On and Off Road Policy Strategies

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Reconciling the Diesel Engine With the Environment: A Comprehensive Approach

Common Aspects--
- Systems approach—fuel change enables clean technologies
- Large environmental benefits
- Responsive to needs of States to meet air quality goals
- Collaborative process

Highway
Tier 2 Light-duty (1999)

Nonroad

Locomotive/Marine

Tier 4 diesel (2004)
This figure is intended to illustrate the timeline for the final highway and nonroad diesel fuel sulfur control programs. It is not drawn to exact scale. Refer to 40 CFR Part 80 for specific program dates.
EU and US Light Duty Gasoline and Diesel Vehicle Standards

Grams/Km

May/Will Include A Number Based PM Standard
Trends in Passenger Car Exhaust Emissions Standards

NOx Emissions Standards
Grams/Kilometer

- USA
- EU
- China
- Beijing
New Vehicle Standards in India

- Entire Country
  - Euro 2 – April 2005
  - Euro 3 – April 2010

- Major Cities
  - Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad & Ahmedabad, Pune Surat, Kanpur & Agra Already Euro 2
  - Tighter emission norms for all private vehicles, city public service vehicles and city commercial vehicles
    - Euro 3 From April 2005
    - Euro 4 From April 2010
Global Trends in On Road Vehicle Black Carbon Emissions
Normalized to 2000
Global Trends in On Road Vehicle Black Carbon Emissions

Normalized to 2000
Average Global Sulfur Levels in Diesel Fuel

PPM


Already Decided
Road Vehicle Emissions By Country

Black Carbon

Base Case

Million Metric Tons

OECD North Am
OECD Europe
OECD Pacific
FSU
East Europe
China
Other Asia
India
Other Asia
Middle East
Latin America
Africa
Targets of Opportunity

• China 2015 Euro 6 & Euro VI
• India 2015 Euro 6 & Euro VI
• Brazil 2015 Euro 6 & Euro VI
• Africa 2015 Euro 4& Euro IV, MC Euro 3
• Middle East 2015 Euro 4 & Euro IV, MC Euro 3
• Latin America 2015 MC Euro 3
Global Trends in On Road Vehicle Black Carbon Emissions

Normalized to 2000
Average Global Sulfur Levels in Diesel Fuel

- **Already Decided**
- **BC Initiative**
Black Carbon Emissions By Road Vehicle Type
Tight Standards Case

Million Metric Tons


- MC
- HDT
- MDGT
- MDT
- LDDV
- LDGV
Road Vehicle Emissions By Country

Black Carbon

Tight Standards Case

Million Metric Tons

- OECD North Am
- OECD Europe
- OECD Pacific
- FSU
- East Europe
- China
- Other Asia
- India
- Middle East
- Latin America
- Africa
North American Heavy Truck Black Carbon Emissions

85% Control of ALL

BASE CASE
Global Trends in On Road Vehicle Emissions
Normalized to 2000

Graph showing trends in various emissions from 2000 to 2050 for THC, N2O, CO, CH4, NOx, PM, and BC.
Road Vehicle Emissions By Country

Carbon Monoxide

Base Case

Million MetricTons

OECD North Am
OECD Europe
OECD Pacific
FSU
East Europe
China
Other Asia
India
Middle East
Latin America
Africa
Road Vehicle Emissions By Country
Nitrogen Oxides
Base Case

Million Metric Tons

- OECD North Am
- OECD Europe
- OECD Pacific
- FSU
- East Europe
- China
- Other Asia
- India
- Middle East
- Latin America
- Africa
Road Vehicle Emissions By Country
Particulate Matter
Base Case

Million Metric Tons

OECD North Am
OECD Europe
OECD Pacific
FSU
East Europe
China
Other Asia
India
Middle East
Latin America
Africa
Road Vehicle Emissions By Country

Methane

Base Case

Million Metric Tons


OECD North Am
OECD Europe
OECD Pacific
FSU
East Europe
China
Other Asia
India
Middle East
Latin America
Africa
Road Vehicle Emissions By Country

Total Hydrocarbons

Base Case

Million Metric Tons

OECD North Am
OECD Europe
OECD Pacific
FSU
East Europe
China
Other Asia
India
Middle East
Latin America
Africa
Figure 8: Projected GHG Emissions for New Passenger Vehicles by Country/Region

Source: ICCT
August 2008, Update