2017 EMA Certification

AND

Compliance Workshop

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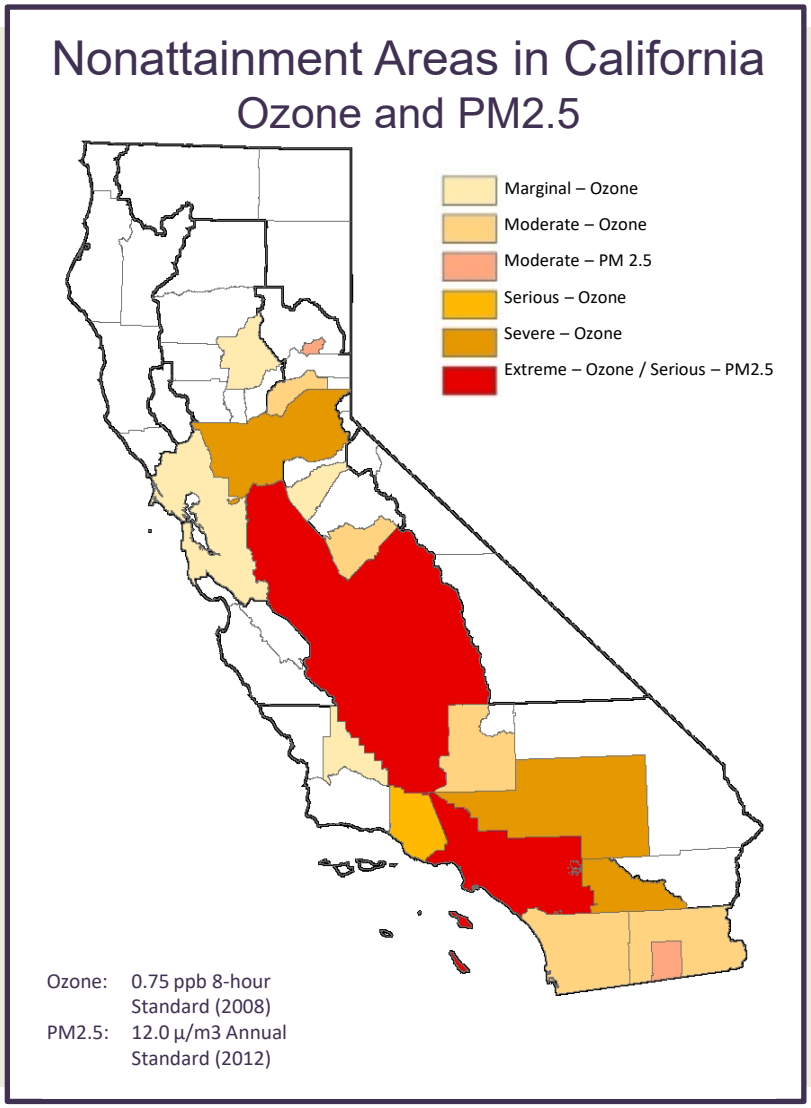
California's Air Quality and Climate Goals

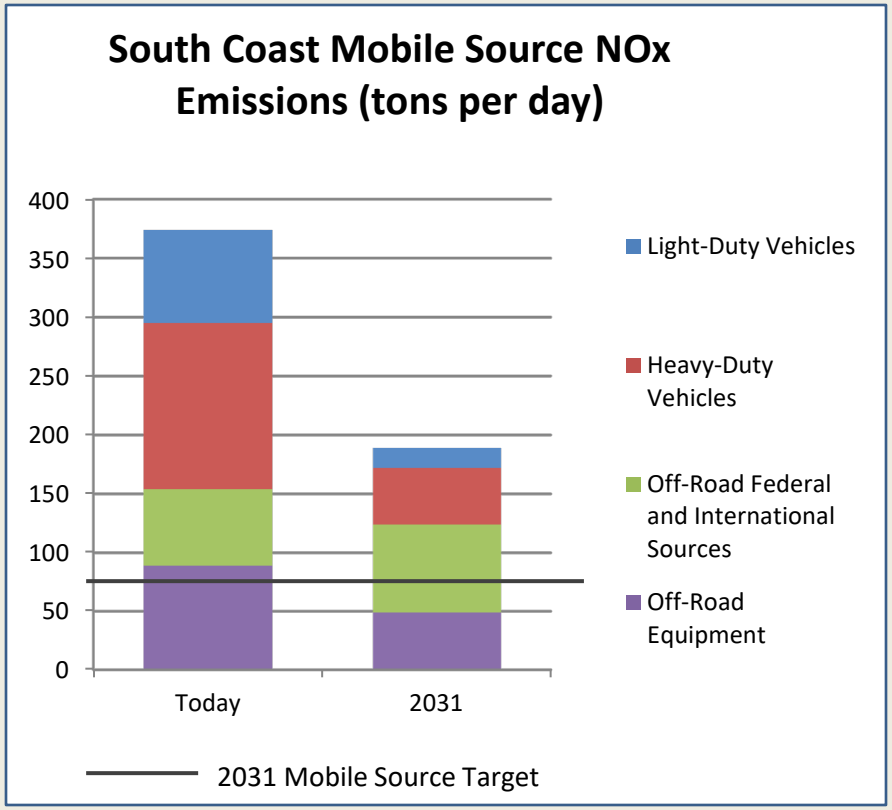
California's Air Quality Challenges

- Over 12 million Californians breathe unhealthy air
- Most areas expected to attain PM standards by 2026
- Key challenges:
  - South Coast ozone
  - San Joaquin Valley PM 2.5



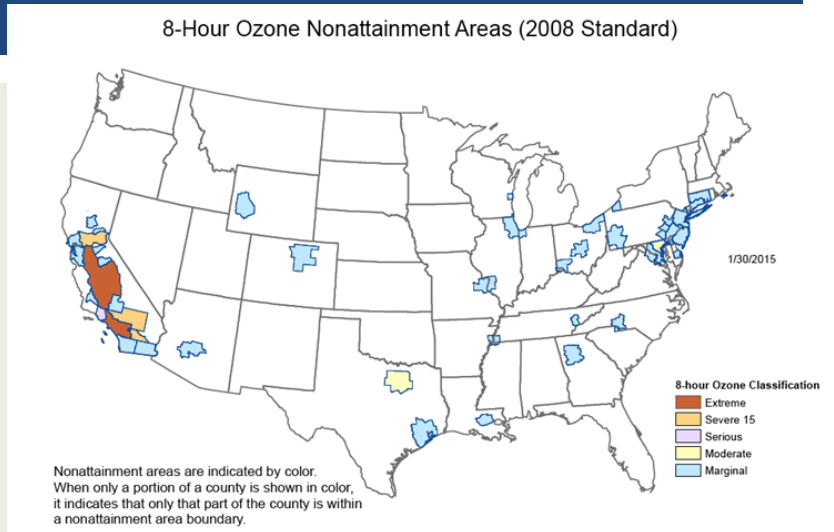
South Coast Emissions Inventory Key Sources

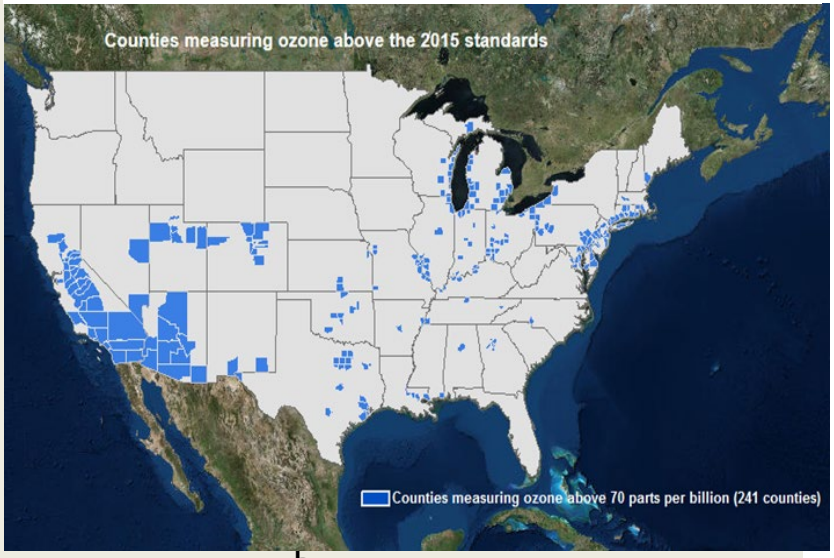
- Current program NOx benefits by 2031
  - Mobile source emissions reduced over 50 percent
  - Heavy-duty vehicle emissions reduced by nearly 70 percent
- Heavy-duty trucks and federal sources remain largest contributors
- Reaching Federal ozone standards in 2031 requires an 80 percent reduction in NOx emissions from today



Significant NOx Reductions Needed in California

- Significant NOx reductions needed to meet ozone standards in South Coast:
  - ~70% reduction by 2023
  - ~80% reduction by 2031
- Heavy-duty (HD) trucks emit 33% of statewide NOx, 509 tpd
- 2015 NAAQS for ozone strengthened
- National standards are important





Current HDE Emissions Standards Delivering Substantial Reductions

NOx reduced 97%
HC reduced 89 %
PM reduced 98%

NOx 0.20 g/bhp-hr

HC 0.14 g/bhp-hr

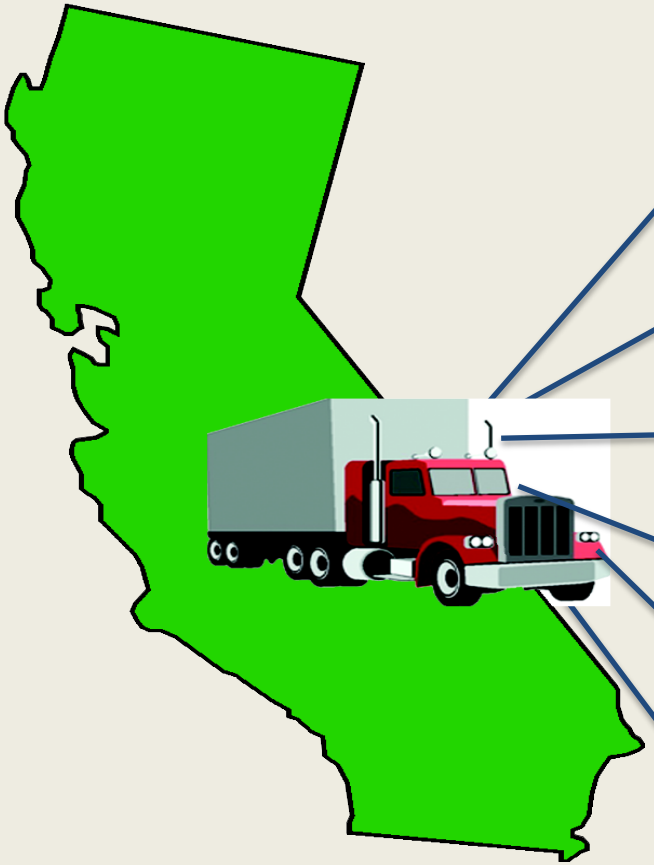
PM 0.01 g/bhp-hr

HC 1.3 g/bhp-hr

NOx 6.0 g/bhp-hr

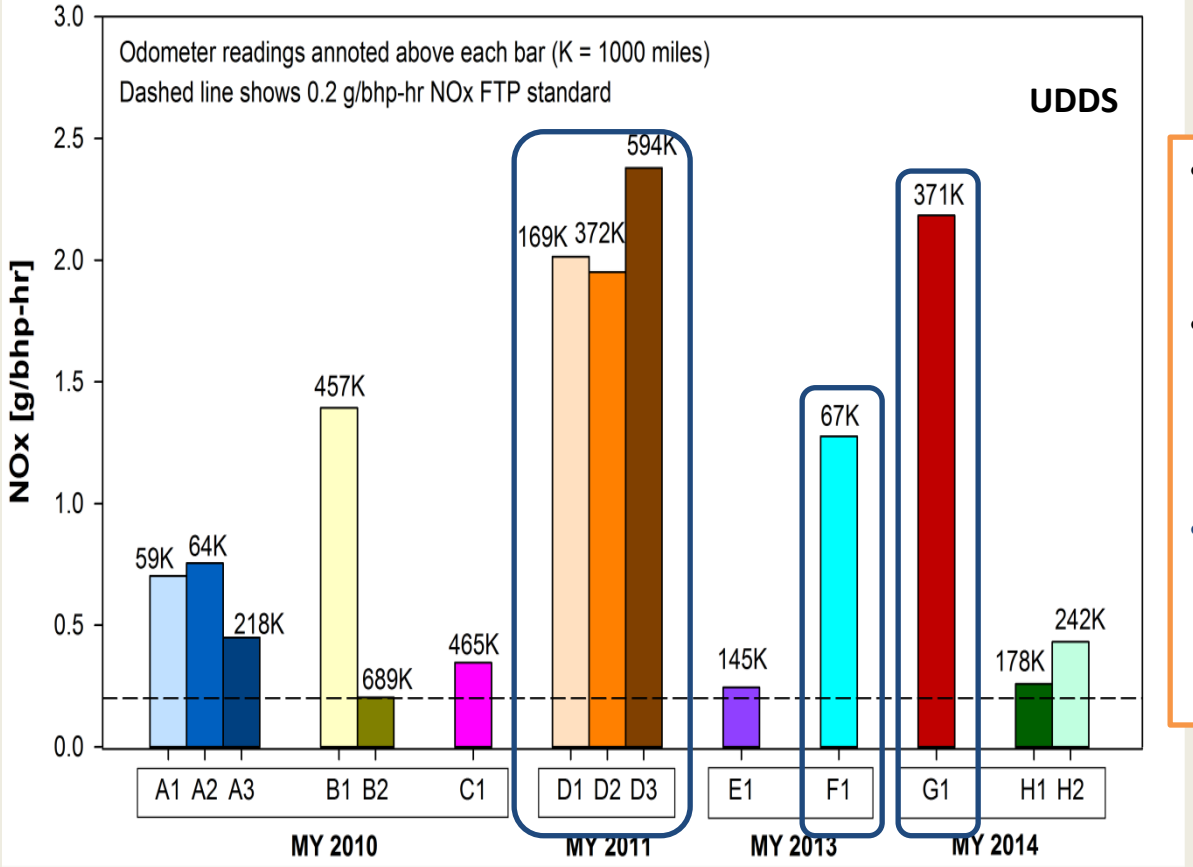
PM 0.6 g/bhp-hr

Reality Checks – Many Programs in Place to Monitor Emissions



- Smoke and Vehicle Inspections
  - Periodic Smoke Inspection Program
  - Heavy-Duty Vehicle Inspection Program (HDVIP)
- Warranty Claim Rates
  - Emissions Warranty Information Reporting
- Manufacturer In-Use Testing
  - Heavy-Duty In-Use Testing (HDIUT) Program
- Laboratory Dynamometer Testing
  - Engine and chassis dynamometer testing
- On-Road Emissions Measurements
  - Portable Emissions Measurement Systems
- Roadside and Remote Sensing Measurements

In-Use Surveillance Program Revealing Emissions Higher than Expected



- UDDS is used as base emissions rate in EMFAC
- At 65,000 lbs, UDDS and engine FTP power close for many engine platforms
- Engine families already referred to full HD In-Use Compliance (HDIUC) Program

D. Quiros, CRC 2017

CARB In-Use NTE Testing Shows Concerns

- Out of 10 vehicles tested in the HD In-Use Compliance program,
  - 6 vehicles failed to meet the minimum R_{pass} (0.90) for NOx
- Clean idle NOx emissions
  - 4 vehicles were under the limit (30g/hr) and 2 over the limit
- CARB is continuing its HD In-Use Compliance efforts with other engine manufacturers
  - Preliminary test results show 2 out of 4 vehicles failed to meet the minimum R_{pass} (0.90) for NOx

D. Lee, CRC 2017 Poster

CARB Implemented Program Improvements: Enhanced Certification, OBD and In-Use

- More In-Depth Auxiliary Emission Control Devices (AECD) Review
  - AECD Guidance Document Workgroup Forming
- Additional Confirmatory Testing with Special Cycles and PEMS
- On-Board Diagnostics Evaluation In-Use
- Emission Warranty Information Reporting
- In-Use Compliance includes non-approved AECD and Defeat Device Screening
- HDE In-Use Compliance Program using NTE Protocol Underway

Future Program Improvements
Critical Next Steps

New Standards
Bring cleanest technologies to market

In-Use Requirements
Ensure clean operations over life

Introduce ZEVs
Targeted applications well-suited for initial deployment

Demo & Pilot Projects -
Help develop next generation of cleanest technologies

Incentives
Accelerate penetration to achieve sufficient reductions

CARB Phase 2 GHG: Building on Federal Rulemaking

Combination Tractors

Vocational Vehicles

Large Pickups and Vans

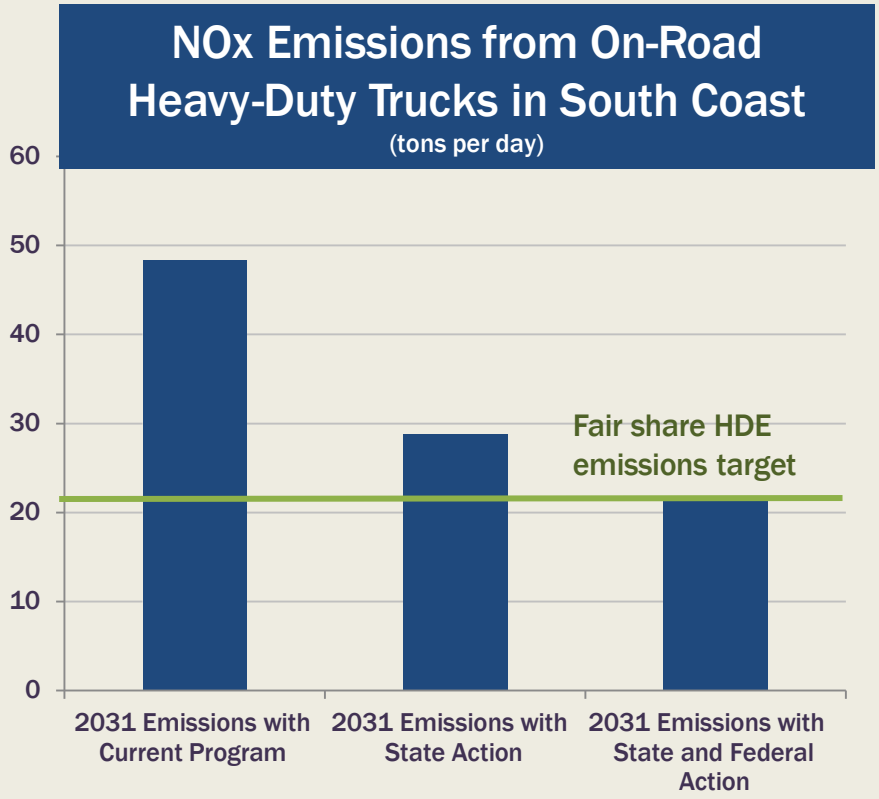
Trailers Pulled by Combination Tractors

NEW!

Federal Implementation:
2018-2027 for trailers
2021-2027 for all other segments

Cleaner Engine Standards

- Establish California low-NOx engine Standards (~90% reduction)
- Federal and State actions needed
- Implementation by 2023/2024 timing important



Engines Must Stay Clean In-Use

- Enhanced programs for in-use performance
  - Comprehensive inspection and maintenance program
  - Lower opacity standard
  - Expanded warranty requirements
  - Revise in-use testing program
  - Lengthen useful life

Introduction of ZEV Technologies

Last Mile Delivery

- Opportunity for near-term ZEV deployment in truck sector
- Purchaser and manufacturer requirements
- Advanced technology credit provisions
- Incentives

Zero-Emission Airport Shuttle Buses

- Facilitate deployment of ZEV passenger shuttles
- May include other airport-owned vehicles, e.g. operational and maintenance vehicles

Looking Forward

- CARB looks forward to working collaboratively with industry to meet California's SIP and Climate Goals
  - Near Term Mobile Source Program Improvements
  - SIP Measures Adoptions
  - Scoping Plan Measures Adoptions






Thank You!

Comments and Questions