HEAVY-DUTY LOW NOX PROGRAM
PUBLIC WORKSHOP

CALIFORNIA AIR RESOURCES BOARD

JANUARY 23, 2019
SACRAMENTO, CALIFORNIA
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Background: Need for NOx Emission Reductions
AIR QUALITY CHALLENGES

- Over 12 million Californians breathe unhealthy air

- Key challenges:
  - South Coast ozone
  - San Joaquin Valley PM2.5
SD SOUTH COAST EMISSIONS INVENTORY
KEY SOURCES

- NOx benefits by 2031 with current program
  - Mobile source emissions reduced over 50 percent
  - Heavy-duty vehicle emissions reduced by nearly 70 percent

- Heavy-duty trucks and off-road equipment remain largest contributors

- Heavy-duty trucks emit ~ one third of statewide NOx

- Additional reductions needed from all mobile sources to meet attainment
WHERE EMISSIONS ARE COMING FROM?

‘til 2023:
- Pre-2010s dominate NOx
  - Ensuring Truck and Bus Rule compliance/SBI critical

Beyond 2023:
- Deterioration-related emissions largest
  - Need HD I/M and Extended Warranty
- Running, start and idling emissions also significant
  - Need lower standards, low-load cycle, improved in-use testing
- Multi-pronged holistic approach required
NOx emissions from low-speed operation to become increasingly significant, due to SCR inefficiency at low loads.

Source: Seungju et al., High In-Use NOx Emissions from Heavy-Duty Diesel Trucks Equipped with SCR Systems and Their Impact on Air Quality Planning in California. TRB paper #17-02027
Implementation to begin in 2023

- Lower NOx standards for heavy-duty engines – 0.0x g/bhp-hr standard (as demonstrated by SwRI demonstration program)
- New low load certification cycle (LLC)
- Lengthened useful life and warranty period (Step 2)
- Strengthen the current durability demonstration program
- Strengthen the in-use testing program (HDIUT)
- Credits: Sunset existing credits, offer zero emission powertrain credits
Timing and Next Steps
U.S. EPA’S “CLEANER TRUCKS INITIATIVE”

- U.S EPA’s “Cleaner Trucks Initiative”  
  (https://www.epa.gov/newsreleases/epa-acting-administrator-wheeler-launches-cleaner-trucks-initiative)

- Announced on Nov 13, 2018

- Initiate HD low NOx rulemaking

- Plans to publish a proposed rule in 2020

- CARB will work collaboratively with U.S EPA to develop as much as possible harmonized national requirements
Upcoming Meetings:
• February 2019: Workgroup Meeting: HD In-Use Testing/Low Load Metrics
• March 2019: Workgroup Meeting: Stage 2 Proposed LLC and LLC Optimization Results
• May 2019: Public Workshop

UPCOMING MILESTONES

Stage 1B Re-age parts
Stage 2 – Develop/ assess LLC/Low load metrics
Stage 3 – Demonstrate low NOx on 2nd engine
Stage 3b – Explore additional engine hardware options that can simultaneously reduce NOx and GHG on stage 3 engine
NREL HD Low-NOx Technology Cost Study
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  - Low Load Cycle
  - Heavy-Duty In-Use Testing
  - Durability Demonstration Program
  - Credit Provisions

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