Comparison of Advanced Clean Cars and EPA Light-Duty/Medium-Duty Multipollutant Proposal

NACAA – May 15, 2023

ZEV Assurance

Data Standardization

ACC II Requirements

Multiple data parameters required, including driver accessible parameters:

- Battery State of Health (SOH)
  - Quantifies amount (0-100%) of original battery energy* that can be stored

  *Includes energy reserve
- Charge Rate

EPA Proposal (NPRM Version)

Only one parameter required on vehicle:

- Battery SOH

  *Must be accessible by driver, does not require reserve energy disclosure

No other data or a vehicle connector to access the data required

Durability

ACC II Requirements

Metric: **Range**

Duration

- 2026-2029: maintain >70% of Range for 10 years/150k mi
- 2030+: 80% of Range for 10 years/150k mi

EPA Proposal (NPRM Version)

Metric: **Useable Battery Energy (UBE)**

Duration:

- Maintain >80% of UBE for 5 years/62k mi
- 70% of UBE for 8 years/100k mi

Warranty

ACC II Requirements

Battery Warranty:
Fail criteria: Battery State of Health (SOH)
MY2026-2030: <70% SOH
MY2031+: <75% SOH
Duration: 8 years/100k mi

'Propulsion-Related Parts' Warranty:
3 years/50k mi: all parts
7 years/70k mi: 'high-cost' parts

Warranty Reporting:
Quarterly reports to CARB for any component exceeding 2% warranty replacement

EPA Proposal (NPRM Version)

Battery & electric powertrain components Warranty:

(still verifying) Fail criteria: Must maintain minimum durability performance requirements

- 5 years/62,000 miles 80% SOH
- 8 years/80,000 miles* 70% SOH

Duration: 8 years/80k mi

*Milage limited by duration of warranty period

CARB

All Other Assurance Measures

ACC II Requirements

- ZEVs: Minimum 150 (label) Mile Range
- Charging: SAE J1772, DCFC capability, CCS1,and charging cord required
- Service Info rules apply
- Battery labeling for recycling

EPA Proposal (NPRM Version)

- None

Questions?

Light-Duty GHG Standards

GHG Fleet Average Standard

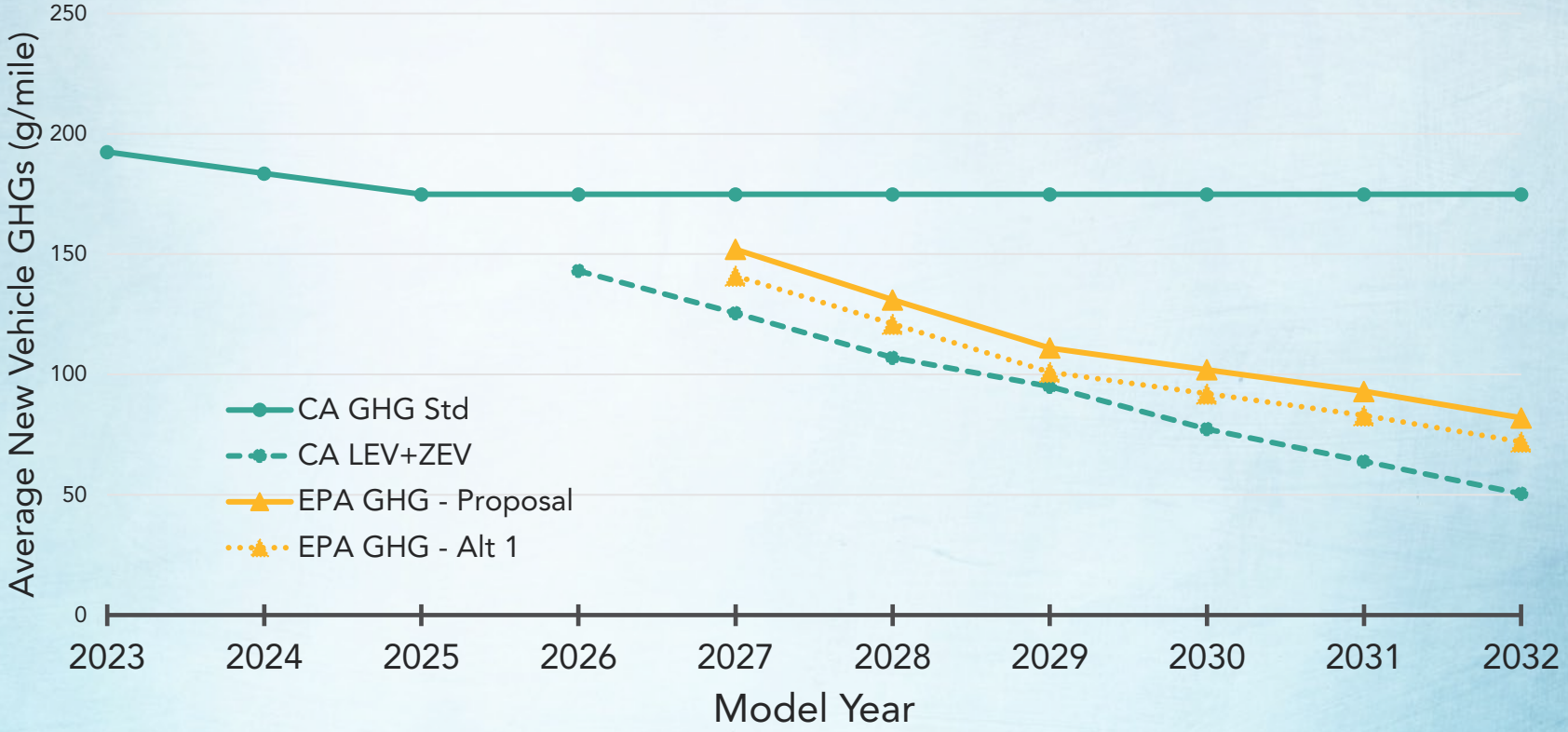
California Advanced Clean Cars

- No changes in ACC II
- Flatlines after MY2025 ~175 g/mi or worst case 277 g/mi for light trucks
- ZEVs included in fleet average with upstream emissions

EPA Proposal

- Maintains footprint curves but makes them flatter due to ZEVs and narrows gap between PC and LT
  - Flatter means bigger vehicles meet closer to same standard as smaller vehicles
- ZEVs included in fleet average without upstream emissions

Fleet Average Greenhouse Gas Emissions



CARB

PHEV Utility Factor

- EPA proposing to lower utility factor for PHEVs (assumption on fraction of electric driving) which will mean PHEVs are less "valuable" for compliance
- CARB analysis shows that different PHEV architectures exhibit different utility factors and variable emission benefits

Off-cycle Credits

- EPA phasing out availability of off-cycle and air conditioning leakage credits
- Real benefits but very small magnitude and resource intensive to implement
- Less relevance for ZEVs
- No significant impact on compliance
- CARB analysis suggests current structure is over-crediting some features

Medium-Duty GHG Standards

- EPA proposing to move medium-duty* vehicles from HD program to a structure like LD program
  - Support change since LD structure is more robust/stringent
- EPA proposing to expand definition of medium-duty passenger vehicles
  - Will move some passenger-focused heavy vehicles from HD program into the LD program itself
  - Support change for increased stringency and appropriate as these vehicles are not 'work' vehicles
- Medium-duty fleet average declines by 44% over period of regulation (largely due to increased ZEVs)
  - Steeper reduction than HD Phase 2 program

*Medium-duty is >8,500 and <14,000 GVWR such as larger tow-capable pick-ups and full-size vans

Light-Duty Criteria Standards

NMOG+NOx Fleet Average Standard

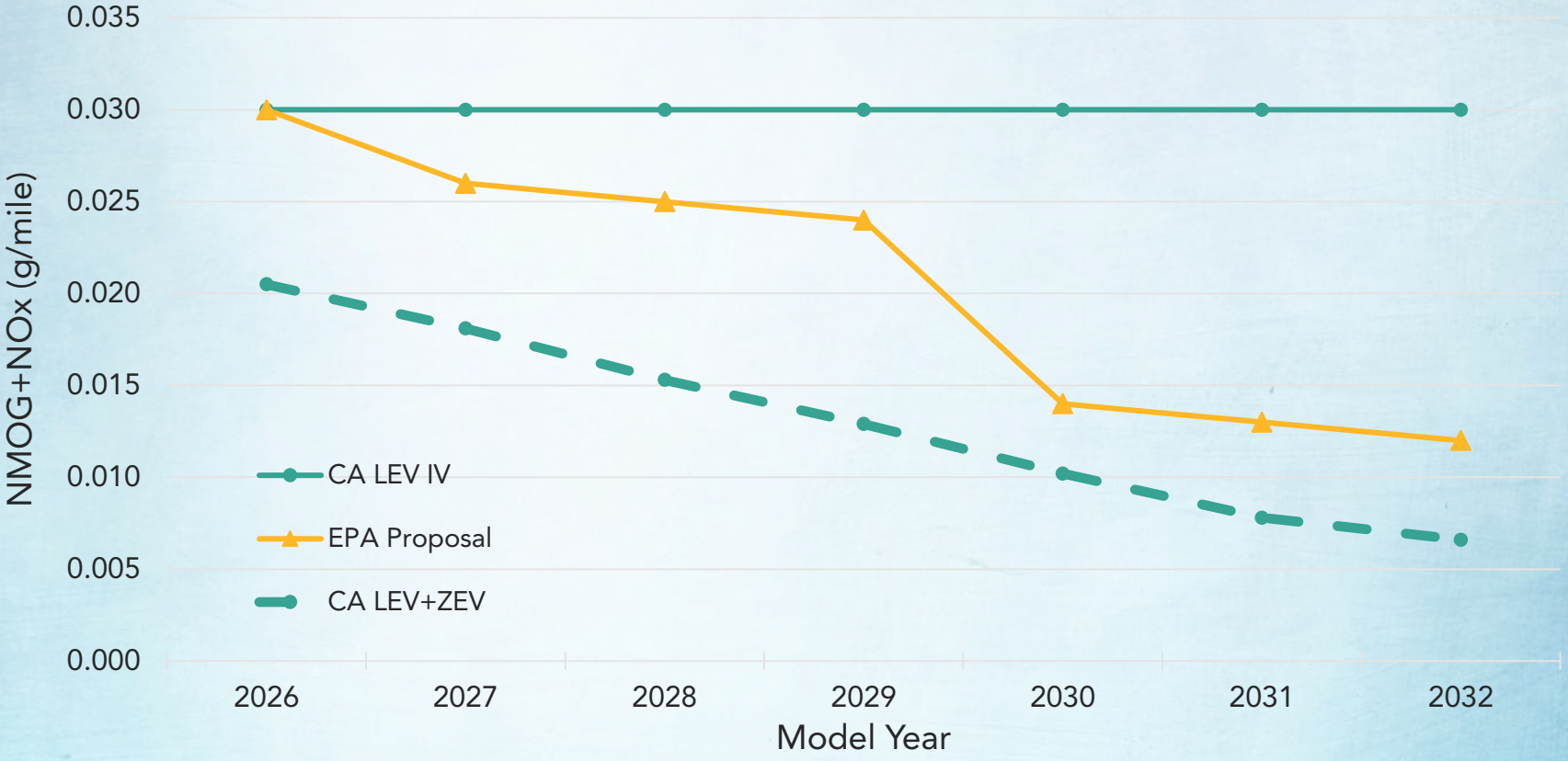
California Advanced Clean Cars

- Maintain NMOG+NOx fleet average at 30 mg/mi
- Excludes ZEVs from the fleet average after MY 2029

EPA Proposal

- Decline NMOG+NOx fleet average from 30 mg/mi to 12 mg/mi by 2032
- Includes ZEVs in average
  - EPA expects gasoline to emit at 30 and increasing fraction of ZEVs to bring fleet average below that

MY2026+ NMOG+NOx Fleet Average Standards (CA/EPA)



CARB

Light-Duty NMOG+NOx Certification Bins

Advanced Clean Cars II Bins [mg per mile]

EPA Tier IV Proposal Bins [mg per mile]

CARB

PM Emission Standards

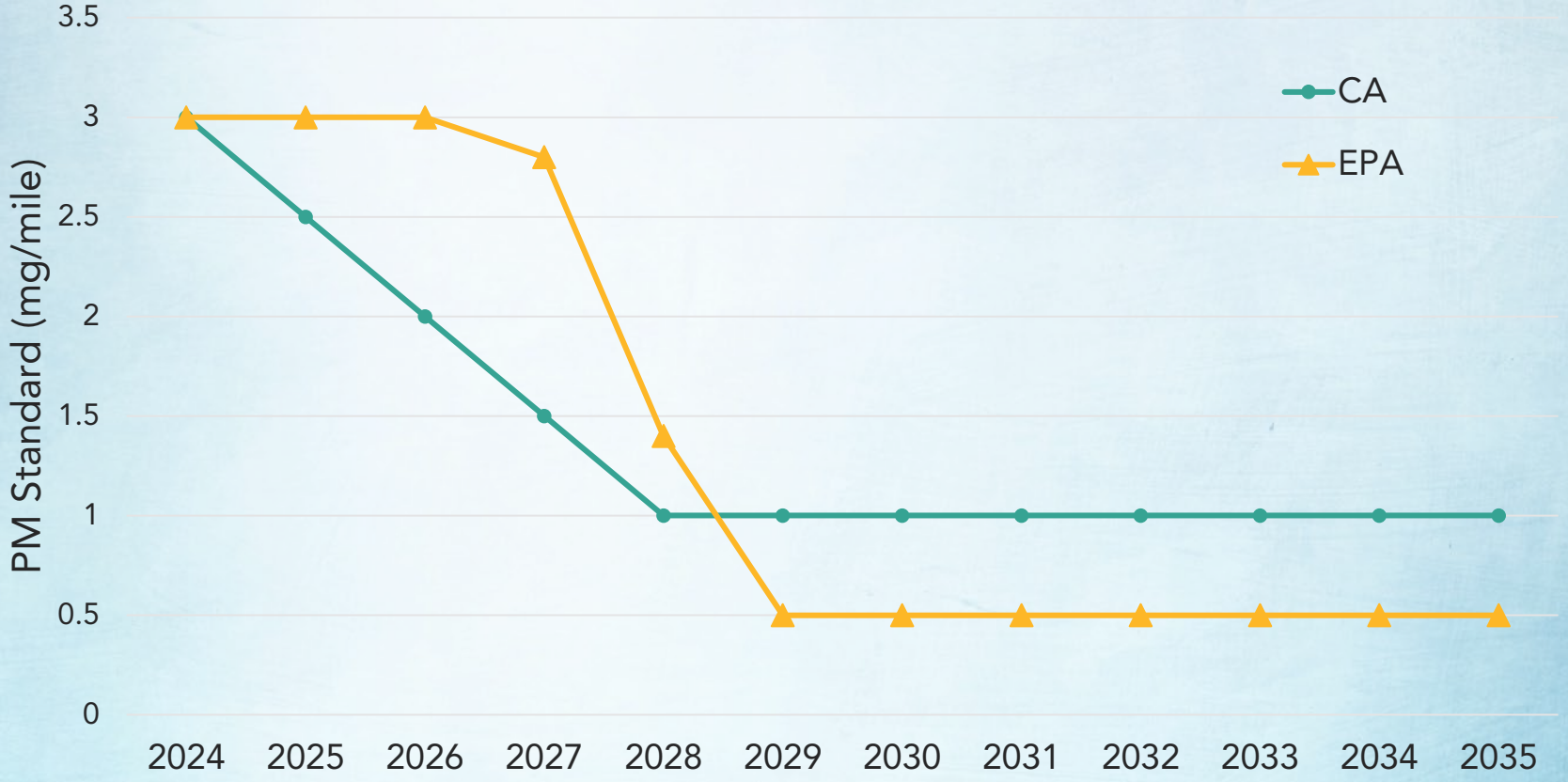
California Advanced Clean Cars

- Maintained FTP standard of 1 mg/mi beginning with MY2025
- Reduced US06 standard from 6 mg/mi to 3 mg/mi
- Phase-in excludes ZEVs

EPA Proposal

- Reducing standard for all test cycles to 0.5 mg/mi (from 3 or 6 mg/mi) effectively requiring gasoline particulate filters (GPFs) on all vehicles
- Phase-in counts ZEVs

Effective PM Standard for ICEs



CARB

Evaporative Emissions

California Advanced Clean Cars

- Lowered running loss emission standard from 0.05 g/mi to 0.01 g/mi
- Added minimum canister size requirement to control "puff" emissions from sealed fuel systems (mostly PHEVs) during refueling

EPA Proposal

- No change to running loss standard (remains at 0.05 g/mi)
- Eliminate exemption from ORVR requirements (captures refueling emissions) for medium-duty incomplete vehicles
- Requesting comment on doing the same for light-duty incomplete vehicles

Provisions Aligned with ACC II

- Improved engine start-up emission control:
  - High powered PHEV cold starts
  - Partial soak
  - Early drive away
- Eliminate composite option for SFTP emissions
  - Ensures more robust high speed/high acceleration emission control

Medium-Duty Criteria Standards

Medium-duty Vehicle Applicability

California Advanced Clean Cars

- Maintain separate standards for Class 2b (8,501-10k lbs GVWR) and Class 3 (10,001-14k lbs GVWR)
- All Class 2b and gasoline Class 3 vehicles must chassis certify
- Heavy-tow capable vehicles (GCWR >14k lbs) must additionally meet HD in-use standards enforced with PEMS

EPA Proposal

- Heavy-tow vehicles (GCWR >22k lbs) must comply with HD standards
  - Effectively all diesel pickups must meet HD standards with engine dyno certification
  - Longer useful life requirements

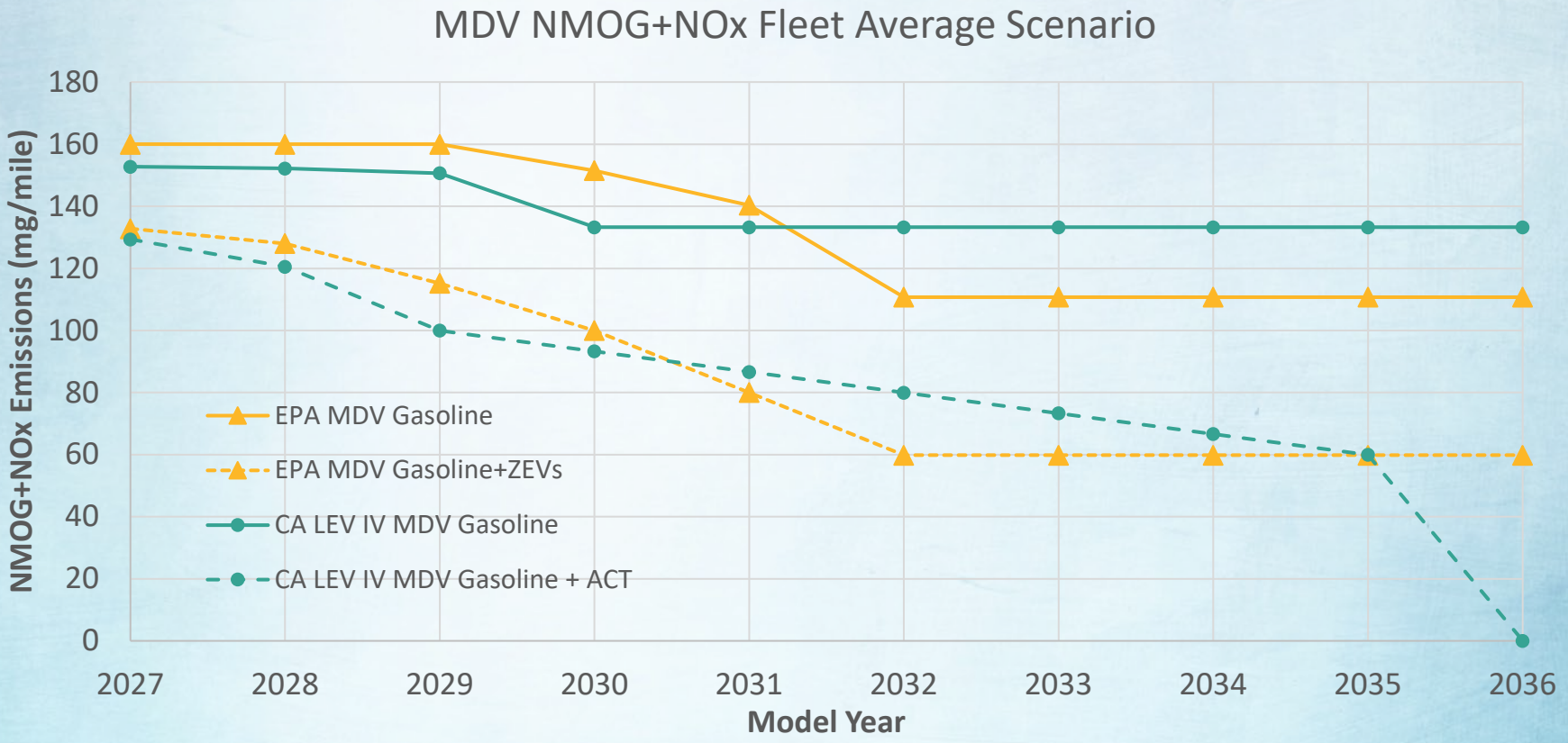
MDV NMOG+NOx Fleet Average Standard

California Advanced Clean Cars

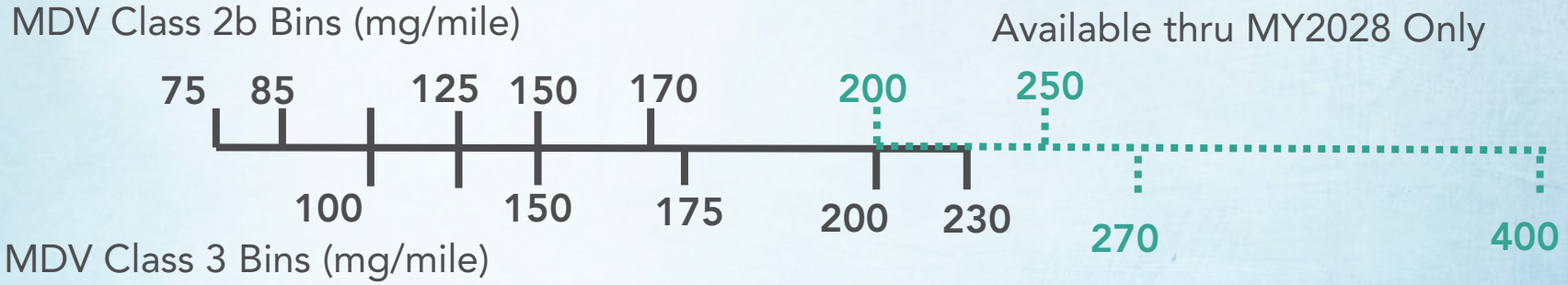
- Lowers Class 2b fleet average to 150 mg/mi by 2030 and Class 3 fleet average to 175 mg/mi by 2030
- Excludes ZEVs from average

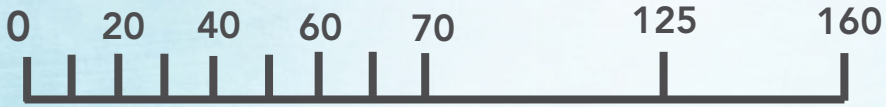
EPA Proposal

- Declines NMOG+NOx fleet average to 60 mg/mi by 2032
- Includes ZEVs in average
- Excludes heavy-tow diesels that must meet HD standards


MDV NMOG+NOx Fleet Average Scenario
NMOG+NOx Emissions (mg/mile)
180
160
140
120
100
80
60
40
20
0
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
Model Year
EPA MDV Gasoline
EPA MDV Gasoline+ZEVs
CA LEV IV MDV Gasoline
CA LEV IV MDV Gasoline + ACT

Medium-Duty NMOG+NOx Certification Bins





EPA MDV (8,501-14,000 lbs GVWR) (mg/mile)

Other MDV Provisions

- PM standards
  - EPA also lowering MDV PM to 0.5 mg/mi like LDV
  - CARB LEV IV lowered PM US06 standards to 5-8 mg/mi
- Both regulations eliminating composite SFTP standards but diverge on test cycles
  - EPA requires full US06 on all vehicles
  - CARB allows softer cycle on lower power vehicles

Questions?