



Heavy Duty Challenges and Scalable Opportunities

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Diesel Progress Summit, October 20, 2020

CARB Integrated Planning

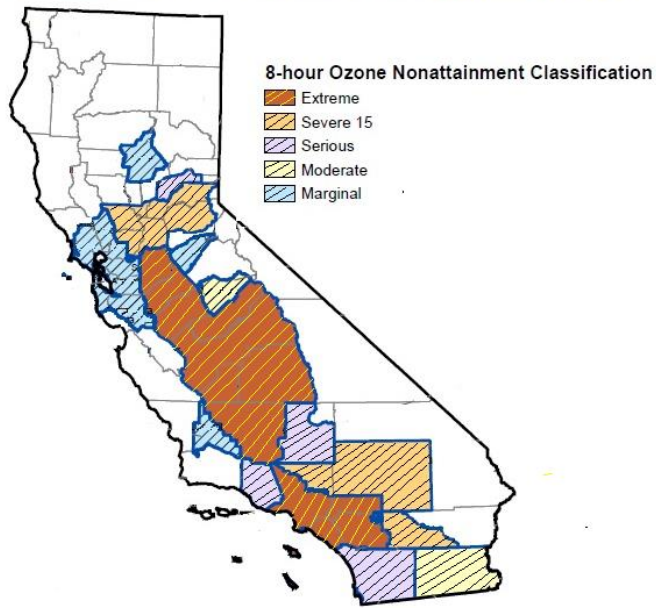


2020 update of Mobile Source Strategy underway

Discussion Draft released for comment looking toward a proposal to be heard at the December Board Meeting

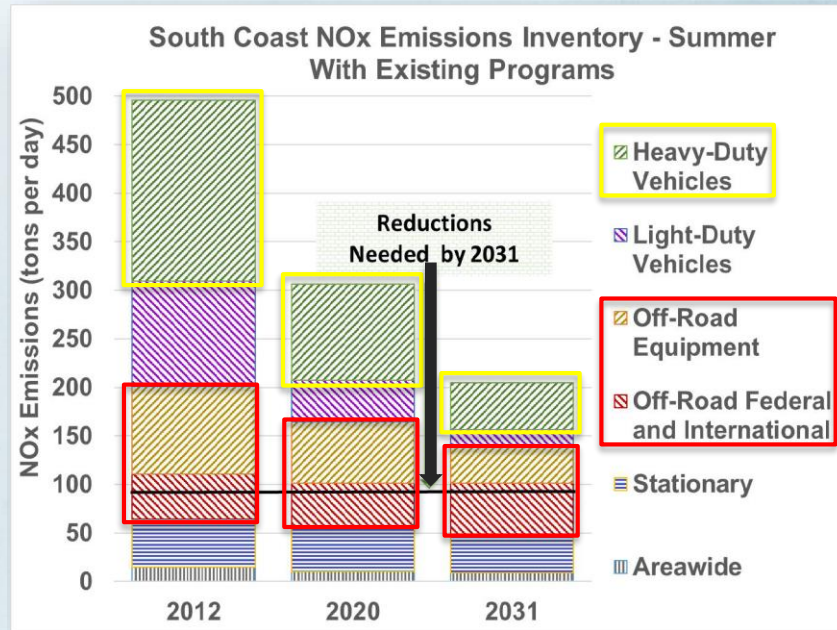
Heavy Duty NOx Critical to CA...

California 8-hour Ozone Nonattainment Areas (2008 Standard)



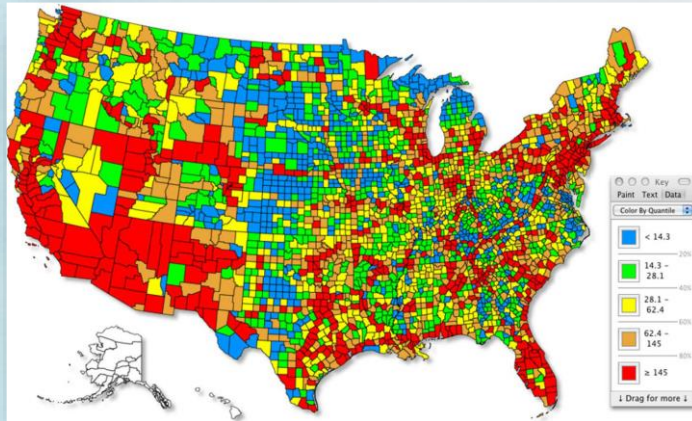
12 Million
breathing
bad air

Deep NOx
reductions
required

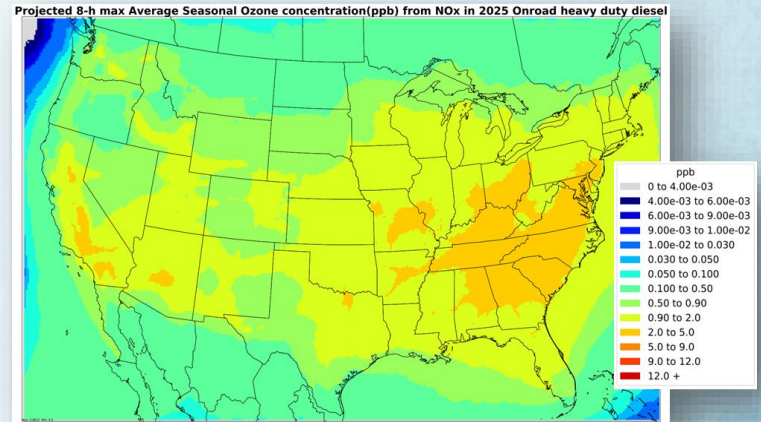


...but with Benefits Well Beyond California

MECA on NO_x: A stringent national HD On Road Program's county level reductions



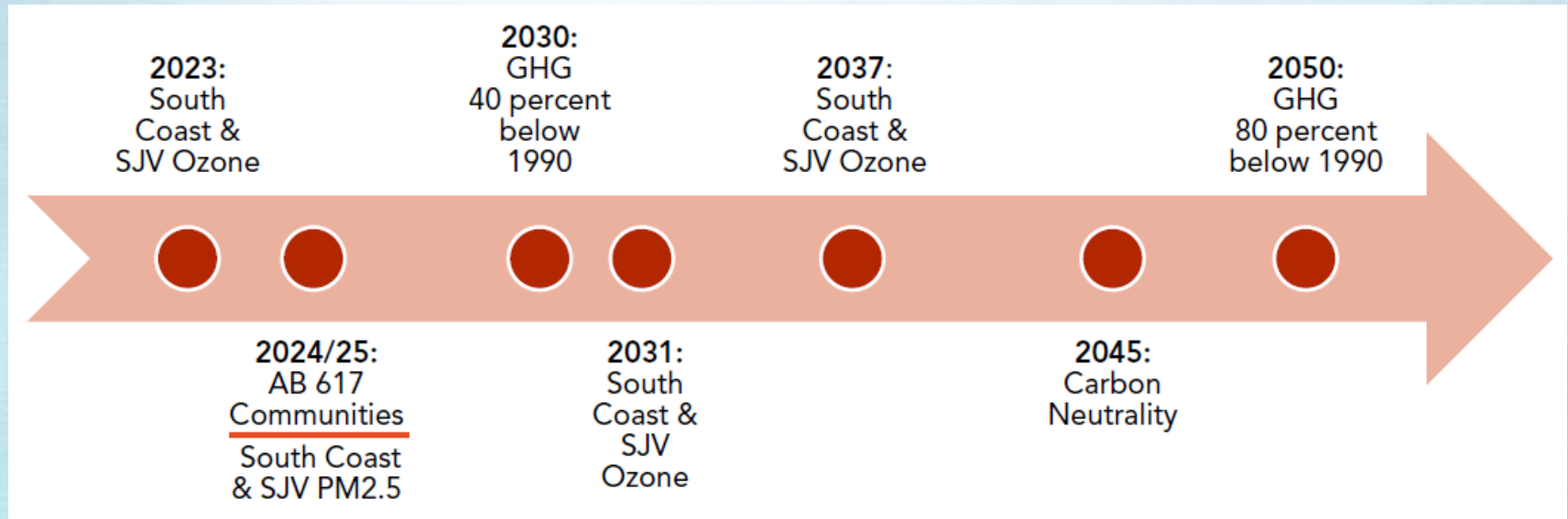
EPA on Ozone: HD On Road is Largest Mobile Source action available



Ozone Transport Commission, Mobile Sources Committee:
"Heavy duty Diesel NO_x Regulations—Current Highest Priority"

HD policy must include GHG

“Zero Emissions Everywhere Feasible,
Near Zero on Renewable Fuels everywhere Else”



Solutions need broad scalability

- Interstate trucks often operate far from where purchase or registered location
- Emissions from truck and equipment sources can drift across jurisdictions
- Used trucks & equipment move in re-sale market
- Vocation & dutycycle slowing with age and 2nd/3rd ownership



California Committed to Low Emission Future



New CARB Southern California Headquarters:

- 19 acre LEED Platinum & Zero Net Energy facility
- 380k sqft dedicated to Transportation Sustainability
- HD and LD Vehicle, OBD, PEMS, Powertrain, and Chemistry Laboratories
- Opening Spring 2021

Governor's Recent Actions

- Executive Order N-79-20* defines Fleet ZEV Transformation Timeline for
- Light Duty & Heavy Duty Vehicles
 - Off Road Equipment & Operations

 **100% ZEV sales** by 2035

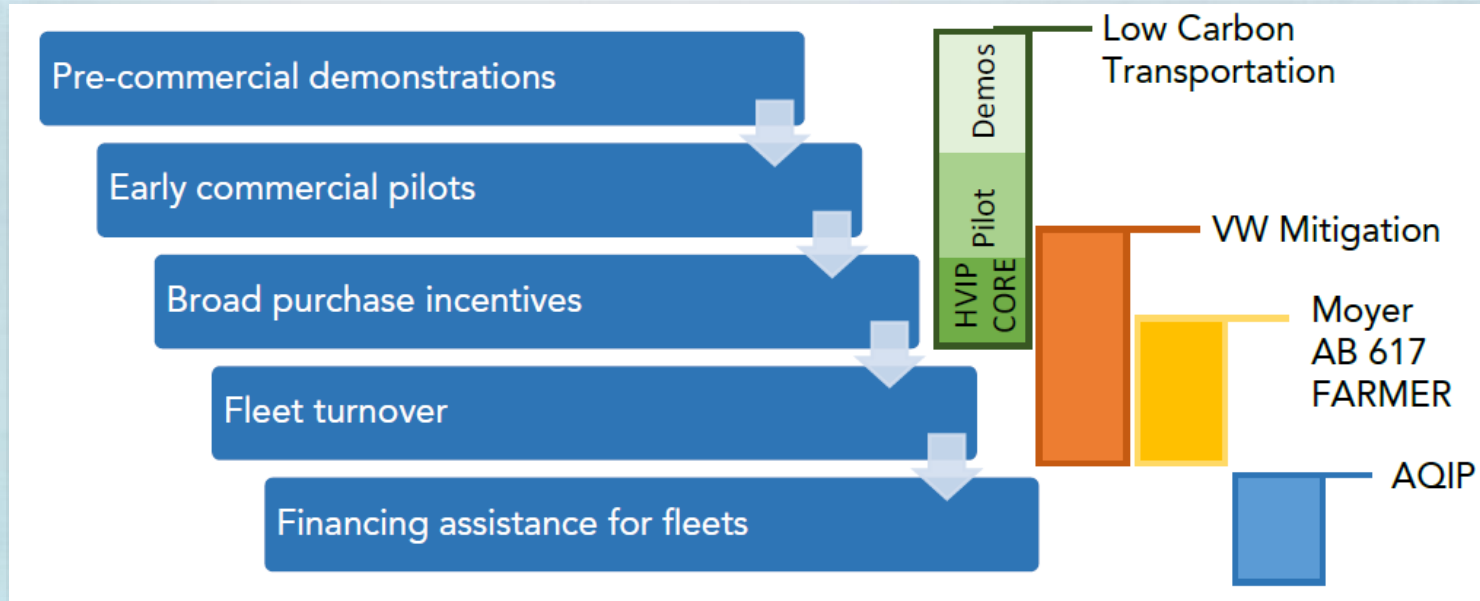
Full transition to **ZEV short-haul/drayage trucks**  by 2035

Full transition to **ZEV buses & heavy-duty long-haul trucks**   by 2045*
 *where feasible

Signed CA to 15 States + D.C.
Medium & Heavy Duty Zero Emission Vehicle MOU



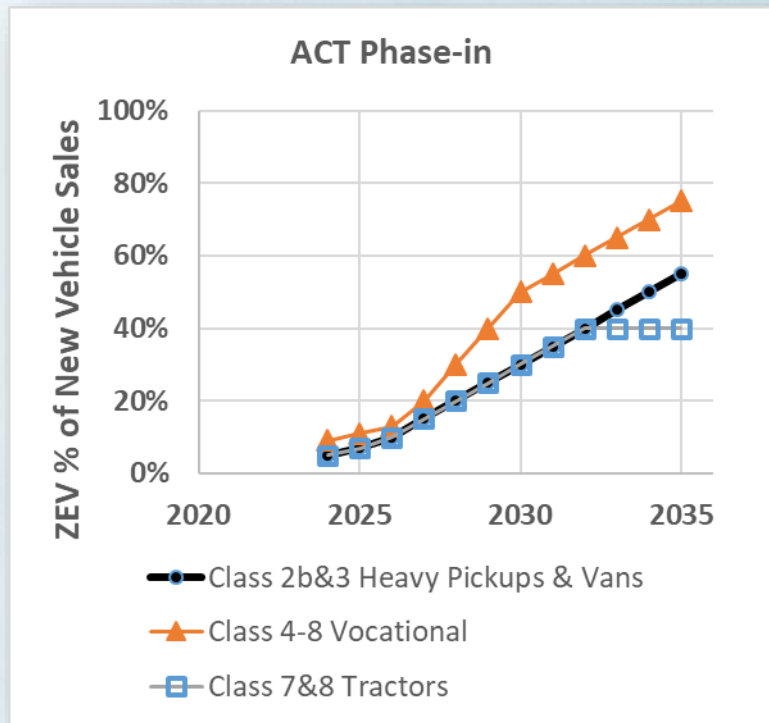
Incentives across Development Cycle



Annual Funding Plan development and 3-yr Investment Strategies

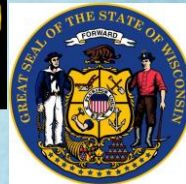
On Road Action: Advanced Clean Trucks

- Board Adopted June 2020
 - % ZEV Sales Requirement for HD vehicle manufacturers
 - One time large entity reporting
- Builds on existing fleet rules
 - *Innovative Clean Transit*
 - *Zero Emission Airport Shuttle Bus*



On Road Action: Heavy Duty Omnibus

- Emissions reductions from remaining Internal Combustion sales
CARB's largest NOx reduction measure in a decade
- Unanimously Adopted by the CARB Board on August 27, 2020
- States' Support Heard: Oral comments from (9) jurisdictions
CT, DC, MD, NJ, NY, OR, WA, WI, Washoe Co NV, + NACAA & NESCAUM
Written comments additionally from:
Colorado, Nevada, Clark Co NV, Maricopa Co AZ



Heavy Duty Omnibus Overview

- Order of Magnitude Cleaner Configurations
- Designed for actual service life in field
- Strong in-use verification and defect resolutions tools

Major Rulemaking Elements

- **Significantly Lowered NOx standard**
0.05g/bhphr initial step for MY2024 then 0.02 g/bhphr@435k step for MY 2027
- **Low Load NOx control requirement**
including Low Load Cycle & In-Use Metric
- **3-bin Moving Average Window In-Use Metric**
full workday emissions performance evaluation
- **Longer Warranty and Useful Life**
reflect actual vehicle usage
- **Improving initial Durability Demonstrations**
procedures for efficacy, efficiency, and practicality`

Visible Low NOx Activity Growing

- Multiple technology approaches toward Low NOx compliance:
 - Aftertreatment Architecture Emphasis
 - Engine Technology Emphasis
 - Hybrid/Emissions Integration Emphasis
- *(2) OEMs already planning MY2024 0.05g/bhphr Low NOx diesels*



Upcoming On Road Activity

- HD Inspection/Maintenance:
 - Legislative direction in SB210
 - Examining remote OBD reporting methods to reduce potential disruptions to compliant vehicles
- Advanced Clean Fleets:
 - ZEV purchase requirement 'pull' to pair with ACT's % ZEV sales 'push'
 - Anticipated to also include some vocation specific requirements for drayage, local delivery, etc.



Upcoming Off Road Activity

- Fleet rules being considered:
 - Zero Emission Large Forklifts
 - Transport Refrigeration Units (TRUs)
 - Cargo Handling Equipment
- Lower Emissions Standards: "Tier 5"
 - Concepts in draft 2020 Mobile Source Strategy
 - Range of engine sizes included
 - OBD and "REAL" NOx logging for Off Road
 - Off Road specific tech transfer of Low NOx
- Consideration of options for Locomotives and Marine



Looking Forward: Need for Broad Actions

- Technology readily available to significantly clean up today's engines
- Zero Emissions poised to address both criteria and GHG issues
- Health-based ambient air quality standards need Federal action on top of California's actions for prompt success.

**US-EPA's Cleaner Trucks Initiative a significant opportunity for progress.
CAA provides for States' action on HD that has been used before.**

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