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HFC Refrigerants in the AB 3232 California Building Decarbonization Assessment

August 26, 2021, IEPR Commissioner Workshop on Building Decarbonization: Embodied Carbon and Refrigerants

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Overview of Assembly Bill 3232 (Friedman, Chapter 373, Statutes of 2018)

CEC must assess potential to reduce GHG emissions

- In residential and commercial buildings
- By at least 40% below 1990 levels
- By 1/1/2030

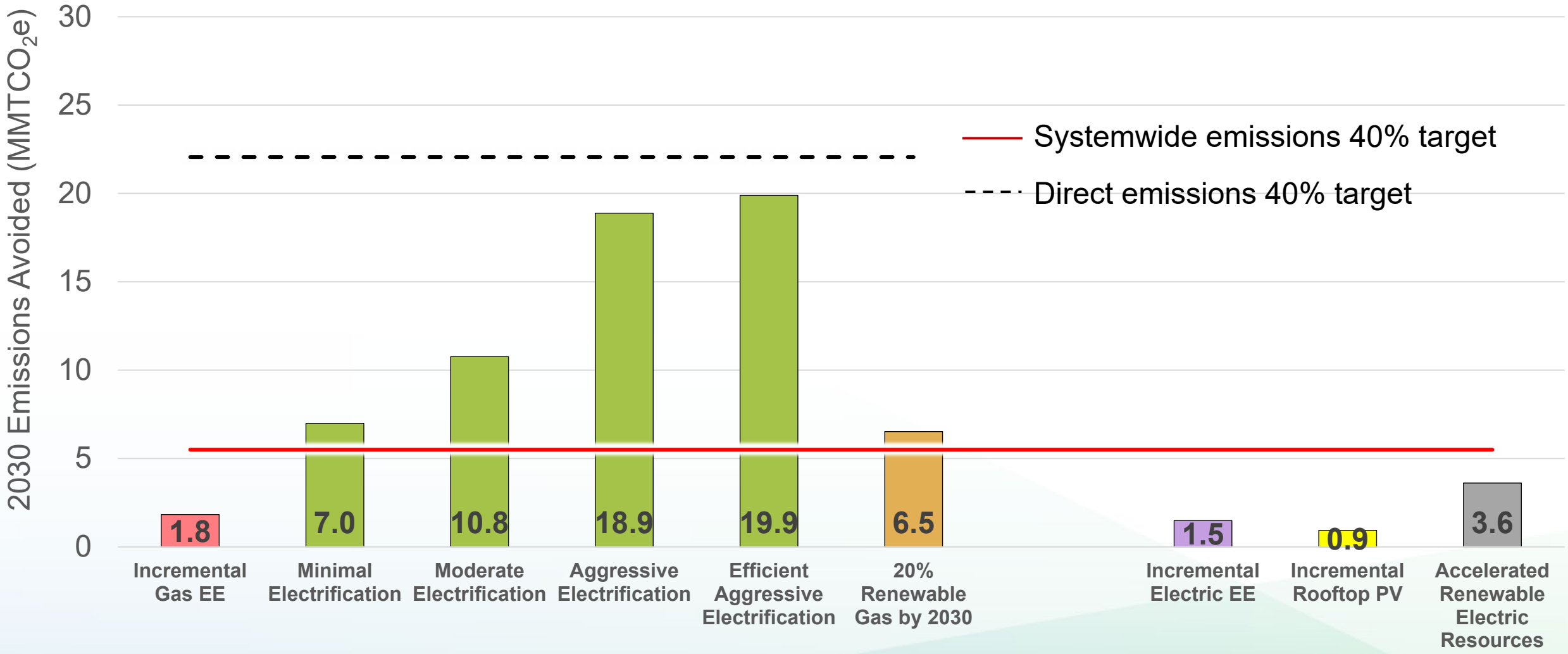
Final Commission Report adopted at the August 11, 2021 Energy Commission Business Meeting:

Kenney, Michael, Nicholas Janusch, Ingrid Neumann, and Mike Jaske. 2021. *California Building Decarbonization Assessment*. California Energy Commission. Publication Number: CEC-400-2021-006-CMF.

Seven Broad Strategies of Building Decarbonization

1. Building end-use electrification
2. Decarbonizing electricity generation system
3. Energy efficiency
4. Refrigerant conversion and leakage reduction
5. Distributed energy resources
6. Decarbonizing gas system
7. Demand flexibility

Annual GHG reduction in buildings for 2030 relative to direct and systemwide 40% reduction emission targets

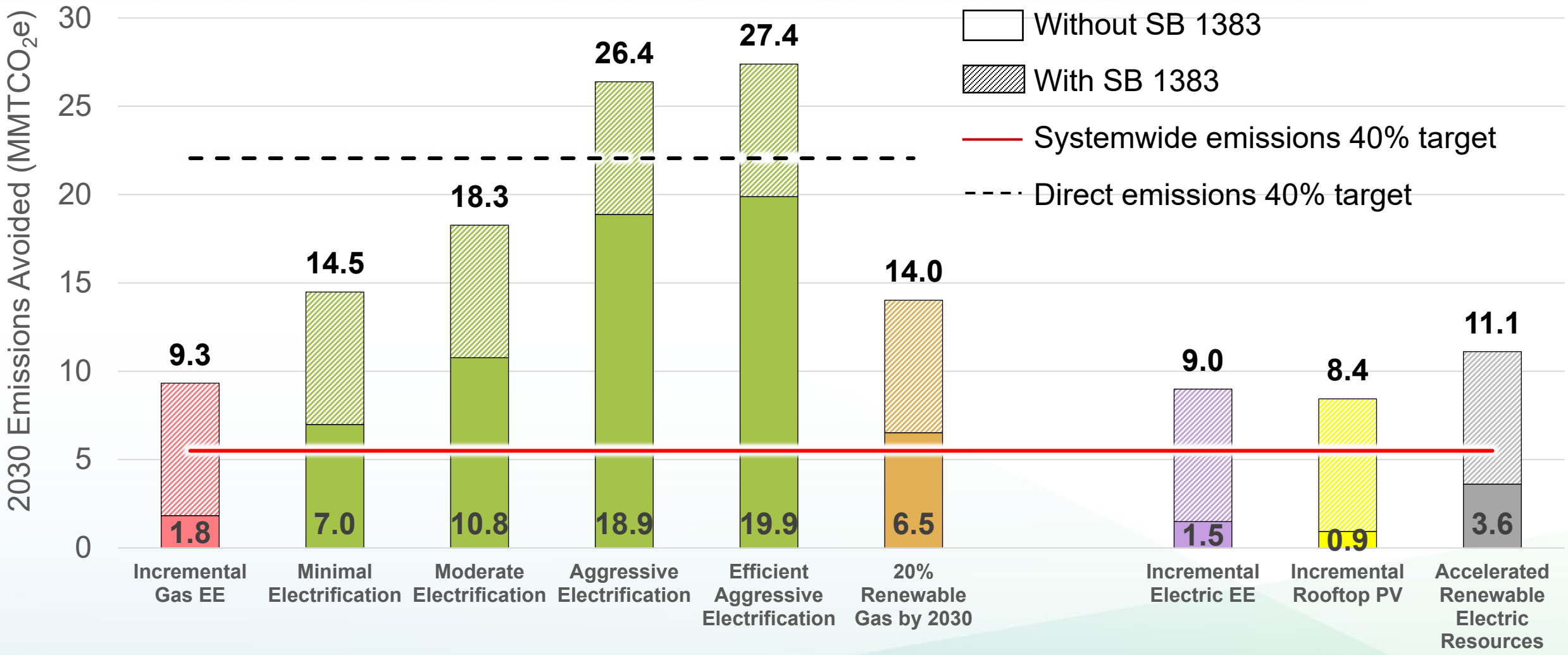


Source: California Energy Commission

AB 3232 Assessment and the SB 1383 toggle

- Senate Bill 1383 (Lara, Chapter 395, Statutes of 2016) established economy-wide goals to reduce hydrofluorocarbons (HFCs) emissions by 40 percent relative to 2013 levels by 2030
- HFCs have very high global-warming potential (GWP)
- The assessment applied an all-or-nothing toggle specific to residential and commercial buildings of achieving the SB 1383 HFC emissions 2030 target
  - Based on data provided by CARB staff, CEC staff approximated the amount of HFC emissions in buildings in 2030 with and without the success of SB 1383
  - Approximately adds 7.5 $MMTCO_2e$ emission reduction in 2030

Annual GHG reduction in buildings for 2030 relative to direct and systemwide 40% reduction emission targets



Source: California Energy Commission

HFC refrigerant leakage beyond 2030

- Two sources of HFC refrigerant leakage:
  - Annual leakage
  - End-of-life leakage
- HFC reductions called for by SB 1383 do not address increased usage from moving to new electric heat pumps
- The building electrification scenarios add less than 0.5 $MMTCO_2e$ in 2030 of incremental refrigerant leakage, all from annual leakage of the installed technologies because of study's short time horizon [1]
- However, the long-term consequences beyond 2030 of these non-energy sources (i.e., high GWP and non-combustion sources) can be significant in 2045, roughly 33 $MMTCO_2e$ economy-wide [2]

[1] Figure 30 in Kenney, Michael, Nicholas Janusch, Ingrid Neumann, and Mike Jaske. 2021. *California Building Decarbonization Assessment*. California Energy Commission. Publication Number: CEC-400-2021-006-CMF. Page 76.
[2] Figure 3 in *Achieving Carbon Neutrality in California: PATHWAYS Scenarios Developed for the California Air Resources Board*. Energy and Environmental Economics, Inc. October 2020. Page 25.

Conclusions

- Mitigating HFC refrigerant leakage is essential in achieving the state's 2030 building decarbonization goals
- HFC refrigerant leakage from electric technologies pose a significant source of emissions in 2045
- CEC will track CARB's actions on refrigerant emissions

Thank You

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