Motor Vehicle Pollution Control in the Asia Pacific Region

Washington DC - November 21, 2000

Motor Vehicle Pollution Control in the Asia Pacific Region

Global Motor Vehicle Emissions Reduction Compared To No Control

US National Air Quality Improvements in Past Decade

Global Trends In Motor Vehicle (Cars, Trucks & Buses) Production

Motorcycle Production in Selected Countries

Global Trend In Motor Vehicles

In '99 China Produced 11,269,136
50% of World Total
28% Increase From '98
PM10 Study in Europe
(Lancet Medical Journal - September 2, 2000)

- ~6% of all deaths from PM10
- ~40,000 deaths per year in Austria, France, Switzerland; 2 times traffic fatalities
- Motor Vehicles responsible for ~50%
- People in Cities die about 18 months earlier than they would otherwise
- over 300,000 cases of chronic bronchitis; 500,000 asthma attacks; 16 million lost person days of activity
- Health costs from pollution from traffic ~1.7% of total GDP

Impact of PM10 On Public Health
(For Every 10 micrograms/m3)

Average Los Angeles Basin Cancer Risk Apportionment

Approximate Risk = 5614 per Million
Adverse Effects From Vehicle Related Pollution

- Public Health Impacts
- Crop Damage
- Acid Rain
- Impaired Visibility
- Possible Climate Modification

Global Warming Concerns

- IPCC - 1995
  "the balance of evidence suggests a discernible human influence"
- IPCC - 2000
  "there has been a discernible human influence on global climate"

Global Atmospheric Concentrations of Greenhouse Gases - PPM

<table>
<thead>
<tr>
<th>Year</th>
<th>CO2</th>
<th>Methane</th>
<th>N2O</th>
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<tr>
<td>Preindustrial</td>
<td>280</td>
<td>0.7</td>
<td>0.275</td>
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<td>1994</td>
<td>358</td>
<td>1.72</td>
<td>0.312</td>
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</table>

Source: IPCC

Nitrogen Dioxide Air Quality Trends In Japan

<table>
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<th>Year</th>
<th>General Stations</th>
<th>Roadside Stations</th>
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<tbody>
<tr>
<td>1974</td>
<td>0.01</td>
<td>0.01</td>
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<tr>
<td>1975</td>
<td>0.02</td>
<td>0.02</td>
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<tr>
<td>1980</td>
<td>0.03</td>
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<td>0.05</td>
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<tr>
<td>1995</td>
<td>0.06</td>
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</table>

Source: Interim Review July 28, 2000

Suspended Particulate Matter Air Quality Trends In Japan

<table>
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<tr>
<th>Year</th>
<th>General Stations</th>
<th>Roadside Stations</th>
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<tbody>
<tr>
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<td>0.20</td>
<td>0.20</td>
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<tr>
<td>1979</td>
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<td>0.15</td>
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<tr>
<td>1984</td>
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<tr>
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<td>0.05</td>
</tr>
<tr>
<td>1994</td>
<td>0.00</td>
<td>0.00</td>
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</tbody>
</table>

Emissions From Vehicles in Japan

- Number of Vehicles
  - Diesel 75.0%
  - Gasoline 25.0%
- NOx Emissions
  - Diesel 100.0%
  - Gasoline 0.0%

Source: Interim Review July 28, 2000
New Vehicle Emissions Standards

Global Trend in Light Duty NOx Control

Global Trend in Light Duty Diesel PM Control

Global Trend in Heavy Duty Vehicle Emissions

European Agreement to Lower CO2 Emissions

- Some 120 g/km cars in 2000
- Target Range of 165-170 g/km in 2003
- Review Feasibility of 120 g/km for Average car by 2012 in 2003

Why Are Fuels Important?

- Fuel Constituents Directly Affect Emissions
- Fuel Changes Can Immediately Impact on Emissions/Air Quality
- Fuel Composition Can Enable/Disable Pollution Control Technology
**Leaded Gasoline Sales in 2000**

- **World Countries**

**Ambient Particulate Lead in Delhi**

(Pre and Post Unleaded Petrol)

- **Source:** CPCB

**Low Sulfur Gasoline**

- Sulfur Poisons The Catalyst
- Impact is irreversible
- Future Low Emissions Technologies Even More Sensitive
- CO, HC & NOx Emissions All Improve With Low Sulfur Gasoline

**Need For Low Sulfur Diesel Fuel**

- Lower Sulfur Lowers Direct PM Emissions and SO2
- Lower Sulfur Allows the Use of Some Advanced Diesel NOx/PM Control Technologies
- Lower Sulfur Improves Performance of Other Advanced Technologies

**Diesel Fuel Sulfur Specifications**

**Global Trends in On Road Motor Vehicle Emissions**

(Normalized to 1990)

- **OECD Countries Only**

22/11/00
Global Trends in On Road Motor Vehicle Emissions (Normalized to 1990)

Vehicle Population in China is Growing Rapidly

Rate of Growth is Even More Rapid in China’s Major Cities

China Vehicle Sales in 1999 (Excluding Motorcycles)
**Anticipated Trends in Vehicle Characteristics**

- Car fraction will grow rapidly
- Diesel fraction of medium & heavy duty will grow
- Motorcycles will grow rapidly; 2 strokes may gradually be phased out
- Traffic congestion will increase in cities

**Developments in China**

- Initial Clean Air Strategy Developed
  - Complete Lead Phase Out by 2000
  - Euro 1 Introduced for Cars & Lt. Trucks in 2000 (Beijing, Shanghai 1999)
  - Heavy Truck Standards, Euro 1, also in -2001 (2000 in Beijing)
  - I/M Pilot Being Developed in Shanghai

**Emissions Test Results - New York City Bus - CBD Test Cycle**

- PM (G/mile)
- NOx, CO, THC (G/mile)

**Conclusions**

- Serious Pollution Control Programs Must Adopt A Comprehensive, Holistic Approach
- Fuels Should Be Improved (Incremental Progress)
  - Ban Leaded Gasoline
  - Lower Sulfur in Diesel & Gasoline
  - Maximum Benzene at 1%
- Fuel Characteristics Should be Posted & Enforced (No Adulteration)

**Conclusions (continued)**

- Effective Enforcement is Critical
- A Strong Public Awareness Program should be Introduced