

*PIU Energy Project*

**TRANSPORT – INITIAL SCOPING NOTE**

Reference: Transport 1 v1.0

Date: August 2001

**1. PURPOSE OF THIS NOTE AND WAY FORWARD**

- 1.1. The aim of this note is to summarise trends in transport use, energy consumption and environmental impacts; to set out the current UK transport policy; and to identify the main issues to be addressed in the energy review.
- 1.2. This is one of a series of initial scoping notes that have been prepared by the PIU Energy Review Team on a series of topics. The team will not be producing scoping notes on every aspect of the Review. Some areas relevant to the Review have already been explored in depth by the PIU Resource Productivity and Renewables Review Team which has been working since January 2001 and which has been merged into the Energy Review Team.

<p><b>Readers should not assume that the PIU has in any respect closed its mind. Questions are put in order to draw responses.</b></p>
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- 1.3. We will be taking forward discussion of the questions and propositions raised in this note over the next two months.
- 1.4. This will be done via bilateral meetings with key stakeholders. We are also likely to arrange a workshop involving all key stakeholders where views on the key issues can be exchanged and debated, probably during October.
- 1.5. The PIU has already invited all interested parties to put submissions to it by 10<sup>th</sup> September on all aspects of the PIU Energy Review. Interested parties are invited to respond in their submissions to the questions and propositions raised in this scoping note.
- 1.6. We would also be grateful if interested parties could let us know as soon as possible if they consider this note overlooks key questions, if any of the questions posed, or propositions put, are fundamentally misconceived, or if the note contains any factual errors.

**2. THE ISSUE**

- 2.1. Transport is currently the largest single sector consumer of energy in the UK (34% of final energy demand in 2000<sup>i</sup>) and forecast increases of energy consumption are primarily driven by growth in the transport sector. The transport sector is the third largest source of greenhouse gas emissions in the UK (23% by end user in 2000<sup>ii</sup>). While projections based on current policies show a stabilisation of emissions to 2010, forecasts indicate strong growth particularly in air travel beyond this date.

- 2.2. Understanding transport trends and using transport policy tools are therefore important elements of a strategy to achieve energy policy objectives. A fundamental review of transport policy is not to be undertaken as part of the Energy Review. The aim of this work stream is to identify the strategic transport issues which are key to energy policy.

### 3. TRANSPORT TRENDS

#### *Transport Use*

- 3.1. Total passenger travel more than tripled between 1952 and 1999, rising from 218 to 728 billion passenger kilometres (Table 1). The majority of growth has been in car travel: the total distance travelled by car is now more than ten times the 1952 level. Average journey times are increasing, even though nearly half of all journeys are under two miles. Bus and coach travel has fallen from being the dominant mode, with over 40% of total travel to only 6% in 1999. Rail travel has remained fairly steady in absolute terms, with an increase in recent years, but has fallen considerably in terms of market share. Over the past 20 years the number of passengers carried into and out of UK airports has trebled, and air transport movements and freight movements have more than doubled. While domestic air travel is currently only 1% of the total distance travelled within Great Britain, air travel is increasing rapidly and already makes up a large proportion of overall energy consumption.
- 3.2. The reasons for the increased use of transport and the modal changes described above include: economic growth and growth in incomes; consequently greater demand for goods and services, and a rise in the levels of car ownership; and the stability in real terms of the cost of motoring compared to significant increases in the cost of public transport.
- 3.3. Total road traffic is forecast to grow by 17% between 2000 and 2010<sup>iii</sup>. On current forecasts rail passenger demand will grow by 34% by 2010; with additional capacity and improved services, this forecast increases to 50%<sup>iv</sup>. Air traffic in the UK is projected to grow from 160 million passengers in 1998 (actual) to 276 million in 2010 (73% increase) and 401 million in 2020 (151% increase)<sup>v</sup>.
- 3.4. These figures present substantial absolute growth in transport use. However, given the significant impact of technological developments, the key indicators of interest for energy policy are energy consumption and environmental impacts.

#### *Energy Consumption*

- 3.5. UK final energy consumption by sector from 1980 to 2020 is presented in Table 2. The transport sector accounted for 25% in 1980, rising to 34% in 2000 and is predicted to rise to 38% in 2020. The main trend is for substantial growth in overall energy consumption accounted for primarily by transport which contrasts with more modest growth in the domestic sector and steady or declining energy consumption in industry. These figures do not include the impact of key transport policies to 2010 discussed further below under environmental impact.
- 3.6. UK energy consumption by transport mode from 1986 to 1999 is presented in Table 3. Road transport accounts for the large majority of energy use in the transport

sector (76% in 1999), followed by aviation (20%) with railways and water making up the rest (2% each). The trend is for a slow increase in energy consumption by road transport and substantial growth in consumption by aviation. Global total aviation fuel use - including passenger, freight and military – is projected to increase by 3% per year between 1990 and 2015<sup>vi</sup>.

- 3.7. Oil is main energy source for the transport sector: 53.0 Mtoe out of a total of 53.8 Mtoe in 1999 with the remainder coming from electricity. The transport sector accounts for the bulk of UK oil consumption: 62% of total oil use in 1999<sup>vii</sup>.

### ***Environmental impacts***

- 3.8. UK greenhouse gas emissions by end user sector, 1990 to 2020, are presented in Table 4. Emissions from UK transport sector stood at 41.5 MtC (23% of total emissions) in 2000. The baseline projection forecasts that emissions will increase to 47.8MtC in 2010 and 52.9MtC by 2020.
- 3.9. By far the largest component of the greenhouse gas mix (over 80%) is carbon dioxide. Emissions of carbon dioxide per mode of transport are presented in Table 5. Road traffic emits the largest proportion of CO<sub>2</sub> from the transport sector (90% in 1998), with much smaller contributions from railways (2%), shipping (1%) and civil aircraft (1%).
- 3.10. Forecasts including the impact of current policies project a much smaller increase by 2010. The main contributor is the EU voluntary agreement with the European Automobile Manufacturers Association which requires car manufacturers to reduce the average CO<sub>2</sub> emissions from new petrol and diesel passenger cars produced in the EU by approximately 25% by 2008. It is estimated the agreement, backed with reforms to company car tax and vehicle excise duty, will reduce CO<sub>2</sub> emissions by 4.0 MtC by 2010 and the impact should rise over time as the improvements in new cars spread through the fleet. In addition, the policies announced in the 10 Year Plan are projected to achieve savings of 1.6 MtC by 2010. If successful, these initiatives would mean a 0.7 MtC increase in CO<sub>2</sub> emission by 2010 compared to the baseline projection increase of 6.3 MtC.
- 3.11. The transport sector is also a major source of other pollution. In 1998 transport accounted for 53% of nitrogen oxides, 74% of carbon monoxide, 42% volatile organic compounds and 28% of particulates<sup>viii</sup>. In most cases emissions of these have been falling, largely as a result of tougher regulation, technical innovation and the introduction of catalytic converters for petrol cars. Because emissions from other sources are also falling, transport's share of these emissions is relatively stable.

### ***Work to be developed during Energy Review***

- 3.12. Future trends for transport use, energy consumption and environmental impact, in particular the impact of developments in aviation, will be considered in more detail during the Energy Review. Short and medium term predictions to 2020 will be based primarily on forward projections. Demand for services in 2050 will be developed through the scenario and system approach developed by the Resource Productivity and Renewables Team.

- 3.13. Future transport technologies and their potential impact are not covered in this note but will be covered in the Review.

## **4. CURRENT POLICY**

### *Development of current policy*

- 4.1. Since 1997 the Government has:

- set out strategic policies in the *White Paper on the Future of Transport – A New Deal for Transport, Better for Everyone* (July 1998)
- outlined in *Transport 2010 – The 10 Year Plan* (July 2000) a spending plan of £180bn: including £60bn of public and private money to fund investment in rail schemes, £21bn for strategic roads and £59bn for local transport
- refocused trunk road investment, giving priority to maintenance, making better use of existing roads and reducing environmental impact
- set up the Strategic Rail Authority (SRA) to invest in the railway network, bringing together the planning of passenger and freight services, and made the Office of the Rail Regulator more effective
- introduced the Transport Act 2000 to establish the SRA, improve bus services, allow local council to introduce charging to reduce traffic congestion and guarantee free bus passes for pensioners and disabled people
- set up the Commission for Integrated Transport to provide independent advice to Government
- initiated Regional Transport Strategies, introduced Local Transport Plans and created a new integrated approach to transport in London
- established the principles of hypothecation for fuel duty increases, congestion charges and workplace parking schemes solely for investment in transport
- set out a strategy for British shipping and a new policy for inland waterways

### *Aim and objectives of the current policy*

- 4.2. The objectives of the 10 Year Plan are to:

- meet the demands of greater mobility, primarily by reducing road congestion
- increase the choice in modes of transport, primarily by increasing investment in alternatives to the car, especially rail
- reduce carbon emissions primarily through improvements in the operational efficiency of the road haulage sector and a modal shift in freight transport from road to rail

- 4.3. Congestion on strategic roads will be dealt with by enhancing the network and traffic management, while local authorities have new powers for congestion charging and parking levies to tackle congestion on local roads and in towns. The Plan will also encourage a shift towards rail use: the 10 Year Plan aims for a 50% increase in passenger growth and an 80% increase in freight growth. This is supplemented with an aim to increase bus passenger journeys by 10%.
- 4.4. The 10 Year Plan and the White Paper state that “increasingly, people do not have real choices. For many people, using a car is now no longer a choice but a necessity”. Under-provision of public transport is seen as the main culprit. Extended choice is to be delivered by rectifying under-investment in rail and improving bus services.
- 4.5. The UK Climate Change Strategy<sup>ix</sup> looks to transport measures to save 5.6 MtC by 2010, which is 24% of the total planned saving. This would mean a small absolute increase in greenhouse gas emission from the transport sector (as set out in paragraph 3.10).
- 4.6. The Plan anticipates that emissions from vehicles will fall markedly over the next decade as new engine technologies come on stream, but acknowledges that more work is required to develop economic and other instruments to bring new technologies to mass markets. Additional support has been committed to cleaner vehicle programmes to encourage fleet managers to move to gas or electric vehicles; the fitting of pollution reduction equipment to existing vehicles; and encouragement of early introduction of hybrid and fuel cell vehicles.

***Fiscal instruments currently used to achieve objectives***

- 4.7. The instruments for delivering Government transport objectives are:
- investment in new network capacity, almost one half of which is assumed to be private finance and the rest from general taxation
  - Private Finance Initiatives, mainly for the London Underground and urban light rail schemes
  - recurrent expenditure, mainly on the road network and on revenue support payments to train operating companies, from general taxation
  - local authority congestion charges and workplace parking schemes, with revenue hypothecated to transport improvements
  - Government grants of up to 75% of the additional cost of the purchase of low emission cars or of the purchase or conversion of heavy vehicles
  - introduction of graduated VED for new cars, based on CO<sub>2</sub> emissions, and a new structure of VED for heavy goods vehicles, reflecting environmental impacts and track costs
  - zero VED for electric vehicles
  - restructuring of company car taxation, linked to CO<sub>2</sub> emissions, starting in 2002

- low fuel duties on road fuel gases
- low fuel duty for carbon-saving biodiesel starting in 2002
- promotion of the development and introduction of further biofuels and other green fuels through reduced or zero duty for pilots

## 5. STRATEGIC ISSUES IN RELATION TO ENERGY POLICY

5.1. The strategic energy policy concerns in relation to the transport sector are:

- to reduce negative environmental impact from energy use in particular in relation to climate change
- to consider fuel efficiency and non-fossil fuel alternatives given the prospect of resource depletion
- to manage the risk of supply interruption including the exercise of market power by OPEC
- to increase social inclusion

While not a direct energy policy concern, the transport policy objective to tackle congestion cannot be isolated and will, for example, influence consideration of the relative role of vehicle efficiency and demand management in policy proposals.

5.2. It is proposed that the following transport questions are of strategic importance to energy policy:

- *The long term objectives of transport policy.* Current policy is focussed on the next ten years. DTLR are commissioning work on longer term trends and policy implications, up to 2030 (see section 6). Based on the Energy Review scenario and system work to 2050, what factors should be taken into account in future policy making? In particular, what contribution should the transport sector be taking in the long term drive to reduce emissions?
- *The role of technological development.* What should be the relative roles of technological development and transport demand management in reaching our long term goals? What role do alternative transport fuels have in environmental improvement and reducing the dependence on oil?
- *The role of transport taxation.* In the context of the full range of energy and transport policy measures, what role should taxation take over the long term? Which fiscal measures could be considered as part of the 2050 strategy?
- *Transport growth and land-use.* What do historic trends suggest about the likely impact of changes to settlement and working patterns on transport demand? Are these trends set to continue and how ought we try to influence them?
- *Support for innovation.* Is the government providing the most appropriate and effective support mechanisms for the development of new transport technologies to take us towards a low carbon economy?

- *Dependencies and synergies.* Are there significant dependencies, or potential synergies, between prospective developments in energy production and in transport technology?
- *The transport fuel infrastructure.* Are short-term changes required to the energy infrastructure for transport to keep options open for 2050?
- *Public perceptions and priorities.* Public views on transport availability, in particular car use, are strong. What are public priorities for energy use and the transport sector over the long term?

## **6. DEVELOPMENTS**

6.1. The following events are occurring within Government during the Energy Review or shortly afterwards. Some will feed into the Review while others will be asked to consider the Review's conclusions as they take work forward.

- Social Exclusion Unit project on *Transport and Social Exclusion* (consultation questionnaire issued on 25 July 2001, forecast to report in 2002)
- DTLR/DTI Consultation on *Powering Future Vehicles* (forecast for issue in October 2001)
- DTLR commissioned study on *The Impacts of Future Scenarios on Integrated Transport Policies*, being undertaken by the Transport Research Group and Mott MacDonald (forecast to report in October 2001)
- DTLR White Paper on Air Transport (forecast for publication in 2002), building on the DTLR consultation document *The Future of Aviation* (published in December 2000)
- DTLR review of Transport 2010 - 10 Year Plan (which will feed into the 2002 Comprehensive Spending Review)

**Table 1: GB Passenger Transport by mode, 1952 – 1999, billion passenger kilometres**

	1952	1961	1971	1981	1991	1998	1999
Road							
<i>Car and van<sup>1</sup></i>	58	157	313	394	582	617	621
<i>Bus and coach</i>	92	76	60	48	44	45	45
<i>Bicycle</i>	23	11	4	5	5	4	4
<i>Motorcycle</i>	7	11	4	10	6	4	5
All road	180	255	381	458	637	671	675
Rail <sup>2</sup>	38	39	35	34	39	44	46
Air <sup>3</sup>	-	1	2	3	5	7	7
All modes	218	295	419	495	681	722	728

1 Includes taxis

2 Data relate to financial year.

3 Includes Northern Ireland and Channel Islands.

Source: DETR, reproduced from 'Social Trends', 2001 Edition, National Statistics

**Table 2: Total UK Final Energy Consumption by Sector, 1980-2020, mtoe and %**

	1980		1985		1990		1995		2000**		2010		2020	
	mtoe	%	mtoe	%	mtoe	%	mtoe	%	mtoe	%	mtoe	%	mtoe	%
The domestic sector	39.8	28.0	42.1	29.6	40.8	27.7	42.7	28.7	47.1	29.1	48.3	26.8	50.8	26.6
The industrial sector	48.3	33.9	41.7	29.4	38.7	26.3	34.9	23.5	37.9	23.3	41.7	23.2	43.2	22.7
Transport	35.5	25.0	38.5	27.1	48.6	33.0	50.2	33.8	55.0	34.1	65.8	36.5	71.6	37.6
Other final users*	18.7	13.1	19.6	13.9	19.2	13.0	21.0	14.0	21.4	13.5	24.4	13.5	25.1	13.2
<b>TOTAL</b>	<b>142.4</b>	<b>100%</b>	<b>141.9</b>	<b>100%</b>	<b>147.3</b>	<b>100%</b>	<b>148.8</b>	<b>100%</b>	<b>161.4</b>	<b>100%</b>	<b>180.1</b>	<b>100%</b>	<b>190.6</b>	<b>100%</b>

\* other final users includes public administration, commercial, agriculture and miscellaneous

\*\* year 2000 figure not available. Estimated from 1999 and 2000 first three quarter figures

*Note* : the totals for final energy consumption in this table differ from those for total primary energy use in table 1 because of losses arising during (e.g.) the generation and distribution of electricity etc.

**Sources:** Digest of UK Energy Statistics – Table 1.13, excludes non-energy use. Figures for 2010 & 2020 taken from Energy Paper 68 – based on the average of the central low and central high scenarios. (The industrial sector includes agriculture in Energy Paper 68).

**Table 3: UK Energy Consumption by transport mode, 1986 – 1999, mtoe and %**

	1986	1990	1995	1999
Road Transport	33	39	39	41
Railways	1.1	1.1	1.3	1.2
Water Transport	1.2	1.4	1.2	1.1
Aviation	6.1	7.3	8.5	10.7
<b>All energy used by transport</b>	<b>41</b>	<b>49</b>	<b>50</b>	<b>54</b>
All energy used by final users	146	147	149	157
<b>Energy used by transport as % of all energy used by final users</b>	<b>28</b>	<b>33</b>	<b>34</b>	<b>34</b>

**Source:** DTI, reproduced from *Transport Trends*, DETR, 2001 Edition

**Table 4: UK greenhouse gas emissions by end user, 1990 – 2020, MtC and %**

Sector	1990		2000		2010		2020	
	MtC	%	MtC	%	MtC	%	MtC	%
Business	90.6	43	68.6	38	64.0	36	64.9	35
Transport	39.7	19	41.5	23	47.8	27	52.9	28
Domestic	46.6	22	42.7	23	41.5	23	42.6	23
Agriculture, Forestry, land use	24.8	12	21.6	12	19.1	11	18.0	10
Public	10.0	5	8.5	5	7.8	4	7.8	4
Total*	211.7	100	182.9	100	180.2	100	186.2	100

\*Percentage figures may not total to 100% due to rounding.

Source: *Climate Change – The UK Programme*, DETR, November 2000 (pg 54). These figures exclude the impact of key policies such as the 10 Year Plan, the EU voluntary agreements with car manufacturers, and reforms to company car taxation and vehicle excise duty.

**Table 5: UK carbon dioxide emissions from transport and other end users, 1985 – 1998, MtC and %**

	1985	1990	1995	1998
Road Transport	26	33	34	35
Railways	1	2	2	2
Shipping	1	1	1	1
Civil aircraft	1	1	1	1
<b>All transport</b>	<b>30</b>	<b>37</b>	<b>38</b>	<b>39</b>
Non transport end users	125	122	112	110
All emissions	155	160	150	148
<b>Transport as a % of total</b>	<b>19</b>	<b>23</b>	<b>25</b>	<b>26</b>

Source: National Environmental Technology Centre, reproduced from *Transport Trends*, DETR, 2001 Edition

<sup>i</sup> Source: see table 2.

<sup>ii</sup> Source: see table 3.

<sup>iii</sup> *Transport 2010 – The 10 Year Plan*, DETR, July 2000 (measured in vehicle kilometres; forecast including policies from Plan)

<sup>iv</sup> *Transport 2010 – The 10 Year Plan*, DETR, July 2000

<sup>v</sup> *Air Traffic Forecasts for the United Kingdom 2000*, DETR, June 2000 ('mid' forecast)

<sup>vi</sup> *Aviation and the Global Atmosphere*, IPCC, 1999

<sup>vii</sup> *Digest of UK Energy Statistics*, DTI / National Statistics, 2000 Edition

<sup>viii</sup> *Transport Trends*, DTLR, 2001 Edition

<sup>ix</sup> *Climate Change – The UK Programme*, DETR, November 2000