The International Transport Forum

- A global platform for transport, logistics, mobility
- A meeting place for the transport sector at the highest level
- A forum run by governments, open to business, research and civil society
- 51 Countries
1\textsuperscript{st} Forum in May 2008 in Leipzig: “Transport and Energy: The Challenge of Climate Change”
Outline

“Mind the Gap”: Trends in the Transport Sector

Which Policies at What Cost?

Transport Policy Implications and Priorities
Transport's Share of CO2 emissions from fuel combustion
(2005 IEA data, including international aviation and maritime)

OECD
- Road: 22.9%
- Domestic Aviation: 1.9%
- International Aviation: 1.8%
- Domestic Navigation: 0.4%
- Other Transport: 0.9%
- Other Sectors: 13.6%
- Manufacturing Industries and Construction: 14.0%
- Energy: 42.1%

World
- Road: 30%
- Domestic Aviation: 2.3%
- International Aviation: 1.8%
- Domestic Navigation: 0.4%
- Other Transport: 0.9%
- Other Sectors: 13.6%
- Energy: 42.1%

Transport
- OECD: 75.9%
- World: 73.3%

- Road: 48.6%
- Domestic Aviation: 5.9%
- International Aviation: 2.9%
- Domestic Navigation: 1.4%
- Other Transport: 5.0%
- Other Sectors: 6.6%
- International Maritime: 6.6%
- Other Sectors: 6.6%
Recent trends

Transport Sector CO2 Emissions by Region: 1990-2005
(excluding international aviation and shipping)

- **EU-15**: +22.3%
- **New EU (EU27-EU15)**: +44.7%
- **North America**: +28.7%
- **OECD Asia**: +32.3%
- **Other ITF**: -19.2%
- **Top 10 non ITF**: +97.8%
World Motorization: WBCSD Projections

Source: IEA
Air Passenger Traffic Development

- **History**: 1995-2005: 4.8%/yr
- **Forecast**: 2006-2025: 5.0%/yr

Air Cargo Traffic Development

- **History**: 1995-2005: 4.5%/yr
- **Forecast**: 2006-2025: 6%/yr

Source: Boeing, 2007

Source: Airbus, 2007
Future trends

Shipping Growth and Forecast

source: Corbett, 2007
"Mind the Gap": CO2 Emission Forecasts vs. Targets
indexed to 1990, IEA Data and ITF

World Total CO2 Emissions
World Transport CO2 Emissions
OECD Total CO2 Emissions

Targets
- EU
- Germany
- Netherlands
- France
- UK
- California
Decrease in Transport CO2 Emissions: 2002-2005
Indexed to 1990, IEA data, France, Germany and Japan
“Mind the Gap”: Trends in the Transport Sector

Which Policies at What Cost?
- Our review of Transport GHG Policies
- Decision framework: Cost Effectiveness
- Evidence of Transport GHG Marginal Abatement Costs
- Focus on Fuel Efficiency and Biofuels

Transport Policy Implications and Priorities
## Analysis of over 400 policies identified

<table>
<thead>
<tr>
<th>Category</th>
<th>Policies</th>
<th>% of policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>Urban planning to discourage sprawl; Road pricing; Logistics optimisation.</td>
<td>4%</td>
</tr>
<tr>
<td>Fuel efficiency</td>
<td>Tax differentiation to promote EFVs; Vehicle efficiency regulations – CAFE, Top-Runner; Driver training; Car pooling; Logistics management, route planning / guidance.</td>
<td>31%</td>
</tr>
<tr>
<td>Carbon intensity</td>
<td>Biofuel targets and tax incentives; Hydrogen fuel cell R&amp;D; Incentives for CNG buses.</td>
<td>24%</td>
</tr>
<tr>
<td>Modal split</td>
<td>Targeted subsidies for public transport.</td>
<td>28%</td>
</tr>
</tbody>
</table>
## Analysis of policies identified

<table>
<thead>
<tr>
<th>Top Policy Combinations</th>
<th>Ave % impact *</th>
<th>No. of ITF Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel tax policy</td>
<td><strong>7.1</strong></td>
<td>6</td>
</tr>
<tr>
<td>Vehicle fuel efficiency/voluntary agreement</td>
<td><strong>4.6</strong></td>
<td>EU + 3</td>
</tr>
<tr>
<td>Vehicle efficiency tax incentives</td>
<td><strong>4.3</strong></td>
<td>17</td>
</tr>
<tr>
<td>On road eff. education / training</td>
<td><strong>2.8</strong></td>
<td>11</td>
</tr>
<tr>
<td>Biofuels regulation</td>
<td><strong>2.6</strong></td>
<td>3</td>
</tr>
<tr>
<td>Fuel efficiency information</td>
<td><strong>2.2</strong></td>
<td>11</td>
</tr>
<tr>
<td>Road pricing</td>
<td><strong>2.1</strong></td>
<td>3</td>
</tr>
</tbody>
</table>

* CO₂ abated by national measure / total domestic transport CO₂ emissions
The 400 transport measures adopted so far should save 700 Mt CO$_2$ in 2010

IEA projection of transport emissions

700 Mt CO$_2$
Cost-effectiveness matters

• Cost-effectiveness fundamental determinant of which abatement policies to adopt

• 2nd best argument – transport should mitigate more because limited de-localisation effects

• Transport reported to have high marginal abatement costs, evidence that this is not so much the case
  – More rigorous abatement cost analysis needed

• High cost measures have attracted political support: Hydrogen, Biofuels, Modal shift, Hybrids

• Despite low effectiveness or robust quantification of GHG reduction

• Effective measures have weak political support
EU Car & Van GHG Abatement Costs & Mitigation Potential

Annual reduction in 2012 ~ 38 Mt

Annual reduction in 2020 ~ 96 Mt

Source: TNO, IEEP, LATS
## Core Vehicle Technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Δ efficiency</th>
<th>Cost/vehicle £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct injection &amp; lean burn</td>
<td>10 - 13%</td>
<td>200 - 400</td>
</tr>
<tr>
<td>Variable valve actuation</td>
<td>5 - 7%</td>
<td>175 - 250</td>
</tr>
<tr>
<td>Engine downsizing with turbocharging</td>
<td>10 - 15%</td>
<td>150 - 300</td>
</tr>
<tr>
<td>Dual clutch transmission</td>
<td>4 - 5%</td>
<td>400 - 600</td>
</tr>
<tr>
<td>Stop-start</td>
<td>3 - 4%</td>
<td>100 - 200</td>
</tr>
<tr>
<td>Stop-start with regenerative braking</td>
<td>7%</td>
<td>350 - 450</td>
</tr>
<tr>
<td>Electric motor assist</td>
<td>7%</td>
<td>1000</td>
</tr>
<tr>
<td>Reduced friction components</td>
<td>3-5%</td>
<td>negligible</td>
</tr>
<tr>
<td>Lightweighting</td>
<td>10%</td>
<td>250 - 500</td>
</tr>
<tr>
<td>Low rolling resistance tyres</td>
<td>2 - 4%</td>
<td>50 - 100</td>
</tr>
<tr>
<td>Aerodynamics</td>
<td>2 - 4%</td>
<td>negligible</td>
</tr>
</tbody>
</table>

Source: King 2007 based on IEA, IEEP, CARB, Ricardo.
Fuel Efficiency: Potential

- Tyres, cruise control, air con effective, lubricants: combined these could save up 5-10% of fuel.
- Diesels: lower potential for improvement
- Reducing vehicle weight important: evidence indicates this can be done without compromising safety
- More ambitious measures might deliver up to a factor 2 improvement by 2035 – but this will be challenging and a crucial question remains: how will people use their fuel savings?
Evolution of New Car Fuel Economy

- US (Light trucks)
- Australia
- Japan
- US (cars)
- Sweden
- UK
- Germany
- Belgium
- Austria
- France
- Italy

Liters per 100 km
Evolution of New Car Weight and Power

Average Car Weight (Kgs)

Average Car Power, kW
# High cost GHG mitigation: Biofuel subsidies

<table>
<thead>
<tr>
<th>Average performance</th>
<th>Euros/tCO$_{2}$eq</th>
<th>USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>US corn-ethanol</td>
<td>390</td>
<td>520</td>
</tr>
<tr>
<td>EU sugar-beet ethanol</td>
<td>450—620</td>
<td>610—840</td>
</tr>
<tr>
<td>EU rapeseed biodiesel</td>
<td>750—990</td>
<td>1 000—1 340</td>
</tr>
</tbody>
</table>

Sources: Koplow 2007; Kutas et al., 2007.
US biofuel tax subsidies to grow and grow

Billions of U.S. Dollars (nominal)

- Farm payments
- Ethanol tax credit
- Biodiesel tax credit

$4Bn

$16Bn
Designing support for Biofuels

• Volumetric targets inappropriate
  Likely to favour worst performing, lowest cost production

• Transport fuel carbon content targets better

• Certification for biofuels production

• Fuel carbon taxes, including for biofuels, would be more cost-effective than subsidies or targets
Outline

“Mind the Gap”: Trends in the Transport Sector

Which Policies at What Cost?

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Policy package (1/2)

• Integrated packages of measures needed
  – Vehicles, fuels, demand management, modal shift: fiscal and regulatory
  – mix depends on context

• Pricing important: London and Stockholm = -20%CO2, German MAUT?

• Public Transport, Integrated Land Use Planning, Strategic Infrastructure Investment all can have large co-benefits... and can deliver other benefits even if climate impact difficult to quantify.

• ... but they deliver GHG reductions on different time scales
UK Modeled CO2 Emission Reductions by Sector
Scenario Showing Least Cost Route to 60% Reduction by 2050

Source: Markal-Macro model
Transport CO2 Reduction Strategy 2002-2010, Japan

- Freight Modal Shift: -8.4mt
- Eco-driving, Clean Veh.: -8.2mt
- Traffic Flow: -5.1mt
- Biofuels: -8.2mt
- Public Transport and ITS: -2.8mt

"Business as Usual" w/out Fuel efficiency
"Business as Usual" w/ Fuel efficiency
Gov’t. Transport Target

Actual

source: MLIT, 2007
Policy package (2/2)

- Vehicle efficiency measures deliver the most quantifiable cuts
- Off-cycle components and eco-driving are most cost-effective
  - Significant, immediate savings – should be core measures
  - Give more attention to efficiency, away from only fuels & modal shift co-benefits approach (currently 1/3 of all national policies reported)
Some Priorities for Road Transport

- Certification of Biofuels, volume targets to become quality targets.
- Differentiate vehicle taxes by CO$_2$
- New low cost efficiency measures – Identify responsibility for implementation
- Develop off-test vehicle component standards / incentives
- Include CO2 in transport appraisal
- Increase understanding of transport abatement costs
- Ultimately, we need a price on Carbon.
Thank You
For more information:
www.internationaltransportforum.org
www.cemt.org