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California's New Credit Program for Future Motor Vehicle Air Conditioning Systems

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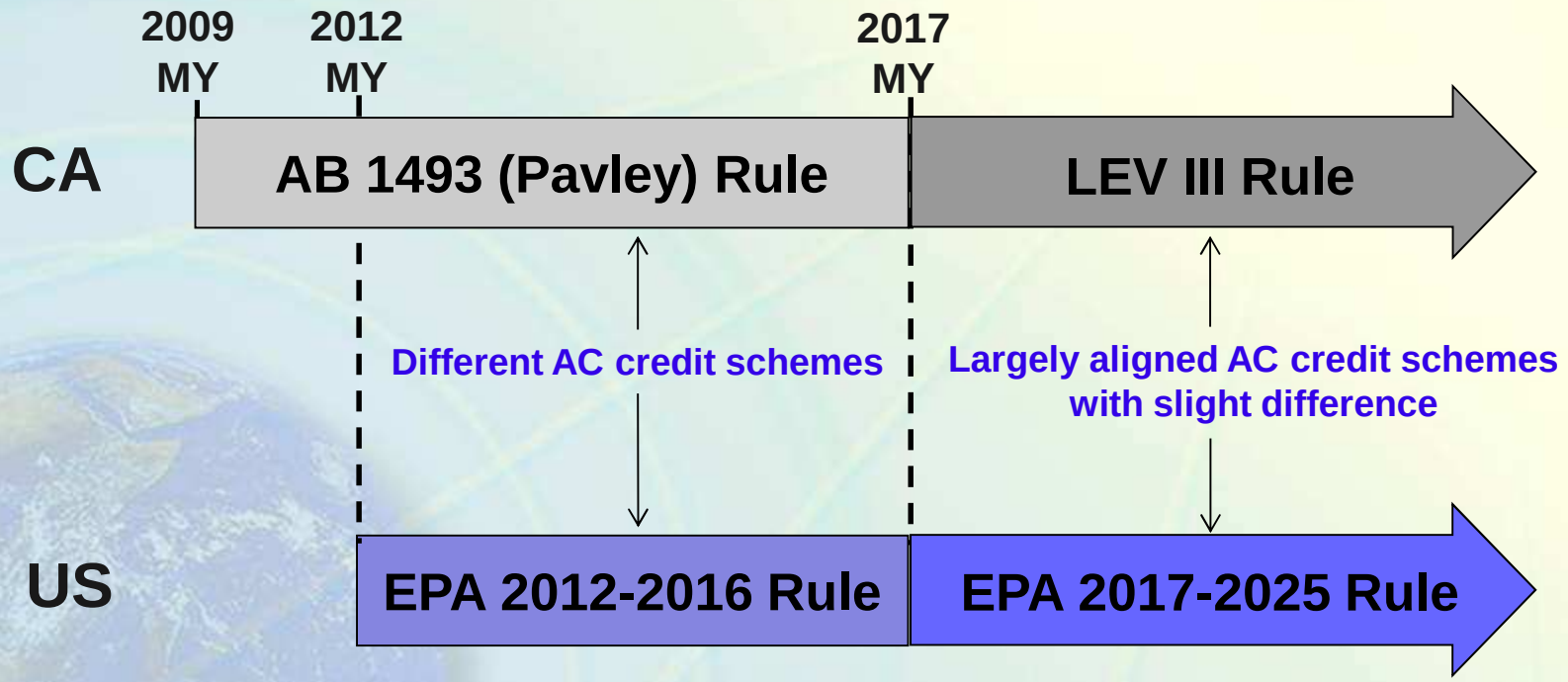
AIR RESOURCES BOARD

Evolution of Regulations



LEV III AC Credit Program: Direct (Leakage) Credit

- Overall structure (aligned with U.S. national program):
  - For HFC-134a AC systems:

$$DirectCredit = MaxCredit \times \left(1 - \frac{LeakRate}{AvgLeakRate}\right)$$

	***MaxCredit* (gCO_2e/mi)**	***AvgLeakRate* (g/yr)**	***LeakRate* (g/yr)**
Cars	12.6	16.6	Evaluated using SAE J2727
Trucks	15.6	20.7	

  - For low GWP AC systems:

$$DirectCredit = MaxCredit \times \left(1 - \frac{GWP}{1{,}430}\right) - HiLeakDis$$

	***MaxCredit* (gCO_2e/mi)**
Cars	13.8
Trucks	17.2

LEV III AC Credit Program: Direct (Leakage) Credit (cont.)

- High Leak Disincentive

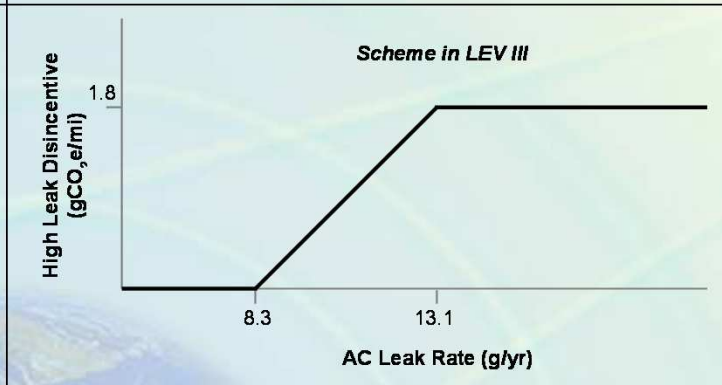
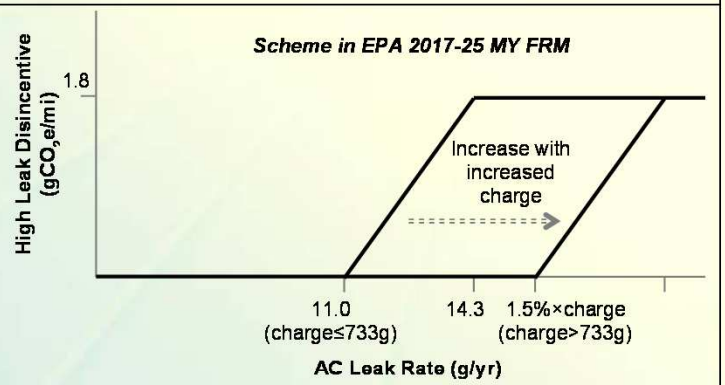
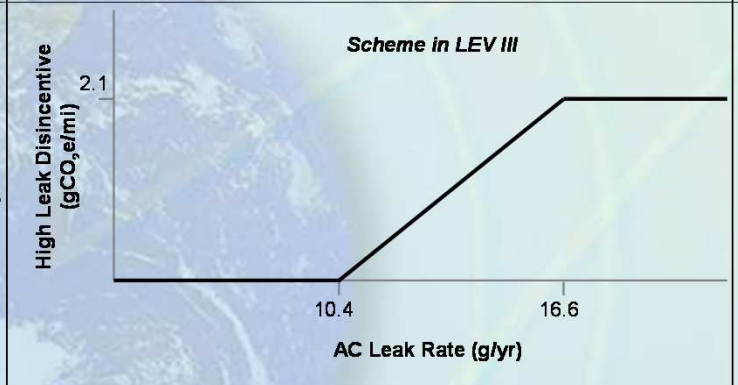
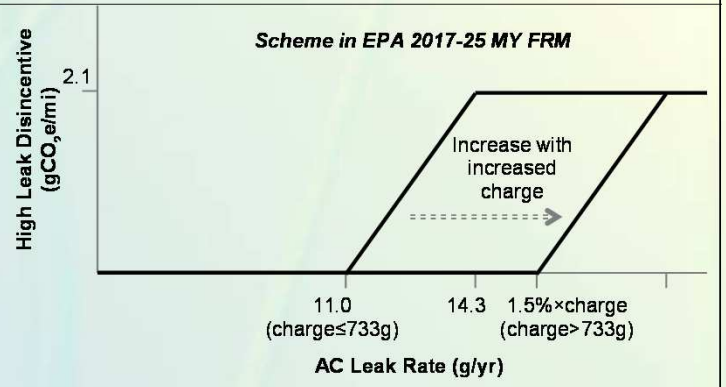
$$HiLeakDis = MaxDis \times \left(\frac{LeakRate - LeakThreshold}{DfltLeakRate - LeakThreshold} \right)$$

- High Leak Disincentive encourages automakers to continue using leakage reduction technologies after transition to low GWP refrigerants.

- Importance of having low leak rates:
  - helps reduce the possibility of recharging low GWP AC systems with an incorrect, but much cheaper, high GWP refrigerant (i.e., HFC-134a)
  - helps prevent the loss of AC efficiency due to undercharging

LEV III AC Credit Program: Direct (Leakage) Credit (cont.)

- LEV III uses different sliding scale values for High Leak Disincentive than USEPA final rulemaking.

	CARB	USEPA
Cars		
Trucks		

LEV III AC Credit Program: Indirect (Efficiency) Credit

- Final CARB indirect AC credit program is identical to what USEPA proposed in the NPRM for the national 2017-2025 model year GHG Regulations
- Based on comments and additional testing, USEPA modified the AC indirect program initially proposed
  - Altered requirements for credit qualification
    - Reporting only option for the 2017-2020 MYs
    - Comparison to a baseline vehicle for the 2021-2025 MYs
  - Refined AC17 Test procedure
  - Clarified terminology and added flexibilities (e.g., engineering evaluation in lieu of baseline vehicle testing)

LEV III GHG Compliance

- In November, staff is going to the Board with a proposed rule that would accept compliance with the national 2017-2025 MY GHG rule as compliance with the LEV III GHG regulation

- A small number of clarifying edits to CARB's GHG program are also proposed
  - Updating SAE J2727 to February 2012 version
  - Incorporation of the final AC17 test procedure by reference

- No other "harmonizing" changes are being proposed at this time

Proposed Research Activities Relating to Electric Vehicles

- Proposed ARB contract with U.C. Davis to conduct an advanced plug-in electric vehicle (PEV) usage and charging behavior study (pending Board approval in December)
  - Recruit 100-150 PEV households and collect travel and charging behavior data on all household vehicles
  - Analyze household travel and charging data to inform state policy on PEVs
  - As part of this study, researchers will collect data on PEV heater and AC usage to understand if/how behavior differs over time and between PEV types (or modes)
  - If possible, the effect of climate control on efficiency will be modeled

Proposed Research Activities Relating to Electric Vehicles (cont.)

- Proposed ARB contract with U.C. Davis to conduct a study on new car buyers' valuation of zero-emission vehicles (ZEVs) (pending Board approval in December)
  - Survey 1,700 new car buying households in California online and interview roughly 40 of them to collect information on decision-making process, awareness and knowledge of ZEVs, and factors influencing new car purchases
  - Complementary research efforts in Northeast and Northwest states
  - Analyze data to identify effective policy to educate consumers and remove barriers or enhance motivations for adoption of near- or pure-ZEVs
- Upcoming Request for Proposal (RFP) on potential vehicle road load reduction to be released soon
  - Potential secondary benefit of extending battery range of EVs
  - Interested investigators can let us know to be notified when scope of work is released

Summary

- CARB's AC direct credit program largely aligns with U.S. federal credit program except that it has more stringent High Leak Disincentive terms.
- CARB's AC indirect credit program harmonized with the federal credit program as proposed in the NPRM.
- In November, the Board is poised to adopt provisions that accept compliance with the national GHG program as compliance with LEV III GHG rule.

ARB Contacts

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For more information, visit

http://www.arb.ca.gov/cc/hfc-mac/hfc-mac.htm

http://www.arb.ca.gov/msprog/levprog/leviii/leviii.htm