Low Emission Strategies Programme

- Background to Low Emission Strategies
- Supplementary Planning Guidance
- Low Emission Vehicles
- Procurement Guidance
- Low Emission Toolkit
695 Mt CO₂e

- International aviation & shipping* = 42 Mt CO₂e
- UK non-CO₂ GHGs = 98 Mt CO₂e
- Other CO₂ = 108 Mt CO₂e
- Industry (heat & industrial processes) = 103 Mt CO₂e
- Residential & Commercial heat = 134 Mt CO₂e
- Domestic transport = 184 Mt CO₂e

77% cut (= 80% vs. 1990)

159 Mt CO₂e

Low Emissions Strategies
using the planning system to reduce transport emissions

Good Practice Guidance

January 2010
Emission Reduction Progression

Avoid

↓

Shift

↓

Improve
Box 1: Low emission funding - ‘The Greenwich Formula’

Contributions will be sought for all residential schemes of 10 dwellings and above, and mixed use and commercial schemes of 500 m² and above.

A standard contribution will be sought of £100 per dwelling for residential development and £10 per m² for town centre and commercial developments.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Operational Phase Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction phase</td>
<td>Refer to the London Code&lt;sup&gt;21&lt;/sup&gt; and TGB case study&lt;sup&gt;22&lt;/sup&gt;</td>
</tr>
<tr>
<td>On-site parking</td>
<td>Graduated price parking permit schemes (e.g. graduation based on VED emission bands/Euro Standards)</td>
</tr>
<tr>
<td></td>
<td>Residential parking space set aside (e.g. for car clubs and/or low emission vehicles)</td>
</tr>
<tr>
<td></td>
<td>Customer parking allocation for low emission vehicles (e.g. supermarket)</td>
</tr>
<tr>
<td>Low emission infrastructure</td>
<td>Provision of electric charging bays or low emission fuelling points</td>
</tr>
<tr>
<td></td>
<td>Car clubs - development and promotion (including provision of low emission vehicles or electric charging bays)</td>
</tr>
<tr>
<td>Fleet emission improvement</td>
<td>Fleet improvement agreements</td>
</tr>
<tr>
<td>Emission-based differential tolling</td>
<td>Toll rates based upon emission performance of vehicles</td>
</tr>
<tr>
<td>Innovative ideas</td>
<td>Creative and opportunistic measures. For example:</td>
</tr>
<tr>
<td></td>
<td>- Low emission travel incentives via store loyalty card</td>
</tr>
<tr>
<td></td>
<td>- Local ESCO addressing transport issues</td>
</tr>
<tr>
<td></td>
<td>- Inter-authority partnership (see paragraph 31)</td>
</tr>
<tr>
<td>Procurement and supply chains</td>
<td>Forward commitment procurement</td>
</tr>
<tr>
<td>Contributions to local plans/projects</td>
<td>Use of procurement potential to help accelerate market entry for low emission technologies</td>
</tr>
<tr>
<td></td>
<td>See paragraph 34</td>
</tr>
</tbody>
</table>
## Fuel Economy

### Carbon dioxide emissions

<table>
<thead>
<tr>
<th>CO2 grams per kilometre</th>
<th>VED bands equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100</td>
<td>A</td>
</tr>
<tr>
<td>101-120</td>
<td>B</td>
</tr>
<tr>
<td>121-150</td>
<td>C</td>
</tr>
<tr>
<td>151-165</td>
<td>D</td>
</tr>
<tr>
<td>166-185</td>
<td>E</td>
</tr>
<tr>
<td>186+</td>
<td>F</td>
</tr>
</tbody>
</table>

### Running costs

**Fuel cost for 10,000 miles (16,000 km)**

Calculated on a combined (town centre and motorway) drive cycle with a base fuel price of 80 pence/litre. Fuel costs may differ from this due to driving behaviour as well as other non-technical factors.

| VED for 12 months | £858 | £125 |

**Vehicle excise duty (VED) or road tax is graduated according to the CO2 emissions of the vehicle and can be paid for 12 or 6 months.**

### Environmental Information

A free guide on fuel economy and CO2 emissions which contains data for all new passenger car models is available at any point of sale and on the web at: [www.vca.gov.uk](http://www.vca.gov.uk). Some specifications of this make/model may have lower CO2 emissions than this. Check with your dealer.

Driving behaviour as well as other non-technical factors play a role in determining a car's fuel consumption and CO2 emissions. Carbon dioxide is the main greenhouse gas responsible for global warming.

### Make/Model

*Ford Fiesta 1.4 ZETEC*

### Engine capacity (cc)

1399

### Fuel type

Petrol

### Transmission type

5 speed manual

### Fuel Consumption

Measured according to Directive 93/116/EU

<table>
<thead>
<tr>
<th>Drive cycle</th>
<th>Litre/100km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban (e.g. town centre)</td>
<td>6.8</td>
</tr>
<tr>
<td>Extra-urban (e.g. motorway)</td>
<td>4.4</td>
</tr>
<tr>
<td>Combined (e.g. town centre and motorway)</td>
<td>6.7</td>
</tr>
</tbody>
</table>

### Carbon Dioxide Emissions

158g/km

**Important note:** Some specifications of this make/model may have lower CO2 emissions than this. Check with your dealer.
Leeds City Region
Supplementary Planning Guidance

• Updates the LES Planning Guidance (Defra 2010)
• Low Emission Assessment Methodology (LEAM)
• Potential to integrate with BREEAM
• Low Emission Strategy Mitigation Options
• Low Emission Technology Availability & Applicability
• Suggested approach to Compensation Formula & Tariffs
• Publish on website this month
Action for Road Transport

UK road transport emissions assuming Eddington growth rate and current technologies and choices

Indicative emissions if technological and behavioural potential is realised

Potential for per km emissions savings

Clean-powered vehicles 80%

Vehicle efficiency (stock) 30% [25-40%]

Biofuels 10% [5-15%]

Choices 10% [5-25%]

50% reduction in CO₂ per km
30% reduction in total CO₂

90% reduction in CO₂ per km
80% reduction in total CO₂

Source – King 2007
European Emission Standards

- Euro I 1992
- Euro II 1996
- Euro III 2001
- Euro IV 2006
- Euro V 2009
- Euro VI 2013
Average new car CO₂ emissions

<table>
<thead>
<tr>
<th>Year</th>
<th>g/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>190</td>
</tr>
<tr>
<td>99</td>
<td>190</td>
</tr>
<tr>
<td>00</td>
<td>185</td>
</tr>
<tr>
<td>01</td>
<td>180</td>
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<tr>
<td>02</td>
<td>175</td>
</tr>
<tr>
<td>03</td>
<td>170</td>
</tr>
<tr>
<td>04</td>
<td>165</td>
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<tr>
<td>05</td>
<td>160</td>
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<td>07</td>
<td>150</td>
</tr>
<tr>
<td>08</td>
<td>145</td>
</tr>
<tr>
<td>09</td>
<td>140</td>
</tr>
</tbody>
</table>
Low Emission Vehicle Demonstrations
Particulate emissions g/kWh (ETC)

- Econic CNG
- EEV
- Euro 5
- Euro 4

Greenwich
Figure 4.3: Greenhouse Gas Emissions for 2002 Generic 38 tonne Heavy Goods Vehicle
Procurement Guidance

• Best Practice Guidance on the use of public sector procurement to reduce road transport emissions

• Working Group includes:
  YPO, Leeds CC, Sheffield CC, Greenwich, Sefton, City, York, TfL & GLA

• Procurement Frameworks, Green Procurement Policies, Sustainable Tender Evaluation, Leasing Innovation, Forward Commitment, Full Life Cycle Costs, Eco-labelling etc

• EU Cleaner Vehicle Directive & Lifetime Costs

• Cleaner Road Transport Vehicle Regulations 2010

• Draft Guidance March 2011 & Public Consultation Summer 2011
## Lifetime Cost Calculator

**Type of Fuel**

<table>
<thead>
<tr>
<th>Type of Fuel</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel, petrol, LPG, ethanol, biodiesel, emulsion fuel: l/100km</td>
<td></td>
</tr>
<tr>
<td>Natural gas or hydrogen gas: Nm&lt;sup&gt;3&lt;/sup&gt;/100km</td>
<td></td>
</tr>
<tr>
<td>Liquid hydrogen: l/100km or kg/100km</td>
<td></td>
</tr>
<tr>
<td>Electricity: kWh/100km</td>
<td></td>
</tr>
</tbody>
</table>

**Fuel Consumption**

- CO<sub>2</sub> Emissions (g/km)
- NO<sub>x</sub> (Nitrous oxides)
- PM (Particulate Matter)
- NMHC (Non-methane hydrocarbons)

**Pollutant emissions**

- Emissions (g/km or g/kWh): Input in g/kWh, g/km is calculated on the basis of input for fuel consumption
- NO<sub>x</sub> (Nitrous oxides)
- PM (Particulate Matter)
- NMHC (Non-methane hydrocarbons)

**Reference fuel**

- Petrol or diesel fuel (cost before tax)
- Reference Fuel Cost of Reference Fuel (€/l)
- Cost of CO<sub>2</sub> (€/t): Range 30-40 €/t, default 30 €/t

## Lifetime Mileage (km)

**Default values**

<table>
<thead>
<tr>
<th>Results of Lifetime Costs</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy consumption</td>
<td></td>
</tr>
<tr>
<td>CO&lt;sub&gt;2&lt;/sub&gt; emissions</td>
<td></td>
</tr>
<tr>
<td>Pollutant emissions</td>
<td></td>
</tr>
<tr>
<td>Total Operational Lifetime Costs:</td>
<td></td>
</tr>
<tr>
<td>Total Lifetime Costs + Cost of Vehicle</td>
<td></td>
</tr>
</tbody>
</table>
Key Results From Two Studies

- Electric vehicles largest emissions reductions when using renewable electricity
- Vehicle size influences emissions
- Bio-methane cleanest burning fuel and lowest life cycle environmental impact
- Bio-diesel produced from waste oil second best performing biofuel
- Bio-diesel reduces PM emissions but slightly increases in NOx
- Bio-ethanol from cereals - increase in aldehyde emissions, life cycle CO$_2$ can be high depending on cultivation & production method
Camden Green Vehicle Policy Development

1) Electric
2) Plug-in hybrid
3) Bio-methane fitted with hybrid assist
4) Bio-methane
5) Compressed Natural Gas/Liquid Natural Gas fitted with hybrid assist
6) Bi-fuel Liquid Petroleum Gas fitted with hybrid assist
7) Compressed Natural Gas/Liquid Natural Gas
8) Bi-fuel Liquid Petroleum Gas
9) Petrol Hybrid
10) Diesel Hybrid
11) Bio-diesel produced from used cooking oil
12) Bio-diesel produced from virgin plant oil
13) Bio-ethanol
14) Ultra low sulphur petrol
15) Ultra low sulphur diesel

Clean Vehicle Fuel & Technology Hierarchy

<table>
<thead>
<tr>
<th></th>
<th>2009/10</th>
<th>2010/11</th>
<th>2011/12</th>
<th>2012/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>15% from options 1-4</td>
<td>20% from options 1-4</td>
<td>25% from options 1-4</td>
<td>30% from options 1-4</td>
<td></td>
</tr>
<tr>
<td>70% from options 5-10</td>
<td>65% from options 5-10</td>
<td>65% from options 5-10</td>
<td>60% from options 5-10</td>
<td></td>
</tr>
<tr>
<td>15% from options 11-15</td>
<td>15% from options 11-15</td>
<td>10% from options 11-15</td>
<td>10% from options 11-15</td>
<td></td>
</tr>
</tbody>
</table>

Example European Emission Standards

<table>
<thead>
<tr>
<th></th>
<th>2009/10</th>
<th>2010/11</th>
<th>2011/12</th>
<th>2012/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger cars/light commercial (&lt;3.5T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euro 4</td>
<td>100%</td>
<td>75%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euro 5</td>
<td>25%</td>
<td>75%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Euro 6</td>
<td>25%</td>
<td>50%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Low Emission Toolkit

- Defra AQ Grant and Greenwich s106 funds
- Contract with TTR, CERC and RPS
- Now finalising the ‘Beta Version’
TECHNOLOGY GUIDANCE

Select vehicles  →  Compare emissions, costs, etc.  →  Output results

Vehicle select

Comparison of new technology vehicles

B30 HGV

Low Emission Strategies

Overview: 30% biodiesel in a conventional diesel engine vehicle.

- Technological Maturity: This technology is widespread and has reached mass scale exploitation.
- Co-Benefits: lower particulate matter, reduced road dust.
- Practicality: few or no specific additional safety requirements compared to standard vehicles. There are few public refueling stations, operators will require their own depot to refuel vehicles. Fuel is available for depot delivery.

GHG (gCO2eq/km): 130.85, 132.65

PM (g/km): 0.22, 0.27

Maintenance (€/km): 0.15, 0.17

Retracting Infrastructure (Total Cost in €/km): 0.35, 0.36
FLEET TOOL

Describe current fleet → Review baseline → Compare alternatives
DEVELOPMENT TOOL

Define development

Review baseline emissions

Select planning measures

Compare scenarios