GAS TRANSMISSION AND DISTRIBUTION (T&D) LEAK ABATEMENT

Targets 40% Reduction Below 1990 Levels by 2030



SB 1371: NATURAL GAS T&D LEAK ABATEMENT

- Mandates CPUC, in consultation with CARB, to adopt rules & procedures to reduce methane emissions from commission-regulated pipeline facilities
- Phase I Decision (D.17-06-015) requires gas corporations to
 - Implement 26 best practices
 - Submit biannual compliance plans
 - Target a 40% emissions reduction by 2030
- Phase II Decision (D.19-08-020) sets rate recovery for
 - Emissions in excess of 80% from the 2015 baseline in 2025
 - SoCal Gas and PG&E

SB 1371: NATURAL GAS T&D LEAK ABATEMENT

- Total emissions have shown cyclical variation with a downward trend
 - The draft 2018 report shows emissions 9.5% lower than the 2015 baseline
- Customer gas meters represent a significant share, about 25% of the total emissions

2015-2018 California Natural Gas Corporation Emissions
(MMTCO₂e, 100-yr GWP)

Source Classification	2015	2016	2017	2018
Meter and Regulating Stations	1.05	1.03	1.05	1.04
Pipelines	1.01	0.91	0.85	0.70
Customer Gas Meters	0.73	0.74	0.75	0.76
Compressors and Underground Storage	0.16	0.12	0.17	0.18
Total Emissions	2.96	2.81	2.87	2.67

COMMERCIAL COOKING MODEL RULE

AB 617 Suggested Control Measure for Commercial Cooking to Improve Air Quality and Protect Community Health



COMMERCIAL COOKING MODEL RULE

- Included in Board-adopted AB 617 Community Air Protection Blueprint
- Evaluate Suggested Control Measure in two-phase process
 - Phase 1: technical assessment, including emission reductions and cost effectiveness
 - Phase 2: develop path forward based on Phase 1 results (e.g., role of incentives, model rule for air district adoption)
- Timing
 - Begin development 2020
 - Implementation TBD

ZERO CARBON BUILDINGS RESEARCH

Assessing the technical feasibility of zero carbon residential and commercial buildings and communities to support state GHG targets



ZERO CARBON BUILDINGS RESEARCH PROJECT

	% REDUCTION FROM BASELINE					
	2013 Vintage			pre-1980s Vintage		
	Energy	GHG w/o PV	GHG w/ PV	Energy	GHG w/o PV	GHG w/ PV
Single Family	> 50%			> 50%		
MF low-rise			> 100%			> 100%
Warehouse	40-50%			40-50%		
Strip Mall				>50%		> 50%
School			> 50%	40-50%		
Lrg Off	< 30%			< 30%		

- When a combination of measures are implemented
 - Plugs/lights reduced
 - Fuel switching
 - Time of use with batteries
 - Maximized rooftop PV

- Zero carbon building performance feasible

- Large office buildings are most challenging

CLIMATE NEUTRALITY EFFORT

Deep decarbonization by 2045



CLIMATE NEUTRALITY

- Evaluating options to reduce GHG emissions and increase carbon sinks
- Part of next Scoping Plan Update
- Building decarbonization is part of solution



KEY TAKEAWAYS

- 1) CARB supports CEC proposal
- 2) Direct GHG emissions accounting approach will require maximum action to decarbonize buildings

HFC Mitigation	Oil and Gas Mitigation	Natural Gas T&D Leak Abatement	Commercial Cooking Rule	Zero Carbon Building Research	Climate Neutrality
<ol style="list-style-type: none"> 1. HFC building emissions could increase 2. Low GWP refrigerants needed 	<ol style="list-style-type: none"> 1. Leak rates vary widely 2. Large leaks at few sites are source of most emissions 	<ol style="list-style-type: none"> 1. SB 1371 targets 40% reduction by 2030 	<ol style="list-style-type: none"> 1. Rule can help Air Districts improve air quality 2. Health benefits 	<ol style="list-style-type: none"> 1. Preliminary results indicate technically feasible 	<ol style="list-style-type: none"> 1. Aggressive action is needed to meet target



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THANK YOU!



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