The Future of Transport: Modelling and Analysis

Introduction

This paper provides further technical detail on the Department for Transport's latest projections, as summarised in the recent White Paper ***The Future of Transport***[1]. They are based largely on the Department's National Transport Model, described briefly below. Detailed decisions on the balance of transport spending and implementation of the strategy have yet to be taken. The projections provide background material to illustrate likely transport outcomes on a 'steady state' basis. Implementation of the Government's strategy can be expected to deliver improvements which are not taken into account here.

Section 1: The National Transport Model

1.1 The National Transport Model (NTM)[2] has been developed by the Department to cover all surface modes of transport. The model has been set up to support policy making by providing projections and illustrating how different policies interact and impact on key outcomes - particularly traffic, public transport patronage, emissions and the distribution of trips by mode, distance and area type. The NTM builds upon a range of techniques and incorporates a series of sub-models to model the interaction between different modes at the appropriate level of detail.

1.2 The model incorporates detailed data on existing travel by individuals and households using survey information such as that provided by the National Travel Survey (NTS). Forecasts of demographic changes and changes in location are exogenous to the model, as are various other key drivers of travel behaviour, such as oil prices, taxation, economic growth and rising incomes.

1.3 A good deal of uncertainty surrounds all transport projections and those from the NTM are no exception. We have selected some of the most important factors that influence our projections of transport demand to create a 'high' and 'low' transport demand range around the central forecast (see Annex A for more details). The numbers should be treated as indicative, illustrating possible trends and broad orders of magnitude. Forecasts for 2025 will be more uncertain than for earlier years. The trends shown are extrapolations between the years for which a forecast is given. They should not be taken as representing the likely trajectory between these points.

1.4 Unless otherwise stated, the projections presented are for England only.

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[1] The Future of Transport: a network for 2030, Department for Transport, July 2004. http://www.dft.gov.uk/strategy/futureoftransport/

[2] A full description of the model is given on the Department's website at http://www.dft.gov.uk/stellent/groups/dft_econappr/documents/divisionhomepage/030708.hcsp

Section 2: Assumptions

2.1 The White Paper showed that the key factors driving transport demand are growth in the economy, demographic trends and transport prices and fares. Transport outcomes also reflect developments in policy on subsidy, fares and the provision of infrastructure. This section outlines some of the main cross-cutting assumptions made in the projections.

Demographic trends

2.2 The NTM uses projections of both population and employment in generating forecasts since the total number of trips made in the country is closely related to the size of the population, and those in employment tend to travel further and at busier times.

2.3 The population is assumed to rise by 3.4% between 2000 and 2010, in line with 2002 Government Actuary Department projections, and to increase at about the same rate through to 2025.

Table 2.1 Demographic assumptions for GB (Total percentage increase)

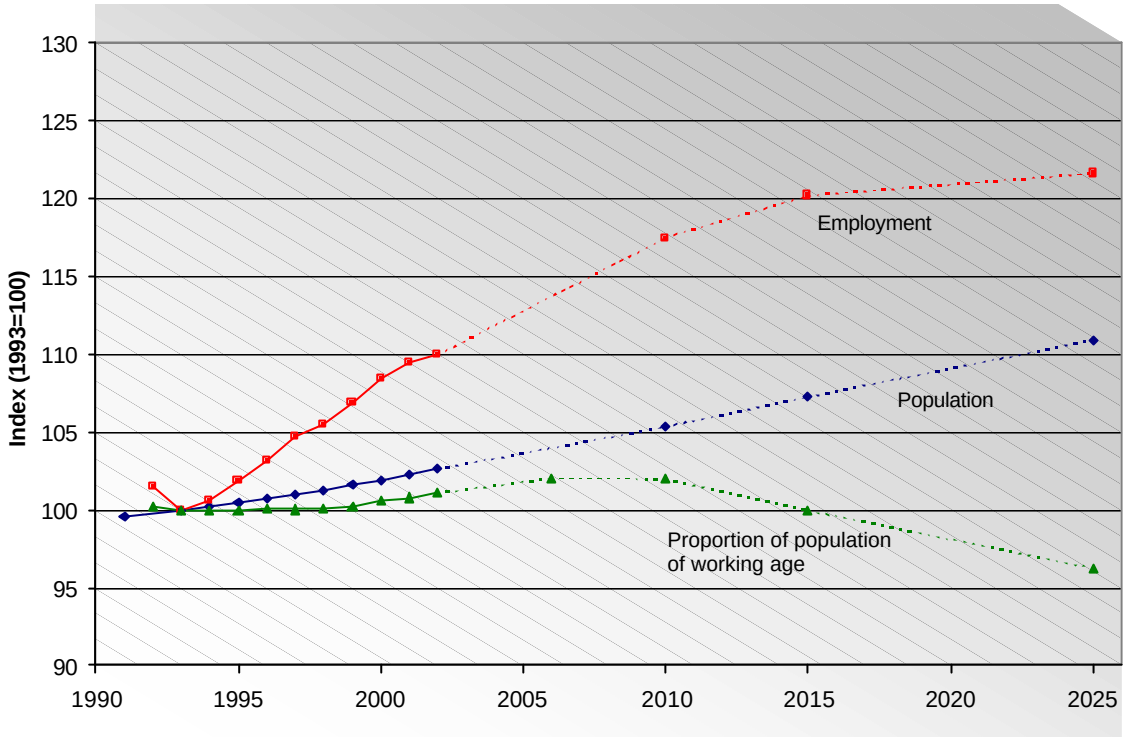
	2000-2010	2010-2015	2015-2025
Population	3.4%	1.8%	3.4%
Employment (workers)	8.4%	2.3%	1.2%

2.4 Employment growth is projected to increase in line with recent trends between 2000 and 2010, but the growth rate is projected to fall quickly thereafter as the population ages[3]. The proportion of the population that is of working age is forecast to peak at about 65%, prior to 2010, before falling to 61% in 2025 as shown in Figure 2.1. Participation rates are assumed to grow at a declining rate in the first half of the forecast period, and to remain static from 2015[4].

3 Workforce assumptions are based on ONS long-term projections of the working age population controlled by Government Actuary Department's national estimates.

4 However, the impact of raising the pension age increases participation rates for women aged 60-64.

Figure 2.1 Historic and projected trends in GB demographics



Economic growth

2.5 The projections presented in this paper assume economic growth of 29% between 2000 and 2010, just under 2.6% a year, in line with Treasury projections. Thereafter the trend growth rate falls back as growth in the labour force slackens, as shown in the table below.

Table 2.2 Real GDP growth assumptions for GB5

	2000-2010	2010-2015	2015-2025
Total percentage increase	29%	13%	23%
Annual growth	2.6%	2.4%	2.1%

5 After 2010 the assumptions used in the model diverge slightly from Treasury UK GDP forecasts. This reflects the fact that the Treasury's 'neutral' assumption of 2% per annum productivity growth is used from 2010 through to 2025. This differs from forecasts in Treasury's 2004 Budget where a 1.75% productivity assumption is assumed from 2015. Also, because the NTM works on a GB, rather than a UK, basis an adjustment is made to reflect slightly slower growth in the working age population of GB compared to the UK from 2010.

World oil prices

2.6 Our projections are based on DTI's long term forecast for 2010 of $23 a barrel (2003 prices) in real terms, increasing to nearly $28 a barrel by 2025[6].

2.7 At present, developments in the oil market are injecting a major element of uncertainty. Sustained higher prices would imply lower traffic growth. If crude oil prices were to end up about US$5 per barrel higher in 2010 in real terms than our current assumption we expect traffic projections would fall by at least 1%.

Policy assumptions

2.8 The projections in this note reflect recent policy decisions, such as the July 2003 announcements on Multi-Modal Studies road schemes and changes to regulated rail fares as detailed in the SRA's fares review in June 2003. But they do not incorporate the final outcome of the Spending Review, or detailed decisions following the July announcements, which may change some of the numbers presented here.

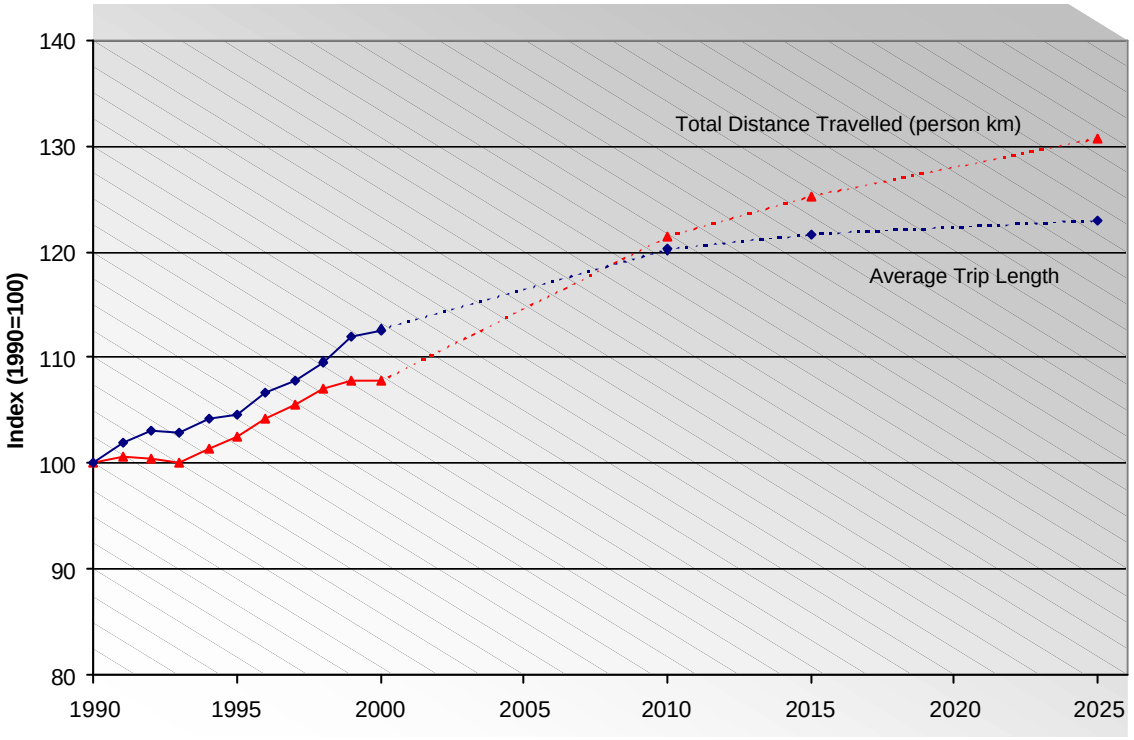
6 DTI, Updated UK Energy Projections, Working Paper May 2004. This paper only forecasts to 2020. Oil prices are assumed to remain constant in real terms between 2020 and 2025.

Section 3: Details of projections in The Future of Transport

3.1 The White Paper showed that the demand for travel will continue to grow as people become better off and choose to travel more.

3.2 Figure 3.1 shows trends in personal travel, in terms of person kilometres, over the period 1990 to 2025. The figures cover travel by rail, bus and car, whether as a driver or passenger, and include trips on foot and by bicycle. Part of the growth is explained by the projected increase in the population. The length of the average trip also continues to increase, although at a reducing rate, from around 8 kilometres in 1985 to around 12 kilometres in 2025.

Figure 3.1 Historic and projected trends in total distance travelled and trip length (GB)



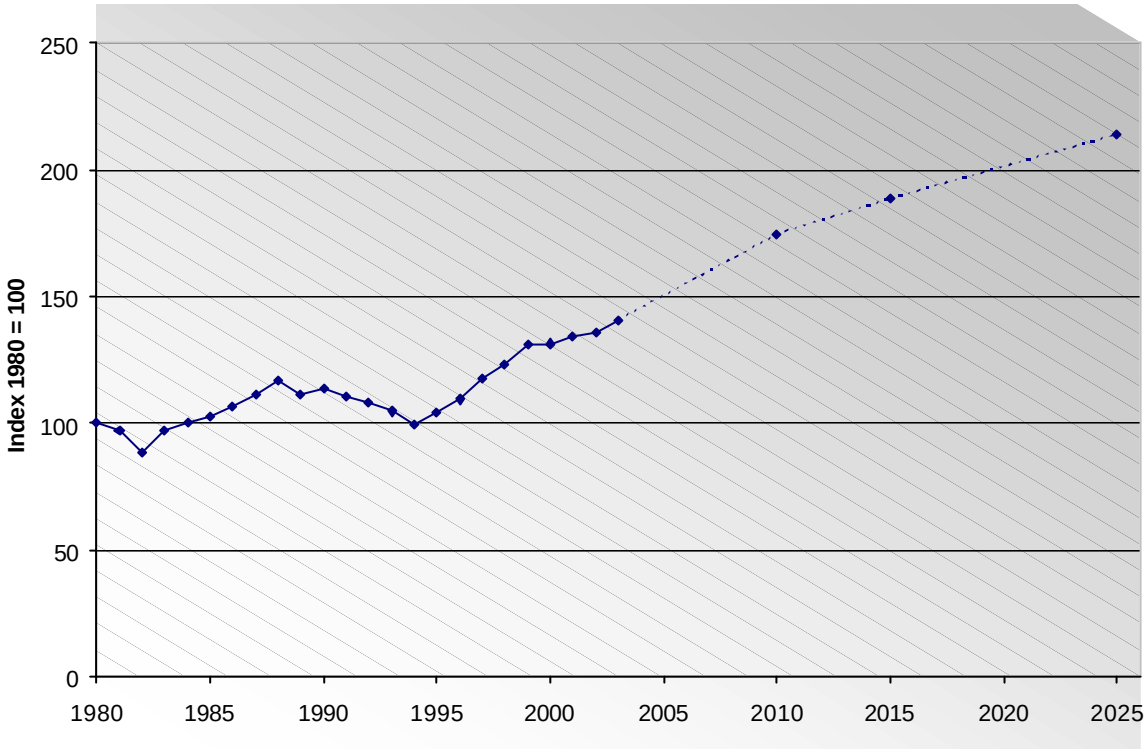
3.3 The rest of this section provides details of the modal projections underlying the projections of total distance travelled.

Rail

3.4 Our central projection shows rail passenger km increasing by 33% between 2000 and 2010. This implies a pick up in growth to around 3.5% a year for the rest of the decade, higher than recent figures but less than in the second half of the 1990s.

3.5 The main factors behind the growth are increasing incomes, population and employment. So called "soft policies" to reduce car traffic may also have a positive impact.

Figure 3.2 Historic and forecast trends in rail passenger kms (GB)



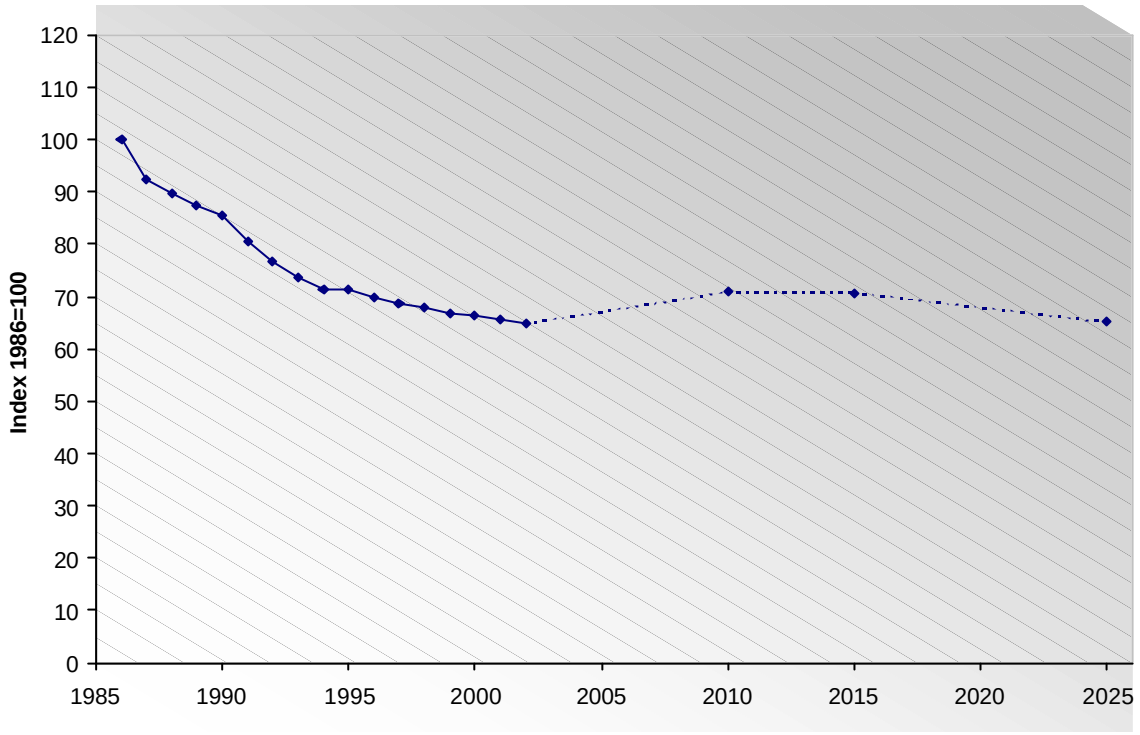
3.6 From 2010 to 2025, rail passenger km growth is expected to increase at a slightly lower rate, with annual growth of around 1.3% compared to an annual average closer to 3% from 2000 to 2010.

Bus

3.7 Growth in bus patronage over 2000 to 2010 is projected at around 11% across England as a whole, composed of increases of 33% in London and 7% in the rest of England. Looking further ahead, bus patronage is projected to fall by 0.4% a year in England as a whole from 2010 as car ownership continues to increase.

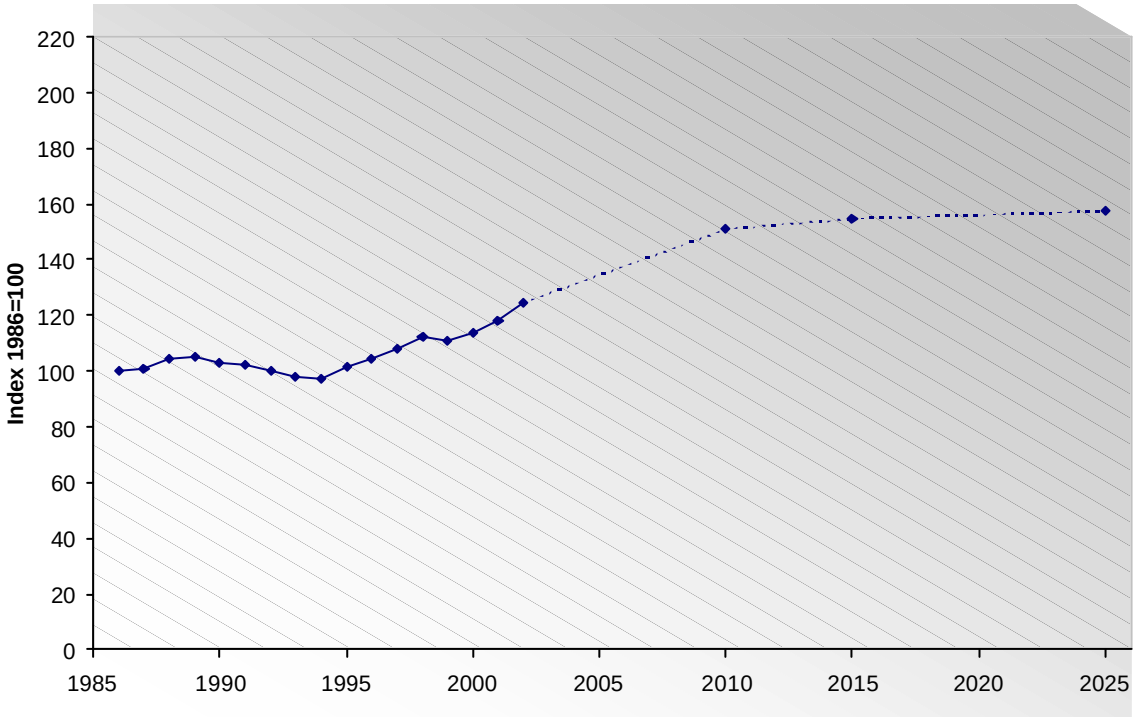
3.8 Outside London, we are projecting a reversal of the recent trend of falling bus patronage, with an increase of 7% over the period 2000 to 2010. This forecast is driven primarily by the assumed impacts of bus investment and soft factor interventions. Beyond 2010, we are projecting bus patronage to fall annually by around 0.6%.

Figure 3.3 England (excluding London) bus patronage



3.9 London bus patronage rose by 28% from 1993/4 to 2001/02. We expect patronage to continue rising by 33% between 2000 to 2010. Growth is projected to slow to 0.3% a year from 2010 to 2025.

Figure 3.4 London bus patronage



Road Traffic

3.10 Rising incomes and economic growth are key influences on the growth of traffic on the road, along with the general cost of motoring.

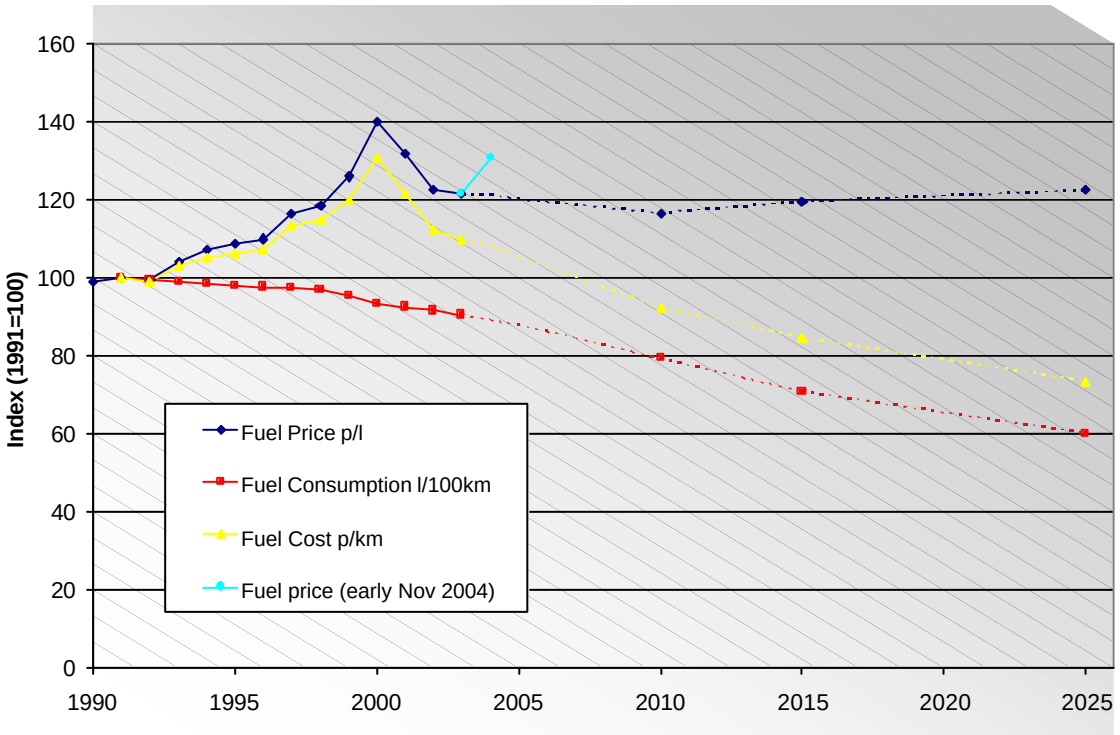
Motoring Costs

3.11 The projected fall in oil prices means that pump prices are expected to be 17% lower in 2010 than in 2000 as shown by Figure 3.5. After 2010 increased oil prices lead to a 5% increase in pump prices by 2025.

3.12 The impact of falling fuel prices on motoring costs since 2000 is compounded by recent and projected improvements in fuel efficiency, driven by the voluntary agreement with European, Japanese and Korean car manufacturers. In 2003, new cars were 5% more efficient than in 2000. Further improvements of 16% are expected over the rest of the decade. This results in forecast all car efficiency improvements of 15% over the decade.

3.13 As a result of the fall in fuel prices and efficiency improvements, car fuel costs per vehicle kilometre are projected to fall by 29% between 2000 and 2010 and a further 24% by 2025.

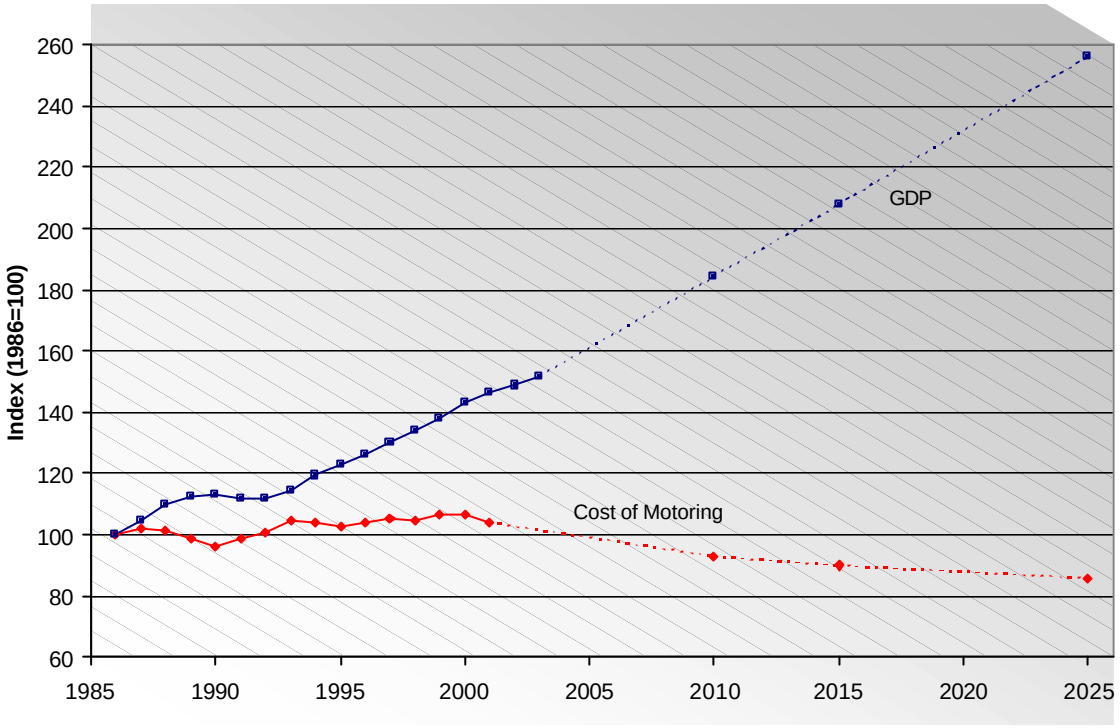
Figure 3.5 Real fuel price, fuel efficiency and fuel cost per km



3.14 Motoring costs include not only fuel costs but also the purchase price of cars and non-fuel running costs like insurance and maintenance. Given projected falls in fuel costs, we expect

the cost of motoring to continue falling for the whole of the forecast period, but at a declining rate.

Figure 3.6 Real cost of motoring and real GDP



Car Ownership

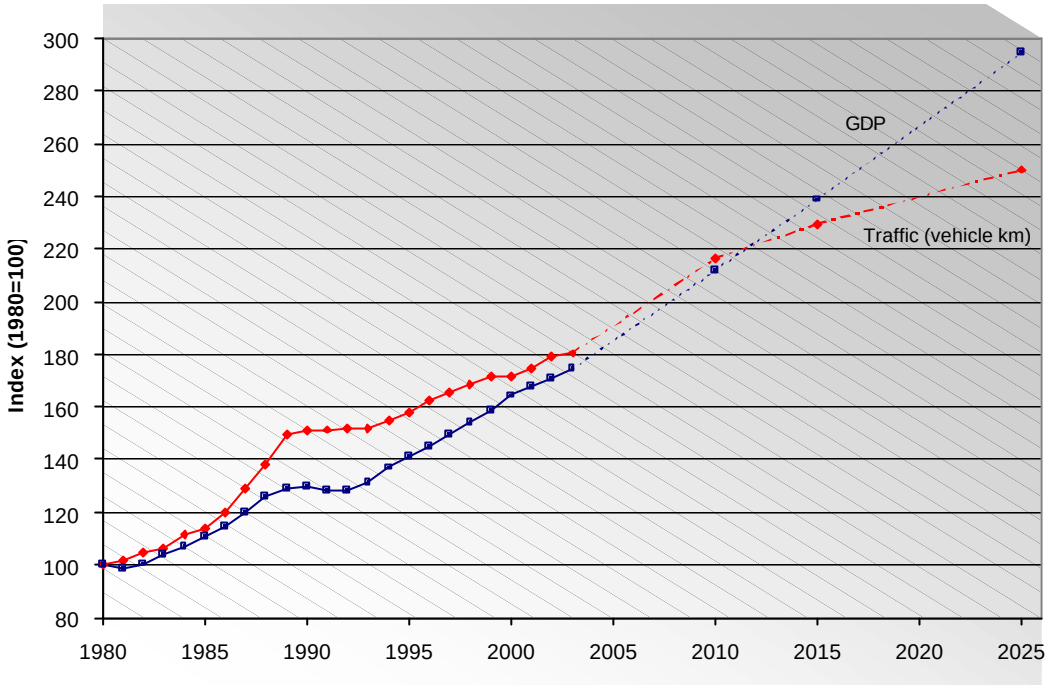
3.15 Since car traffic makes up around 80% of total traffic, rising car ownership plays a major role in the projections of road traffic. The key influences on ownership are household income, household composition and the level of urban density. However, the rate at which the stock of cars will grow is set to decrease over time as shown in Figure 3.7. We are also forecasting a slow down in the growth of driving licence-holding.

Figure 3.7 Historic and forecast car stock and car stock per person (GB)

Road Traffic

3.16 The central projection is for traffic to grow by 26% between 2000 and 2010, implying an annual average increase of 2.3% over the whole decade (around 2.6% per year for the rest of the decade). The main factors behind this are falling fuel costs, increasing incomes and higher car ownership.

Figure 3.8 Traffic growth and economic growth



3.17 Annual growth in traffic between 2010 and 2015 is projected to slow down to around 1.2%. The main factors behind this are: a levelling off of fuel costs, slower growth in the economy, and a continuing reduction in the income elasticity and a saturation effect slowing down growth in car ownership. A further slowdown in growth is expected beyond 2015 (to 0.9%) as the population ages and the proportion of the population of working age shrinks.

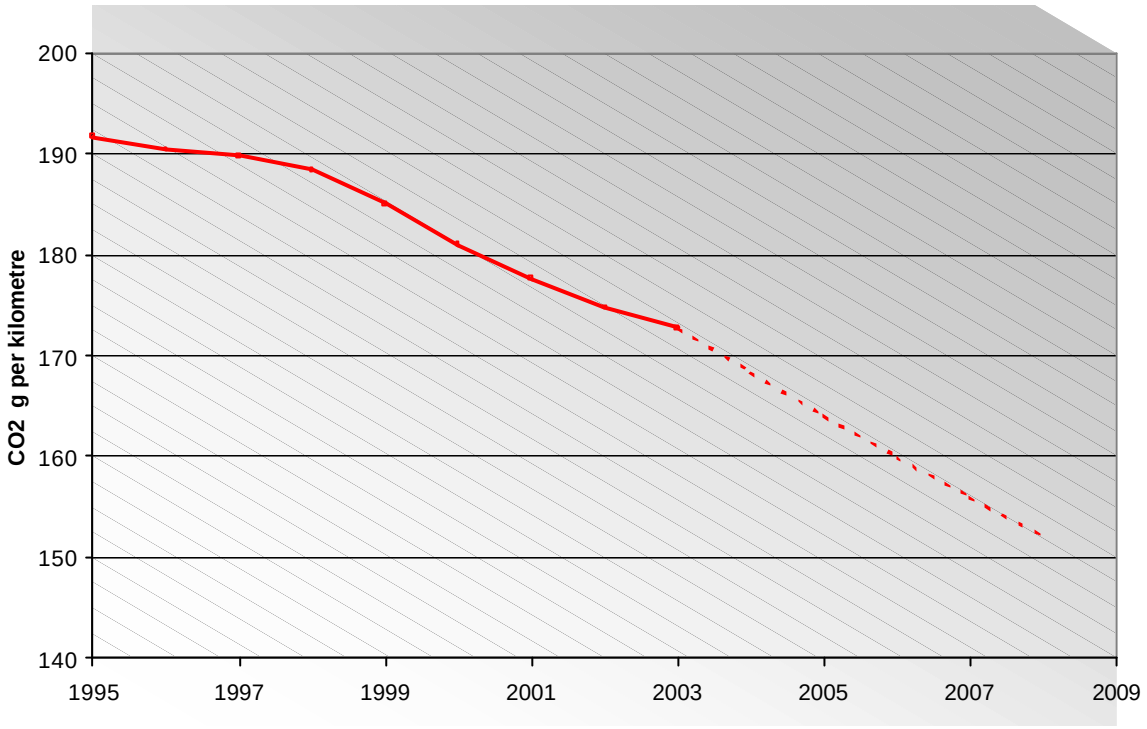
Emissions from Road Transport

3.18 The transport sector is currently responsible for about 22% of the UK's total CO_2 emissions (2002 estimate)[7]. Road transport is responsible for the majority of this - about 20% of the UK's total emissions. The absolute and relative contribution of transport to the UK's total CO_2 emissions is set to increase in future years as a consequence of further traffic growth and falling emissions in other sectors.

3.19 The main policy for reducing carbon emissions from road transport is the voluntary agreement with European, Japanese and Korean car manufacturers, which aims to reduce carbon emissions per kilometre from new cars by 25% on 1995 levels by 2008. The projections assume a 2.5% per annum improvement between 2004 and 2008 and improvements of 1.5% a year thereafter to reflect continuing policy initiatives and technical progress.

[7] This figure excludes international aviation as there is currently no international agreement on ways of allocating such emissions.

Figure 3.9: Improvements in UK average new car CO2 emissions (per kilometre)

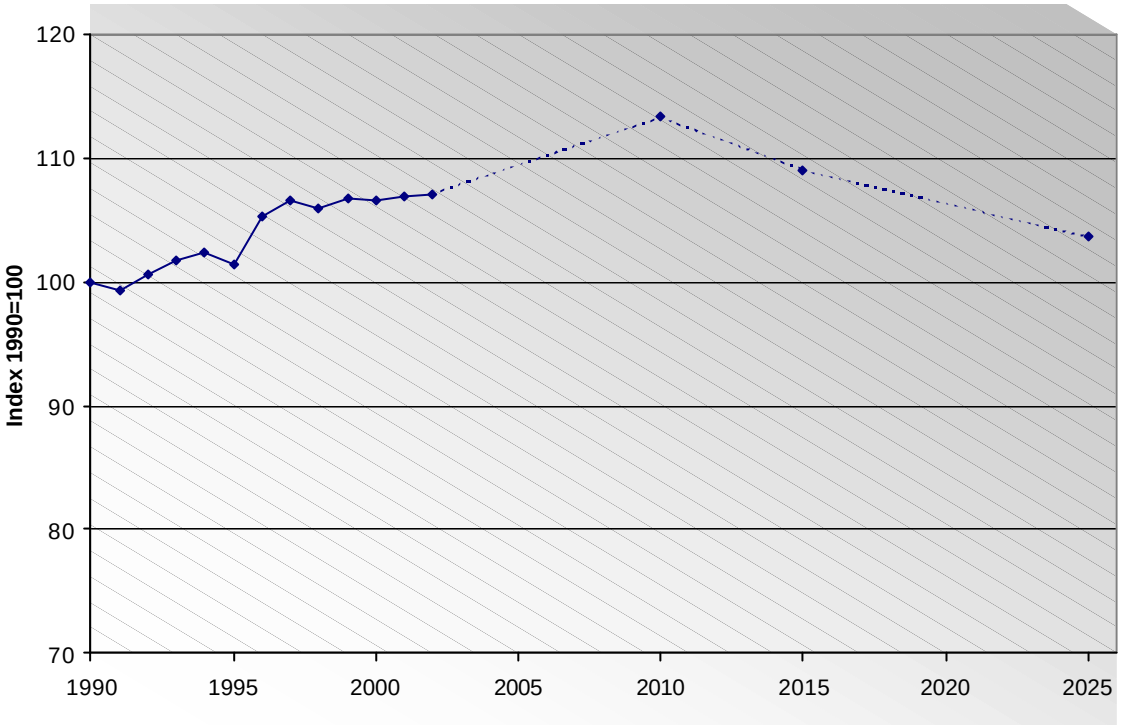


3.20 The impact of increased efficiency on emissions is damped because the cost per mile of motoring is reduced and thus traffic increased. The projections suggest that road transport CO_2 emissions will increase by around 6% in England over the decade, taking emissions to 31.1 MtC (Mega tonnes Carbon, end-user England)[8].

3.21 As traffic growth declines in the later years emissions are projected to fall; the increase from 2000 to 2015 is now put at just 2% and a decrease of 3% forecast from 2000 to 2025.

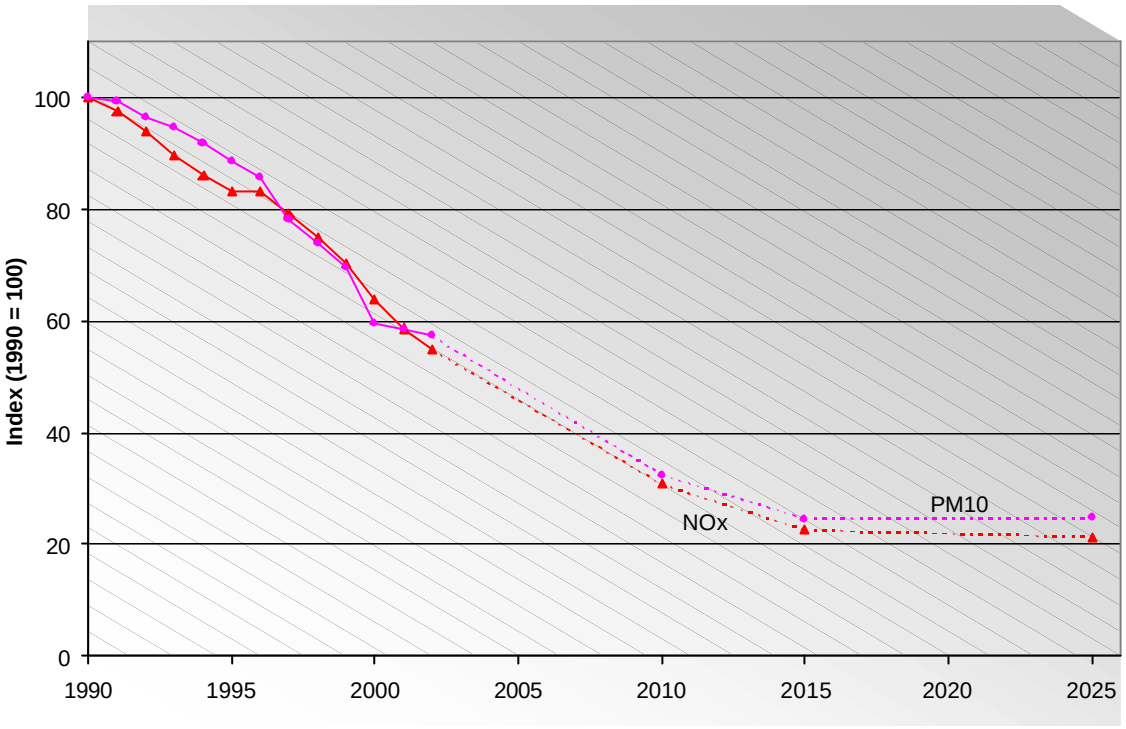
8 Published DTI and DfT forecasts cannot be directly compared as they are frequently on a different geographic and total emissions definition basis. The DTI and DfT models are very different from one another in terms of coverage and approach and we would not expect our projections to be identical.

Figure 3.10: Historic and forecast road transport CO2 emissions



3.22 Transport emissions of NOx are projected to fall by more than a half between 2000 and 2010, with PM10 emissions falling by around 46%. This is largely a result of tighter European emission standards. Between 2010 and 2015 PM10 and NOx emissions are projected to fall further, by around a quarter, as shown in Figure 3.11. Beyond 2015 the downward trend flattens off and emissions could start rising again unless further action is taken.

Figure 3.11: Historic and forecast road transport emissions of PM10 and NOx


Index (1990 = 100)
100
80
60
40
20
0
1990
1995
2000
2005
2010
2015
2020
2025
PM10
NOx

Annex A: Ranges and Uncertainty

The NTM seeks to take account of a wide range of social and economic factors affecting businesses, individuals and households, however, a significant range of uncertainty is attached to all forecasts. We've selected some of the most important factors that influence our forecasts of travel demand and emissions to create a 'high' and 'low' travel demand range around the central forecast.

The range reflects:

- Different views about how rising incomes increase peoples propensity to travel further and decrease peoples sensitivity to future changes in the money costs of travel.
- Different assumptions about improvements to car fuel efficiency.
- Alternative assumptions about the growth of the economy.
- Different views about the likely intensity of application and impact of soft factor interventions, such as travel awareness.
- Different views on how income growth influences rail demand.

There are other sources of uncertainty in our forecasts, particularly when looking as far ahead as 2025. In particular, the impact of changes in demographic trends and the future transport demand characteristics of older people. We are considering ways of reflecting these additional uncertainties in our forecasts. Summaries of our current range forecasts are shown in the tables below.

Table A1: Range forecasts of traffic growth (England)

% change on 2000	All Roads					Inter-urban Trunk Roads
	All areas	London	Conurbations & Large Urban	Other Urban	Other	
2010	23 to 29	18 to 26	19 to 26	19 to 24	27 to 33	33 to 40
2015	29 to 38	22 to 34	23 to 34	25 to 31	34 to 43	40 to 51
2025	38 to 53	30 to 50	29 to 46	34 to 45	45 to 59	51 to 69

Table A2: Bus and rail range forecasts of patronage		
% change on 2000	Bus (boardings, England)	Rail (passenger kms, GB)
2010	10 to 12	28 to 37
2015	10 to 13	36 to 50
2025	2 to 8	50 to 73

Table A3: Road transport emissions of CO2, NOx & PM10			
% change on 2000	Road CO2 emissions	Local emissions	
		NOx	PM10
2010	5 to 7	-52 to -51	-46 to -45
2015	0 to 4	-65 to -64	-60 to -58
2025	-6 to -1	-68 to -65	-60 to -57