Vehicles, Fuels & Climate Change

Recent Developments in Europe

European Auto Standards

Gasoline Light Duty Truck Standards in EU

M.P. Walsh 07/21/98, 12:48 PM
Other Aspects of the Decision

- **Vehicle Related**
  - Cold Test (7°C) for Gasoline Cars, LTDs (2002)
  - Encourage Fiscal Incentives for early introduction of 2005 Technologies
  - By end of '99, Commission Proposal:
    - Cold Test for heavier LDTs
    - OBD Limits for 2005
    - Address Longer Term Objectives

M.P. Walsh
Other Aspects of the Decision (continued)

- **Fuels Related**
  - Lead Phase Out by 2000 (derogation up to 2005 in limited circumstances)
  - Allow very low sulfur fuels from 2000
  - Allow limited sulfur derogations (2003, 2007)
  - Establish uniform monitoring system to check fuel quality
  - Additional Proposals from Commission by end of 1999

---

**Gasoline Car NOx Standards For 2000**

<table>
<thead>
<tr>
<th></th>
<th>EU/US Tests Correlated</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Federal</td>
<td>0.340</td>
</tr>
<tr>
<td>CA TLEV</td>
<td>0.340</td>
</tr>
<tr>
<td>CA LEV/ULEV</td>
<td>0.170</td>
</tr>
<tr>
<td>EU STEP 3</td>
<td>0.150</td>
</tr>
</tbody>
</table>

---

**Diesel Car NOx Standards For 2000**

<table>
<thead>
<tr>
<th></th>
<th>EU/US Tests Correlated</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Federal</td>
<td>0.053</td>
</tr>
<tr>
<td>CA TLEV</td>
<td>0.026</td>
</tr>
<tr>
<td>CA LEV/ULEV</td>
<td>0.050</td>
</tr>
<tr>
<td>EU STEP 3</td>
<td>0.050</td>
</tr>
</tbody>
</table>

---

**Diesel Car PM Standards For 2000**

<table>
<thead>
<tr>
<th></th>
<th>EU/US Tests Correlated</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Federal</td>
<td>0.053</td>
</tr>
<tr>
<td>CA ULEV</td>
<td>0.026</td>
</tr>
<tr>
<td>EU STEP 3</td>
<td>0.050</td>
</tr>
</tbody>
</table>
Gasoline Car NOx Standards Proposed For 2005

- LEV/ULEV2: 0.042
- SULEV: 0.017
- EU Step 4: 0.080
- Default Tier 2, 160K: 0.170

EU/US Test Procedures Correlated

Diesel Car NOx Standards Proposed For 2005

- LEV/ULEV2: 0.04
- SULEV: 0.02
- EU Step 4: 0.25
- Default Tier 2, 160K: 0.17

Diesel Car PM Standards For 2005

- LEV/ULEV2: 0.007
- EU Step 4: 0.250
- Default Tier 2, 160K: 0.026

Useful Life Requirements

- US: 160,000
- CA Proposed Option: 240,000
- EU 2000: 80,000
- EU 2005: 100,000

M.P. Walsh 07/21/98, 12:48 PM
Sulfur Levels in Gasoline

Diesel Fuel Sulfur Specifications

Challenges For Vehicles

Global Carbon Dioxide Emissions

M.P. Walsh

07/21/98, 12:48 PM
European Proposals to Lower CO2 Emissions

Fuel Consumption Conversion

Fuel Consumption Conversion

European Approaches

- Gasoline DI
  - Lean NOx Catalyst/Low Sulfur Fuel
- Turbo Direct Injection (TDI) Diesel
  - Lean NOx Catalyst/Low Sulfur Fuel
- Fuel Cell
**Technology Market Share in Europe**

- DI Diesel
- SI DI
- IDI Diesel
- SI

Source: AVL

- Downsized
- VVT
- DI
- DI/VVT/d-size
- SI MPI
- Hybrid incl FC
- DI Diesel
- IDI Diesel

Source: FEV

**Emissions Reduction Targets**

- CO2
- SO2
- VOCs
- NOx

"Toward an Environmentally Sustainable Transport System"
Swedish EST Project - 1996

**UK Greenhouse Gases - 1995**

- CO2
- CH4
- N2O
- NOx
- CO
- NMVOC

M.P. Walsh 07/21/98, 12:48 PM
US Greenhouse Gases - 1995

- CO2: Transport 31.7%, Other 68.3%
- CH4: Transport 0.7%, Other 99.3%
- N2O: Transport 31.4%, Other 68.6%
- NOx: Transport 50.6%, Other 49.4%
- CO: Transport 83.3%, Other 16.7%
- NMVOC: Transport 40.2%, Other 59.8%