



Proposed Optional Low NO_x Standards for Heavy Duty Engines, Extended Engine Warranties, and Heavy Duty Zero Emission Vehicles Certification

Public Workshop

March 11, 2013

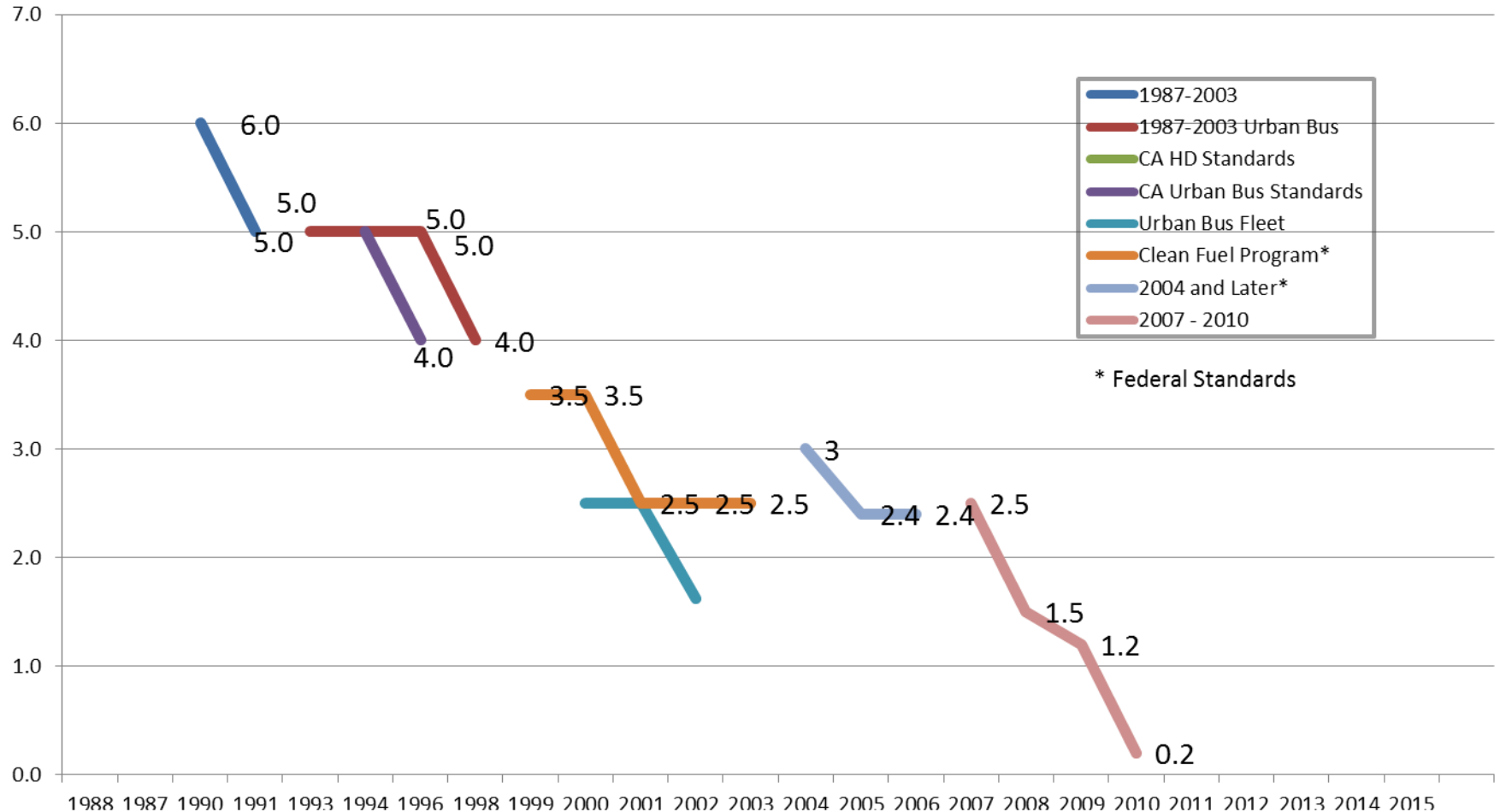


Outline



- Background
- Past and Current Mandatory NO_x Standards
- NO_x Control Strategies
- NO_x Related Research
- Proposed Optional Low NO_x Standards
- Durability / Warranty
- OBD Requirements
- Incentives
- Heavy Duty Zero Emission Engine Vehicles Certification

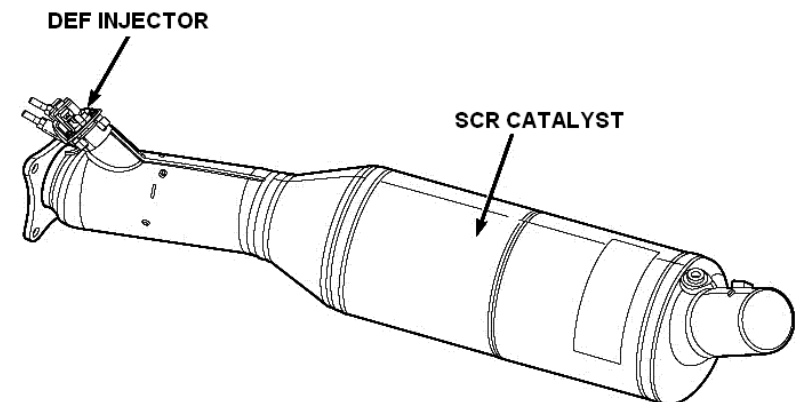
Federal and California Heavy Duty Diesel Engine NOx Emission Requirements (1988-2010)



Typical NO_x Reduction Strategies



- **Diesel**
 - Selective Catalytic Reduction (SCR)
 - Urea based systems
 - Exhaust Gas Recirculation (EGR)
- **LNG/CNG/Gasoline**
 - Three Way Catalyst/EGR



Additional Reductions Needed



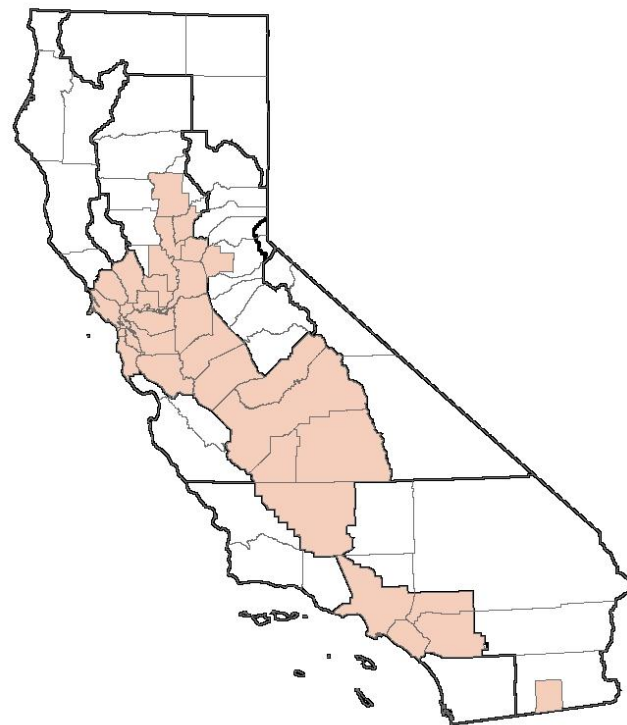
- Health impacts still significant
- Localized impacts still remain
- Near and long term reductions still needed for air quality and SIP



Federal Non-attainment Areas Ozone

Background: Why Optional Lower NO_x Emission Standards?

- If the entire on-road fleet complies with 2010 NO_x standards
 - NAAQS for PM and Ozone will still be exceeded
 - NO_x creates Ozone
 - NO_x contributes to secondary formation of PM (nitrates)



Federal Non-attainment Areas PM_{2.5}

How Will We Get There ?

- Engine Turnover
- Along with reduced idling
- Electric vehicles
- Cleaner New Engines
- Lower emitting new engines
 - Optional Low NOx standards to encourage development





Current NO_x Related Research

Relatively High NO_x When Engine, SCR Cool

- Developing optional low NO_x standards could focus emission reductions in emission reduction technologies problem areas.
 - Cold start
 - Low speed/low load
- Focus on thermal management of NO_x emission reduction technologies.

ARB Funding Research to Identify When SCR Functionality Challenged



- Characterize heavy-duty truck activity profiles (e.g., duty cycles, starts and soak time) for different vocational uses to identify operating conditions relevant to SCR function
- Evaluate emission test cycles to represent SCR relevant operating modes
- http://researchplanning.arb.wagn.org/files/Activity_Data_HDD_SOW-20666.pdf

Request for Proposal



- Research Division RFP
- “Evaluating Technologies and Methods to Lower Nitrogen Oxide Emissions from HDVs”
 - \$1.6 million project budget
 - Proposals due in April 10, 2013



California Energy Commission Projects

- Two Projects
- Near-Zero Emission Technology Research for HD Natural Gas Vehicles
 - Achieve 90% NO_x reduction without incurring a fuel penalty
 - Contracts are in development
- Hybrid Test Design Project
 - Natural gas hybrid
 - Goal 0.01 g/bhp-hr NO_x



Current Certification

For 0.2 g/bhp-hr NO_x Standard:

- 25% of engine families certified (2007-2012) to lower level
 - Less than 0.03 - 0.14 g/bhp-hr No_x
- Various fuels available



Proposed Optional NOx Standards



NOx Level g/bhp-hr	% Below Current Standard
0.2 (Current)	
0.1	- 50%
0.05	- 75%
0.02	- 90%

On-Board Diagnostics



- On-Board Diagnostic (OBD) systems
 - Mostly software in engine computer
 - Illuminates 'check engine light' when fault is detected
 - Standardized information for repair technician to help fix vehicle
- Required in on-road heavy-duty engines
 - Phase-in started in 2010MY
 - Required on all 2013+MY



OBD Goal: Maximize Lifetime In-Use Benefits of Lower NOx Standards



- OBD thresholds currently at 2 - 2.5x current standards (i.e., 2-2.5 x 0.2 g/bhp-hr)
- Proposal would retain this threshold
- May not be feasible immediately to lower to 2 – 2.5x proposed optional low-NOx levels



Optional Warranty



- Current warranty
 - 5 years or 100,000 miles
- Optional warranty
 - 5 years or 250,000 miles



Why Certify to a Lower NOX Standard?



- Why would manufacturers certify to optional NOx standards?
- Why would people want to buy optional lower NOx engines?

Carl Moyer Program



- Carl Moyer Memorial Air Quality Standards Attainment Program
 - Grant program funding incremental cost of cleaner than required engines, equipment, and other sources of air pollution
 - In the first 12 years, the Moyer program provided over \$680 million in State and local funds

Expanded Carl Moyer Funding Opportunities



- The Carl Moyer incentive program utilizes lower emission new purchase engines in their current program
- Current 2011 CM guidelines for new purchase
 - 30% cleaner than the 0.2 g/bhp-hr NO_x emission standard
 - Up to 25% of the new purchase cost depending on the project cost effectiveness
 - This option would open pathway by setting a new standard



Could Modify In-Use Rules to Encourage Use of Optional NOx Standards



- Truck and Bus Regulation
 - Requires turnover of all affected fleets by 2023 to 2010 and newer engines
 - Could be modified to give fleets incentives to purchase trucks with engines certified to optional NOx standards



Zero Emission Heavy Duty Trucks



A Path to Certify HD ZEVs



- Currently difficult to register HD ZEVs
 - All engines need to be certified to operate in CA
- There is not a regulatory pathway for HD ZEV engines to be certified in CA
 - To reach the emission reduction goals we need this sector to develop and grow

Possible HD ZEVs Certification Requirements



- ARB regulation needs to provide a certification pathway (HD >14,000 lbs)
 - HD ZEV manufactures would provide
 - Proof of range
 - Durability information
 - Label samples
 - In addition to other information proving zero emissions and vehicle safety

ARB Optional Low-NOx: Next Steps



- Public workshop Mar 11, 2013
- Release draft regulatory language Summer 2013
- Public comment on staff report begins Sep 9, 2013
- Board hearing Oct 24-25, 2013

Contact

- Comments and questions can be directed to:

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Questions?