Improving Mobile Source Emissions

2003 OTC Fall Meeting
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Engine Manufacturers Association

Engine Manufacturers Association

Engine Manufacturers Association

- Member trade association representing manufacturers of internal combustion engines
- Represents industry on legislative and regulatory matters with federal, state, local government
- Emphasis on environmental, regulatory and emissions technology issues

Overview

- Diesel-fueled (CI) mobile sources are a significant contributor to NOx and PM air emissions inventories and are of concern to state air regulators
- CI engine technology has improved greatly over the last two decades, resulting in lower-emitting, higher efficiency engines
- Presentation provides an overview of those improvements and suggests potential program areas for state activity

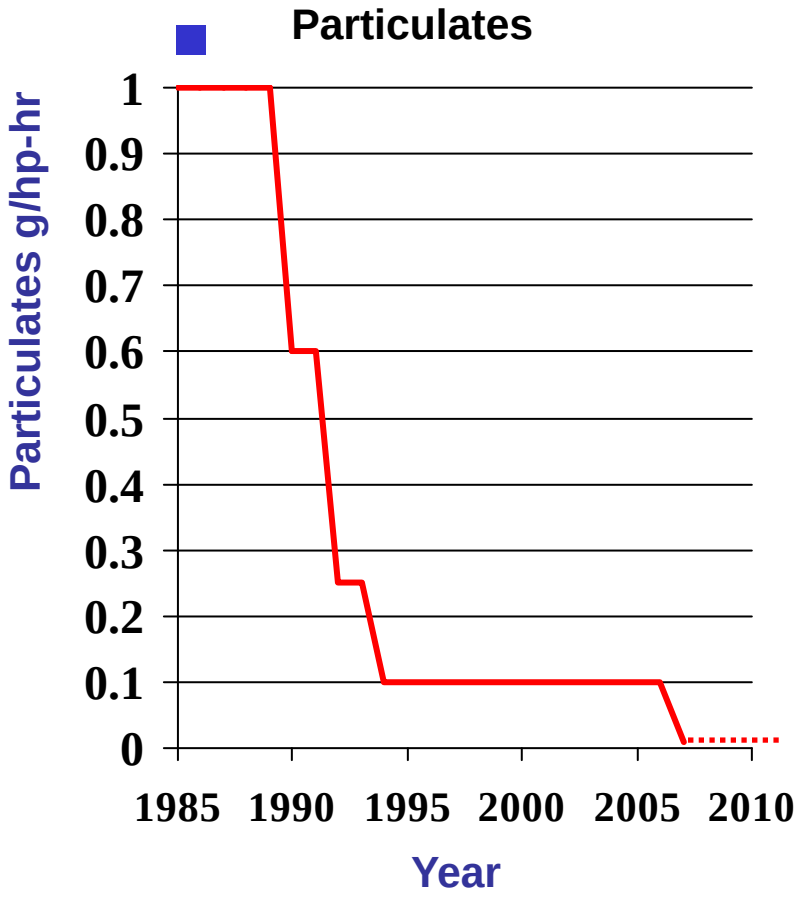
Improving Emissions Profiles

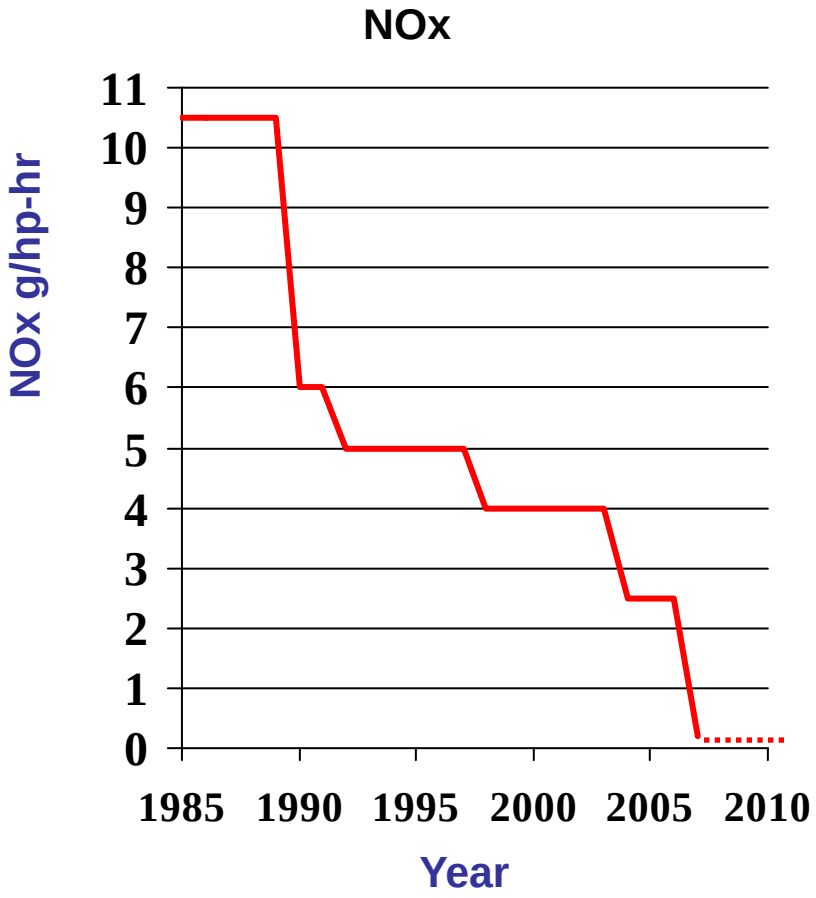
- Presentation concentrates on:
  - Heavy-duty on-highway CI engines (HDDE) including trucks and buses
  - Heavy-duty nonroad CI engines including construction, agricultural equipment
- Emission regulations and improvements for new engines
- Emission regulations and improvements for existing fleets

New Engines

- Emissions from new mobile source HDDEs are regulated federally under the Clean Air Act
- EPA has primary responsibility for establishing emissions standards for all new mobile source engines
- Under the Act, California may also establish emissions standards for certain new engines provided ARB secures a preemption waiver from EPA
- Other states are generally preempted from establishing emissions control requirements for new mobile source engines, but may adopt standards identical to CA
- Goal is to have national harmonized standards for sources that move in (and enable) interstate commerce

EPA On-Highway HDDE Emission Standards



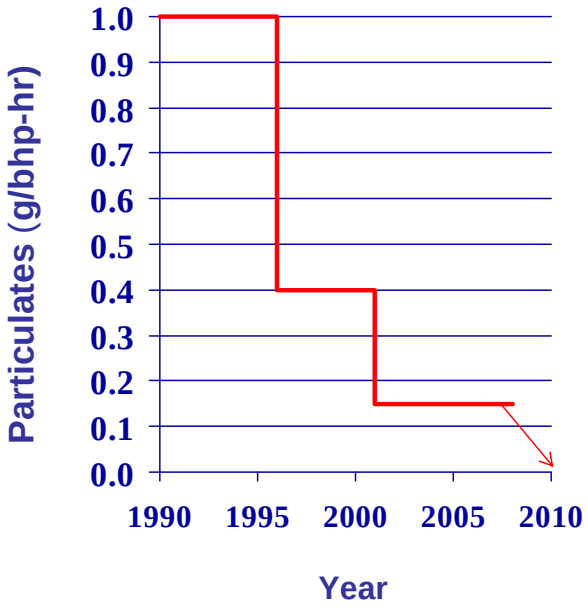


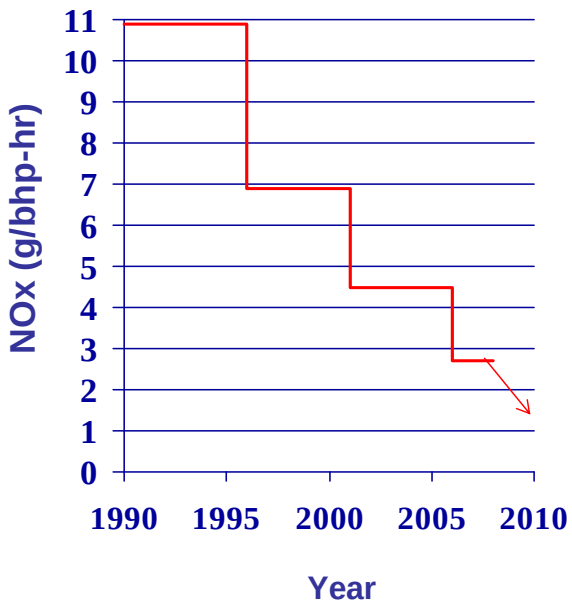
EPA On-Highway HDDE Emission Standards

- 2004(Oct 02 for “consent decree” companies)
  - PM 0.1 g/bhp-hr
  - NOx+NMHC 2.4 g/bhp-hr
- 2007 -2010
  - PM 0.01 g/bhp-hr
  - NOx 0.2 g/bhp-hr (1.18 g/bhp-hr in 07)
- Ultra-low Sulfur Diesel Fuel – Sept 2006
- Represents near 90% emissions reductions from new engines compared to current levels

EPA Nonroad CI Emissions Standards

EPA Diesel Engine Emission Standards
e.g, 302-602 hp





EPA Nonroad Emissions Standards

- Tiered Approach Based on Engine Size
- Example, 175 HP engine

- 2003(Tier 2)
  - PM 0.22 g/bhp-hr
  - NOx+NMHC4.9 g/bhp-hr
- 2007(Tier 3)
  - PM 0.22 g/bhp-hr
  - NOx+NMHC3.7 g/bhp-hr
- 2011 (Proposed Tier 4)
  - PM 0.01
  - NOx 0.30 (100% phase-in by 2014)

- Low–sulfur diesel fuel in 2007 and Ultra-low sulfur diesel fuel in 2010

- Represent near 90% emissions reductions from current levels

Issues in Meeting New Engine Emissions Standards

- Final Tier 4 rule expected in April/May 2004
- Requires Ultra-low sulfur diesel fuel
- Requires development of advanced aftertreatment control technology
  - PM Catalyzed Particulate Filter
  - NOx SCR, NOx Adsorber, EGR, ?
- Requires adequate lead time, stability, and “stagger”
- Requires technology transfer from On-highway to Nonroad environment
- Meeting proposed standards and schedule is a significant challenge for engine manufactures, especially those already challenged by HDOH 2007 rule

Status of Meeting New Engine Emissions Standards

- Petroleum Industry working to supply ultra-low sulfur diesel fuel by 2006
- Engine manufacturers developing systems approach that will use PM filters and some type of NOx control
- Greatest challenges will be to reduce NOx emissions and to scale PM traps to larger engines
- EMA initiating collaborative study to examine improvements in health effects from new technology – ACES (Advanced Collaborative Emissions Study)

Existing Engines, Vehicles and Equipment

- Emissions from new engines are being reduced to near zero levels, but emissions from existing fleets will persist until fleet turnover is complete
- States' efforts can be focused on reducing emissions from existing "non-new" fleets (subject to preemption issues/ARB waivers)

Areas for State Action

- Assure proper engine/vehicle maintenance and operation to control emissions
- Incentivize fleet turnover and rapid conversion to new, cleaner technologies
- Incentivize retrofit of existing fleets to improve emissions profile

I&M Programs

- Disproportionate levels of emissions come from poorly maintained engines and vehicles
- Implementation of appropriate I&M programs will significantly reduce emissions inventory from current fleet
- New research suggests that health effects from poorly maintained engines may be a key issue

Fleet Turnover

- Old engines and vehicles contribute to emissions inventory
- Replacing older vehicles with new technologies will dramatically improve fleet emissions profile
- States should encourage transition to cleaner technologies through voluntary incentives that increase fleet turnover
- Higher turnover to new technology will reduce emissions from current levels

Voluntary Retrofit Programs

- Retrofitting existing vehicles and engines can be an effective technique to reduce existing emissions
- Retrofit programs should be voluntary and incentivized – not all engines can be retrofitted effectively
- Cost and technology availability is key issue for vehicle owners
- Providing incentives through tax breaks/subsidies are best options
- Leverage federal retrofit programs and avoid cost and difficulties associated with establishing different state retrofit technology/verification programs

Summary

- New US EPA standards comprehensively address emissions from new CI engines and are driving emissions from heavy-duty applications to near zero levels
- New engines, fuels and emissions control technologies are the solution to clean air issues
- States can implement programs to reduce emissions from existing fleets including:
  - I&M Programs
  - Voluntary Incentivized Fleet Turnover Programs
  - Voluntary Incentivized Retrofit Programs

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