RAC Foundation

Misconceptions and Exaggerations about Roads and Road Building in Great Britain

Royal Automobile Club Foundation

Motoring Towards 2050 – Roads and Reality
Background Paper No.5

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In December 2007 the RAC Foundation published its report on 'Roads and Reality' along with a supporting Technical Report. As part of this exercise a series of background papers was produced and these are to be published during the course of 2008. This is the fourth in the series.

The Royal Automobile Club Foundation for Motoring Limited is a charity established to promote the environment, economic, mobility and safety issues relating to the use of motor vehicles.

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Introduction

Almost everyone has views on roads and road building. These are coloured by personal experience, popular beliefs, comment in the media and propaganda by a wide range of special interest groups. As with any matter where there is varying, and sometimes strongly held views, there are also differences between actuality and perception: and for roads and road building this is particularly marked. In this paper the more important of these concerns are examined and the factual evidence set out.

The key misconceptions examined are:

- Roads occupy large areas of land
- Roads are inefficient users of space compared with railways
- Britain is unusual in relying so much on roads
- New road capacity simply fills up with traffic
- Building new roads will have a material effect on climate change
- Building roads will not benefit low-income groups
- Traffic pollution is getting worse
- The construction industry can not accommodate a substantial increase in road building
- Building new roads is too costly
- Road traffic does not pay its way and
- Public transport is a ready alternative to the private car

Each of these is addressed in turn in the following sections.

Roads do not occupy large areas of land

Roads occupy about 1.75% of the surface of Great Britain and most of these are local streets and lanes providing access to houses, offices factories and farms. All main roads occupy about 0.4% of the surface area and the Highway's Agency trunk roads only 0.16%. Almost all the growth in road-space in recent years has been for local access roads.

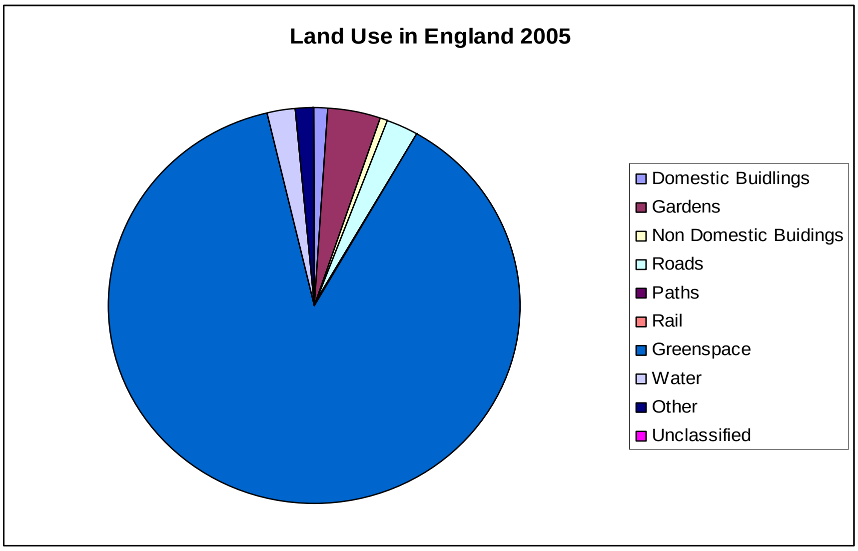
It is easy to understand why people feel that roads are such a dominant part of their environment. People live near roads, work near roads and when they go to visit people and places on business or pleasure they almost always go to somewhere next to a road. People also usually travel by road. Just as swans might believe lakes and rivers dominate the environment, humans can be forgiven for thinking the same of roads. Even our maps exaggerate the size of roads with large-scale road atlases typically showing Motorways as four times their actual width[1] and lower scale maps even more so.

[1] Phillips (2007)

A glance through an aeroplane window on a fine day or a satellite view on 'Google Earth' gives a much better impression of how much space roads really occupy.

Figure 1 shows how much of England's surface is occupied by roads. Currently roads (including associated footpaths and verges) in England cover an area of 2,950 square kilometres whilst England's surface area is 131,926 square kilometres[2]. Thus roads occupy 2.25% of the surface area of England. This includes all kinds of roads, along with associated footpaths, cycleways and verges, from Motorways to residential streets and country lanes. The lengths of the different types of roads in England along with an estimate of their area are set out in table 1.

Figure 1: Land uses in England 2005



Source: Department for Communities and Local Government (2007)

Table 1: Estimates of areas of different classes of roads in England 2006

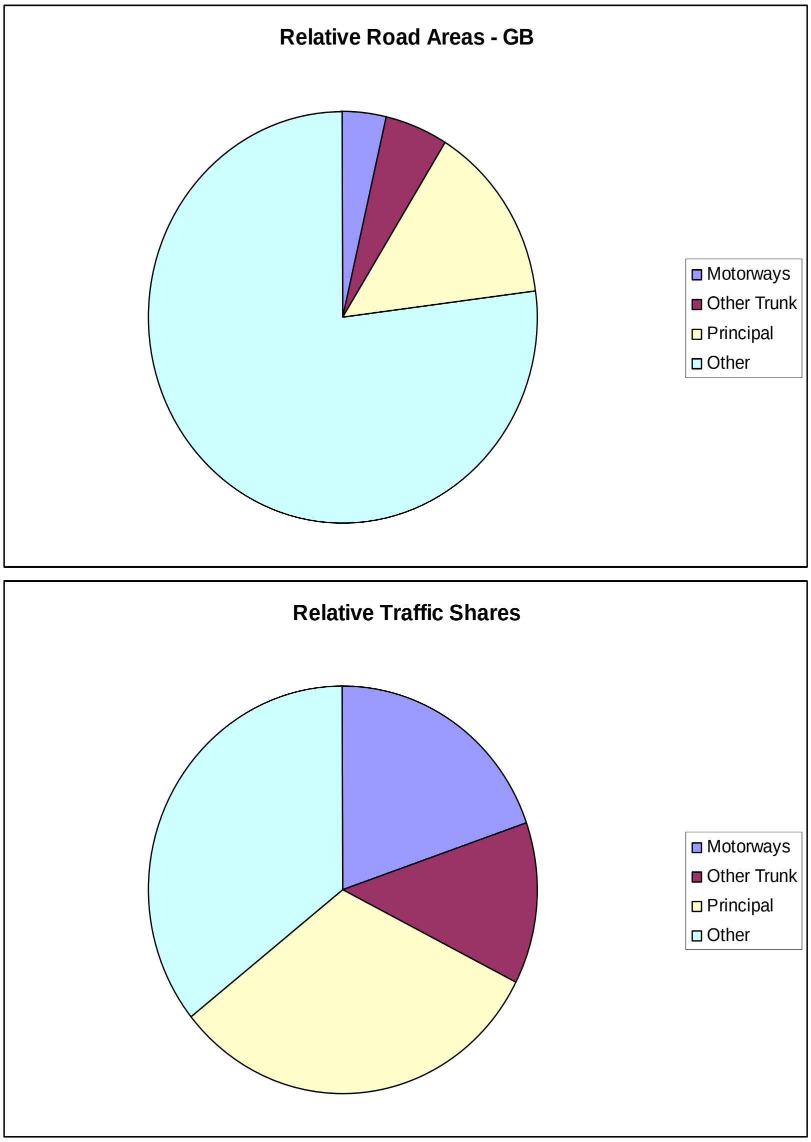
Road type	**Length (kms)**	**Width (metres)**	**Area (km^2)**
Motorways	3,007	*40*	*120*
Other trunk	4,349	*25*	*110*
Principal	27,900	*15*	*420*
Other	268,832	*9.2*	*2,415*
Total/Average	**304,089**	***10.1***	***3,065***

Sources: Department for Transport (2007a), table 4.3 & Department for Communities and Local Government (2007). Numbers in italics are the authors' estimates

[2] Department for Communities and Local Government (2008)

This implies that Motorways and trunk roads occupy less than 0.2% of England's surface area and all main roads – including principal roads – about 0.5%. These are the roads that carry the bulk of traffic – 64% in 2006[3]. The relative shares of space occupied and traffic carried are illustrated in figure 2.

Figure 2: Relative shares of land occupied, and traffic carried, by road type



Sources: Table 2 & Department for Transport (2007e) table 7.4

The growth of the road network has mainly occurred through building new minor roads: typically residential streets and service roads for industrial estates and commercial developments.

[3] Department for Transport (2007e) table 7.4

Between 1956 and 2006 the length of the main road network (Motorways, trunk and Principal Roads) in Great Britain increased from 45,000 to 50,300 kilometres whilst the length of minor roads increased from 258,000 to 348,000 kilometres[4]. Even allowing for reclassifications and changes in measuring methods, the growth of minor roads has been significantly more than ten times that of main roads.

For example, the predominance of largely access roads in the network means that urban areas (where most people live) have a higher proportion of road space than rural areas. Rural West Devon has less than 1% of its area as roads, whilst urban Westminster has almost a quarter[5].

The estimates in table 1 are for England alone as road area statistics are not available for Scotland and Wales. However, if similar estimates are made including Scotland and Wales, then the picture shown in table 2 emerges with even smaller percentages of land area occupied by roads.

Table 2: Estimates of areas of different classes of roads in Great Britain 2006

Road Type	**Length (kms)**	**Width (metres)**	**Area (km^2)**
Motorways	3,555	*40*	*142*
Other trunk	8,723	*25*	*218*
Principal	38,032	*15*	*570*
Other	337,832	*9.2*	*3,110*
Total/Average	**398,350**	***10.1***	***4,040***

Source: Department for Transport (2007a), table 4.2 & Department for Communities and Local Government (2007) figures in italics are the authors' estimates

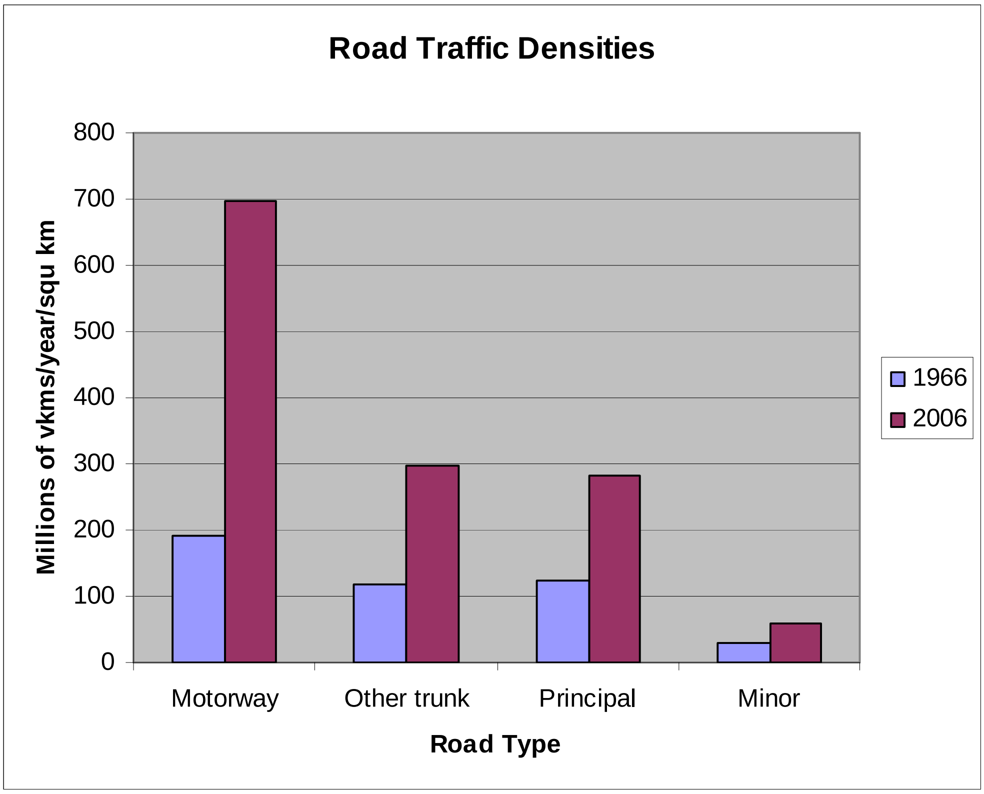
Roads make-up 1.75% of Great Britain's total area[6] (which amount to 228,945 km^2). This estimate is probably a little high in assuming similar road widths in Wales and Scotland to those in England. For Motorways and trunk roads the figure is 0.16% and, if Principal Roads are included, 0.4%.

Main roads are efficient users of space compared with the railways

Trunk roads carry a third of all road traffic and occupy 1.5 times as much space as railways - both rely on other roads for almost all of their access movements. Trunk roads carry 4.75 times as much passenger traffic and over five times as much freight traffic as the railways. As a consequence, trunk roads are at least twice as efficient users of space than the national railways. Local roads also provide space for many facilities and activities other than motor traffic; and much of the space they occupy would be needed for this in any event.

[4] Department for Transport (2007e) table 7.6
[5] Department for Communities and Local Government (2007)
[6] National Statistics (2007a) table 1.1

Figure 3: Traffic densities by road type Great Britain 1966 & 2006



Source: Department for Transport 2006d, table 7.3 and Department of the Environment (1976) table 24. Areas estimates as in table 2

Roads are typically characterised as being land used by road traffic. Most roads, as shown in figure 2, are local access roads of one kind or another. As such they provide for stationary vehicles as well as vehicles in motion. They provide spacing between buildings which aids day-lighting, ventilation and noise protection. They provide easements for water, gas and sewage pipes as well as power and telecommunication cables. In addition to carrying wheeled traffic they provide footways for pedestrians and sometimes verges with grass and trees. Footways also accommodate lighting and signage columns and provide space for utility and post boxes. Much of the space occupied by minor roads would be needed for these other purposes even if there were no motor traffic. This is especially true in denser urban areas, where the proportion of the total surface area occupied by roads is at its highest. Some railway land also serves non-transportation purposes; but to a much lesser degree than roads.

Figure 3 illustrates that minor roads are currently only a twelfth as densely trafficked as motorways, and although the potential capacity of minor road space is substantially less than that of Motorways, most of this difference is because the space is only lightly used by motor traffic.

Whilst traffic densities have risen on all roads since 1966; those on minor roads have doubled. Traffic densities on trunk roads have grown by 2½ times and on motorways by almost four times.

Railways are sometimes presented as being much more efficient users of land than roads - and this is undoubtedly the case for heavy radial flows into city centres. More generally, however, this is not the case. The railway network is only a fraction of the length of the road network and does not accommodate many of the miscellaneous functions described above. However, the trunk road (at 12,300 kms) and national rail networks (at 15,800 kms) are of roughly similar lengths and both provide for mainly medium and longer distance passenger and heavier goods movements.

In table 2 it is estimated that trunk roads in Great Britain occupy 360 km^2. The area of land occupied by railways in England was 180 km^2 in 2005[7]. This includes the London Underground (part of which is below ground) and other local rail systems so the National Rail figure will be somewhat less. Making an allowance for these factors the National Rail network occupies about 170 km^2 in England. In Scotland there are 2,729 kms of railways[8]. It has not been possible to obtain data on the precise length of railways in Wales but these are estimated to be about 1,400 kms[9]. Again when pro-rating the 170 km^2 to the whole of Great Britain this increases to 230 km^2.

The national rail network carried 46.5bn pkms in 2006/07[10] and 22.1bn tkms of freight traffic[11]. The trunk road network carried 18.3bn HGV vkms – (63% of the national total), 124.3bn vkms of car/taxi/van traffic (31% of the national total) and 0.9bn vkms of bus and coach traffic (17% of the national total)[12]. Making reasonable assumptions about the relationship between vehicle travel and personal travel, the trunk road network accommodates 221bn kms of passenger traffic and 117bn tkms of freight traffic.

The trunk road (including Motorways) network is 12,226 kilometres long[13] and the National Rail network is 15,975 kilometres in length of which 14,353 kilometres is open to passenger services[14]. Therefore, in relation to its length, the trunk road network carries 5⅓ times as much passenger traffic and almost seven times as much goods traffic as the national rail network. If we assume that freight traffic operates over only two thirds of the network this gives a ratio of 4.6:1.

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[7] Department for Communities and Local Government (2003) column k
[8] Scottish Executive (2005), table 8.15
[9] Network Rail estimates 2002
[10] Department for Transport (2007e) table 6.1
[11] Department for Transport (2007e) table 4.1
[12] Department for Transport (2007e) table 7.4
[13] Department for Transport (2007e) table 7.6
[14] Department for Transport (2007e) table 6.1

However railways can have a higher 'pipeline' capacity than roads and many sections of railway are narrower than trunk roads. To make allowance for this it is necessary to look at the spatial footprint of the two networks. There are also a number of other differences between rail and trunk roads that make a simple comparison of this kind biased. Tables 3 and 4 provide estimate of road and rail transport productivity including a range of allowances for the differing characteristics of the two systems.

Table 3: Comparisons of trunk road and national rail passenger transport productivity 2006

Basis of Comparison	Trunk Road	National Rail	Road: Rail
Network length	17.26m pkms/km/year	3.24m pkms/km/year	5.3:1
Network area*	614m pkms/km^2	225m pkms/km^2	2.7:1
Trunk network area**	590m pkms/km^2	255m pkms/km^2	2.3:1
Core network area***	590m pkms/km^2	275m pkms/km^2	2.15:1

* Area of network served by passenger services in relation to pkm output
* * Area of the trunk road network with the same length as the passenger rail network, in relation to pkm output
* * * Area of the passenger rail network with the same length as the trunk road network with allowance for car parking, depots etc. in relation to pkm output

Table 4: Comparisons of trunk road and national freight transport productivity 2006

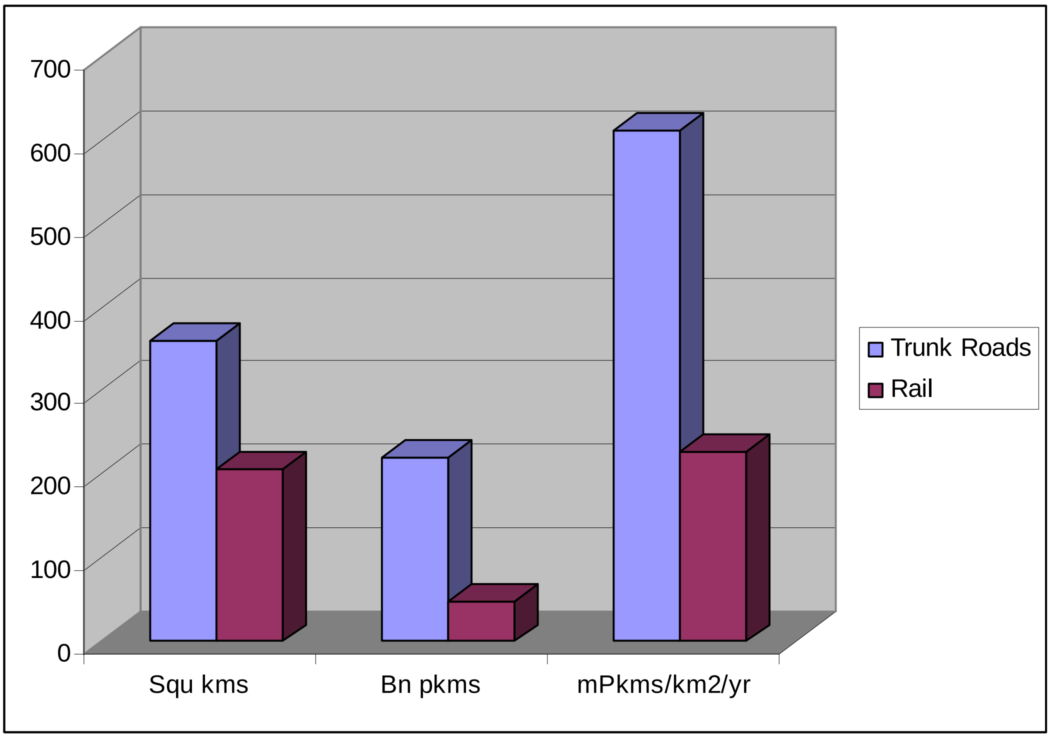
Basis of Comparison	Trunk Road	National Rail	Road: Rail
Network length	9.55m tkms/km/year	2.08 tkms/km/year*	4.6:1
Network area*	325m tkms/km^2	145 tkms/km^2	2.2:1
Core network area**	324m tkms/km^2	150 tkms/km^2	2.2:1

*Assuming only ⅔ of the network is used for freight movements
** Assuming only ⅔ of the network is used for freight movements with an allowance for depots etc.

For passenger travel 90%, of the total rail network area is taken to reflect the actual scale of operations, whilst in the case of rail freight two thirds is assumed. These areas are further reduced in the 'core network' calculation to allow for car parks and rail depots. The reduction in the passenger calculation is roundly 12 km^2 and 8 km^2 in the case of freight.

The basis of these estimates is provision for 200 thousand car parking spaces and the 97 light maintenance depots owned by Network Rail[15]. In all estimates the full extent of the trunk road network has been used. Figures 4 and 5 show the raw results for the two complete networks.

<u>Figure 4: Comparison of trunk road and national rail areas, passenger traffic and land productivity 2006</u>



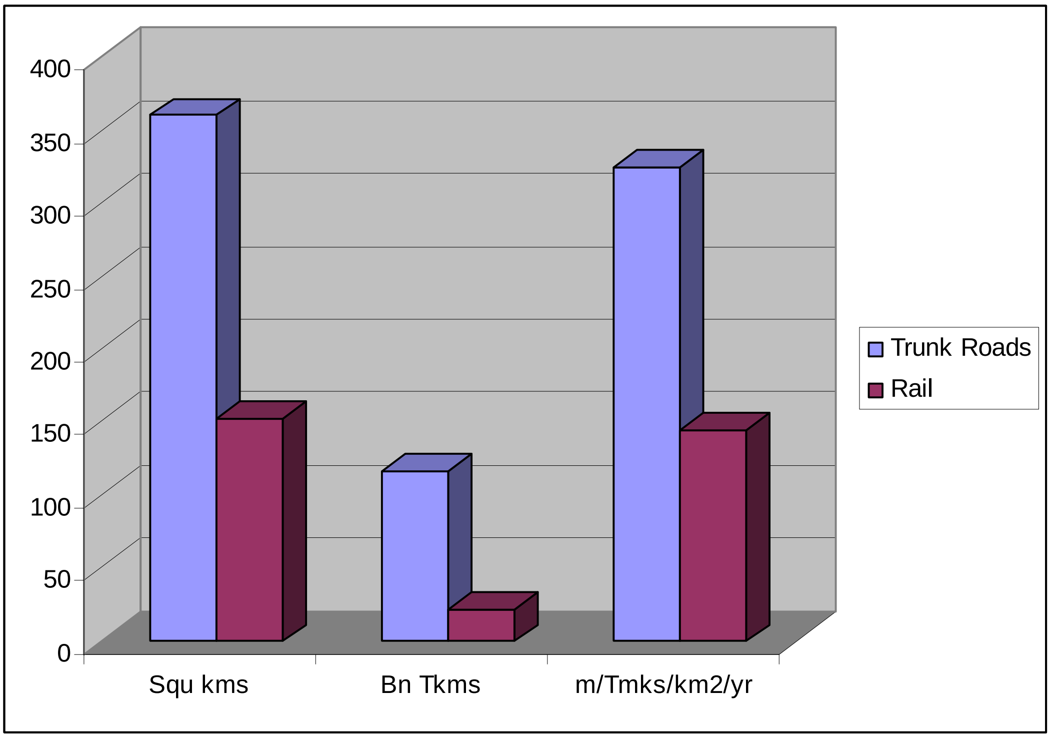
Source: DCLG (2007) and TSGB (2007)

The ratios calculated in tables 3 and 4 are not definitive as they involve estimates and allowances which cannot be fully verified. However they are based on considered judgements. Allowing for errors in these estimates and assumptions it is fair to conclude that the trunk road system is at least twice as productive as the national rail system in the use of land for transportation purposes.

Travel per unit area is only one indicator of transportation efficiency. Speed is another but it has not been possible to produce similar estimates for journey speeds. However, for most journeys, door to door speeds are higher by road transport than by rail (See: Transport Direct and figure 30). Therefore the superiority of trunk road over rail is not likely to change if it were possible to develop a combined productivity indicator.

[15] Network Rail (2006)

Figure 5: Comparison of trunk road and national rail areas, freight traffic and land productivity 2006



Source: DCLG (2007) and TSGB (2007)

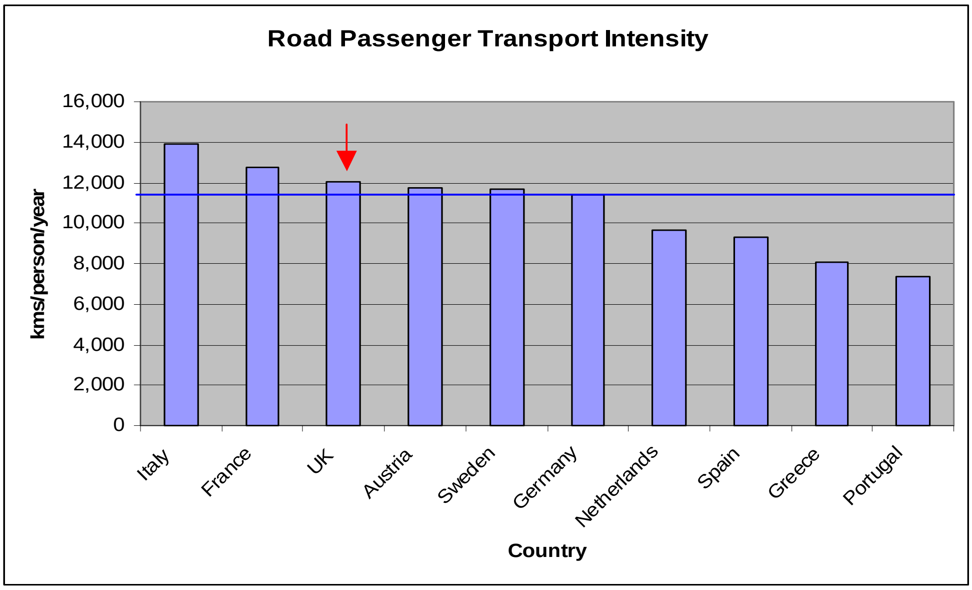
Britain is not unusual in relying so much on roads

Britain relies on roads for transportation to much the same extent as its European neighbours. However provision of roads is markedly lower than in the rest of Europe.

National circumstances, as well as transport and other policies, affect the reliance on road transport, so drawing conclusions on how Britain stands in this respect is difficult. Figures 6 and 7, which include the ten largest western European countries and the EU15 as a whole, illustrate road passenger and freight transport reliance.

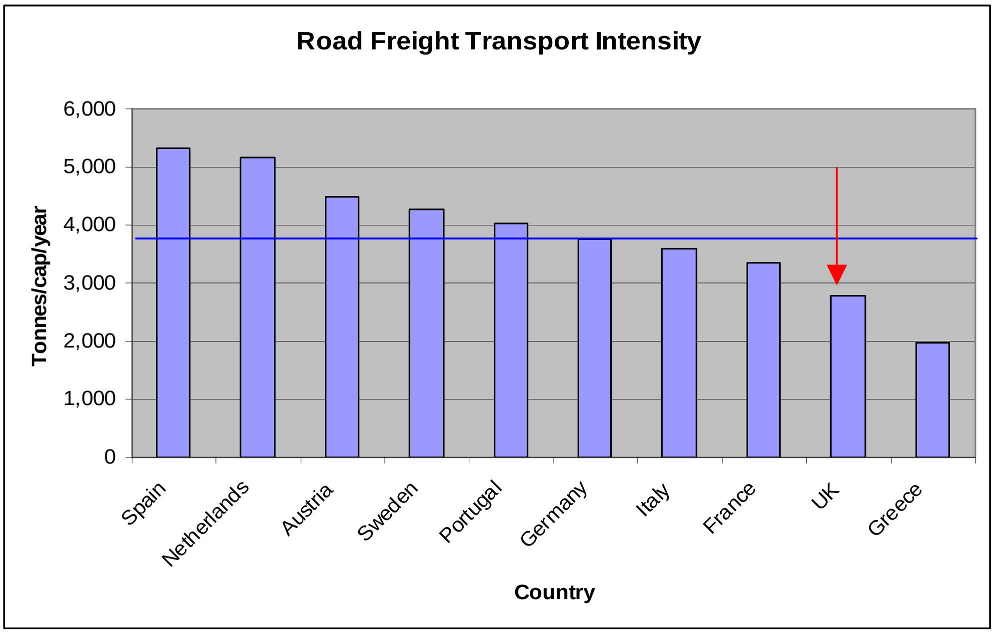
These indicate that Britain's use of roads is not very different from the rest of Europe. The UK has a 4% higher than average road passenger use but a 27% lower than average freight transport usage. Overall therefore the use of road transport is similar to or perhaps a little lower than the Western European average.

Figure 6: Road passenger transport intensity in the ten largest EU15 countries (average = 11,853)



Source: European Commission (2007) tables 1.1, 3.3.4, & 3.3.5.
[1]National & international hauled by vehicles registered in that country

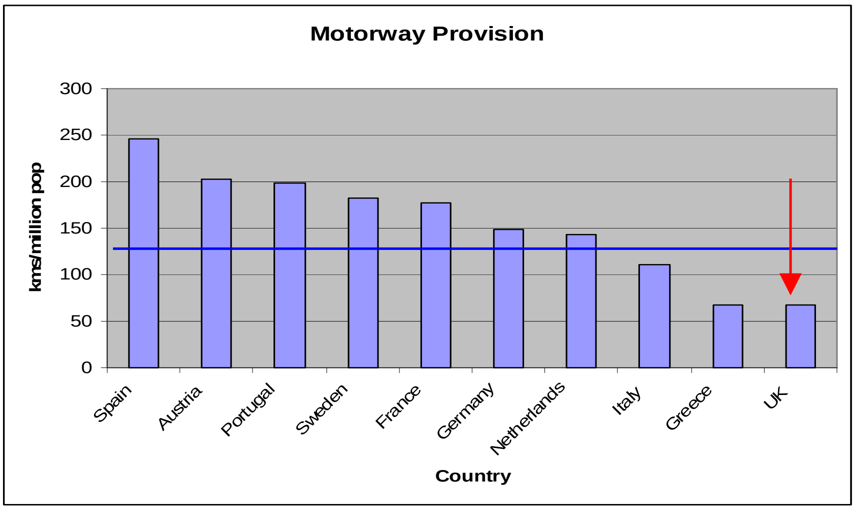
Figure 7: Road freight transport intensity in the ten largest EU15 countries (average = 3,813)



Source: European Commission (2007) tables 1.1 & 3.2.4c.
[1]National & international hauled by vehicles registered in that country

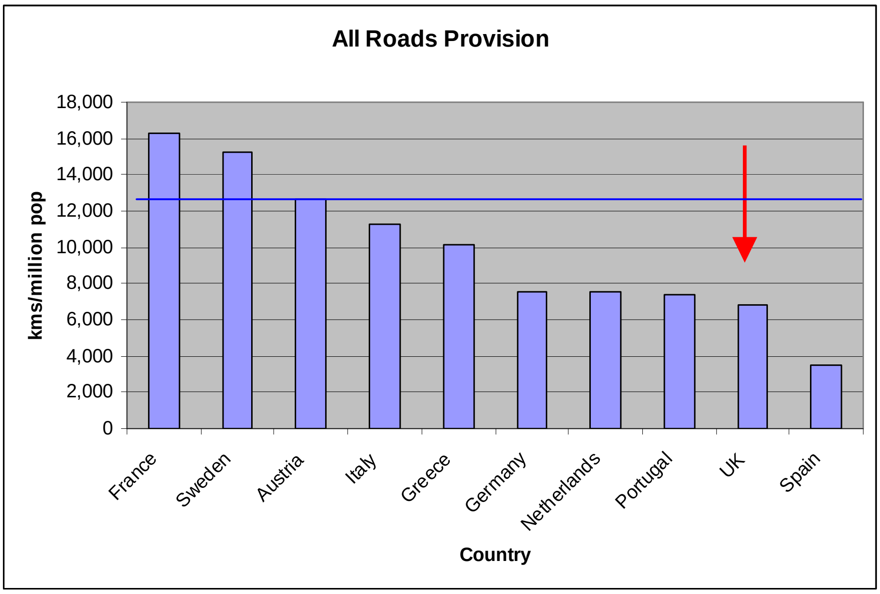
However road provision is significantly different, with the UK having a much lower provision of Motorways compared with its population and a substantially smaller network under the jurisdiction of central government. Even though the minor road system in the UK is much larger than the main road network, it is quite restricted on a per capita basis when compared with most other European countries. Figures 8, 9 and 10 illustrate just how poorly the UK fares compared with other major western European countries in this respect.

Figure 8: Motorway provision in the ten largest EU15 countries (average = 144)



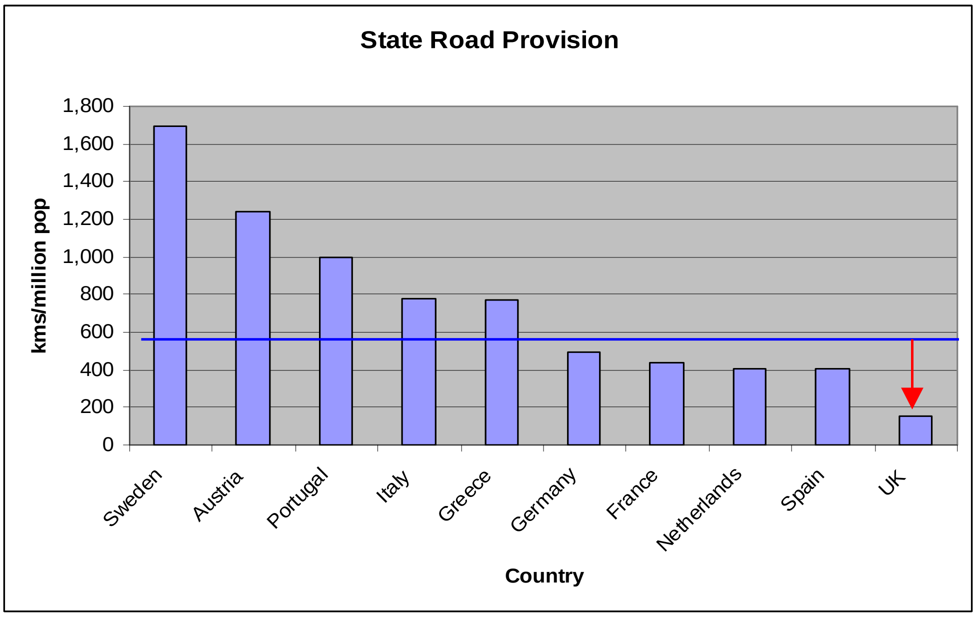
Source: European Commission (2007) tables 1.1 & 3.5.1.

Figure 9: All road provision in the ten largest EU15 countries (average = 12,214)



Source: European Commission (2007) tables 1.1 & 3.5.2.

Figure 10: State road provision in the ten largest EU15 countries (average = 550)



Source: European Commission (2006) tables 1.1 & 3.5.2.

If the Motorway comparisons were carried out on an area, passenger kilometre or GDP basis, provision still turns out to be below average, with:

- 15 kms/10^3km^2 compared with 17¼ for the EU15
- 5kms/10^9pkms (by road) compared with 13½ for the EU15 and
- 2kms/€10^6GDP compared with 5.4 for the EU 15 as a whole.

Therefore, by any reasonable standard, Britain is poorly provided with Motorways. In fact even if the network were doubled in length it would still be below average on three of the four measures described above.

New road capacity does not simply fill up with traffic

New road capacity can relieve congestion which, in turn, reduces travel costs which can result in more traffic. Some of this has come from other roads so relieving them, but there is some entirely new traffic. However this does not 'simply fill up' the additional capacity but a new balance between supply and demand is formed in which there is more traffic than before, but less congestion. In the long run this relief might be reduced with rising demand but, to some extent, that would happen in any event.

This is a commonly expressed concern about road building: that any additional capacity will simply get filled up with suppressed demand. It is first worth making the point that it is not capacity that affects demand but the ease of travel provided. Where roads are un-congested adding capacity has little affect on travel times or costs so traffic volumes are barely affected.

The case for building and improving roads however is usually made because of congestion on existing roads. Where it rests on safety grounds alone, traffic volumes are not likely to be much affected, as the risk of having an accident is only a marginal factor in most travel decisions.

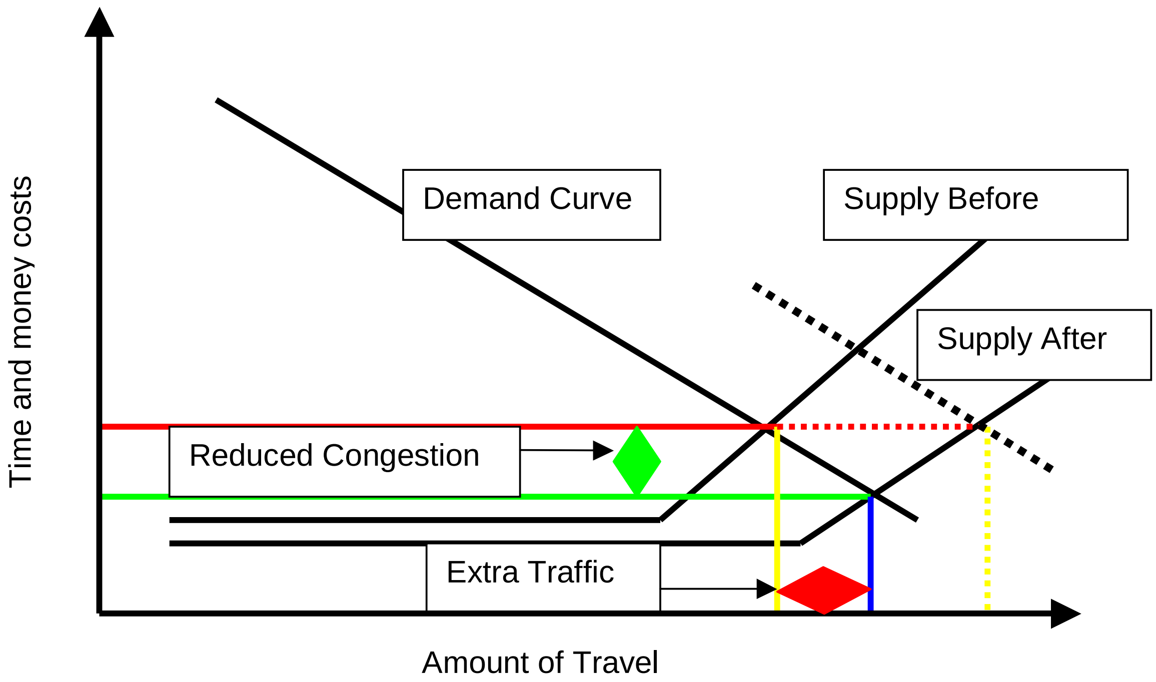
The provision of additional road capacity in a congested corridor will ease travel conditions and as a consequence some additional travel will be generated. Depending on the layout of the road network some of this additional traffic will have diverted from other routes, so easing overall congestion. But on all routes affected there will be some traffic generation.

This is illustrated in figure 11 which plots the amount of travel against its cost (in both time and money senses). The Demand Curve represents the amount of travel that would take place at a particular cost. Thus at the bottom (right), where costs are low, there would be more travel than at the top (left), where they are high. The costs are affected by the amount of traffic in relation to the capacity of the road and this is shown by the Supply (Before) line - the break represents the point at which the road starts to become congested. Where these two lines intersect determines the amount of travel; and this is shown by the solid yellow line - with the solid red line showing the cost.

If the road is improved, then at any level of use congestion is less and costs fall. This is illustrated by the supply (After) line and the resulting amount of travel shown by the blue line and the cost by the green line. The additional traffic is represented by the red triangle and the reduction in congestion by the green triangle.

So increasing capacity reduces travel cost from the red to the green line; and increases travel volume from the yellow line to the blue line. However if the road were equally congested (or ‘filled up’ in lay parlance) the costs would not have been reduced, but the costs have fallen from the red line to the green line - so the extra capacity has been only partly used.

Figure 11: Illustration of the effect of additional road capacity on traffic

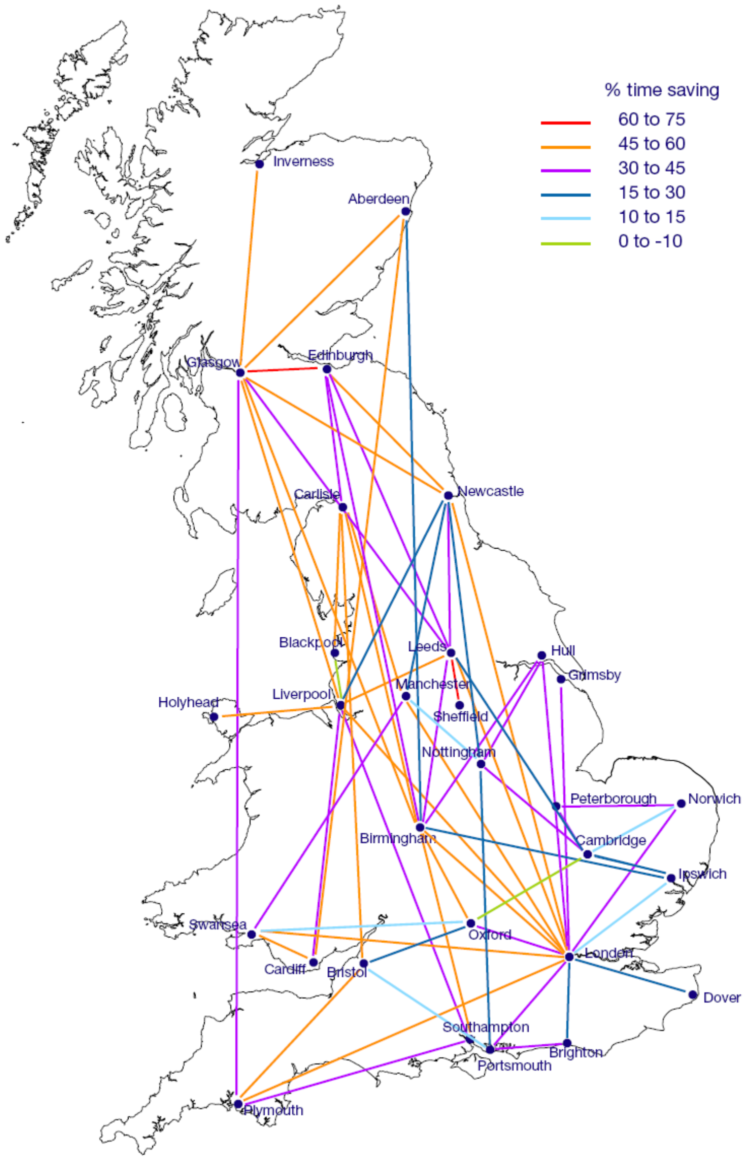


Source: Authors own

As time passes and if the number of people and cars increased then the demand curve would shift to the right – but this is not primarily as a result of expanding road capacity. At some point, shown by the dotted black line on figure 11, the demand curve may shift to a point where congestion is as bad as prior to the road improvement but this is due to social and economic factors rather than changes to the road system.

There are many examples of road improvements where journey times have improved despite consequent increases in traffic volumes. Figure 12 demonstrates just how much of a difference the construction of the Motorway network has made to express coach journey times despite huge increases in long distance road traffic over the last fifty years.

Figure 12: Coach journey timetable differences 1959-2006



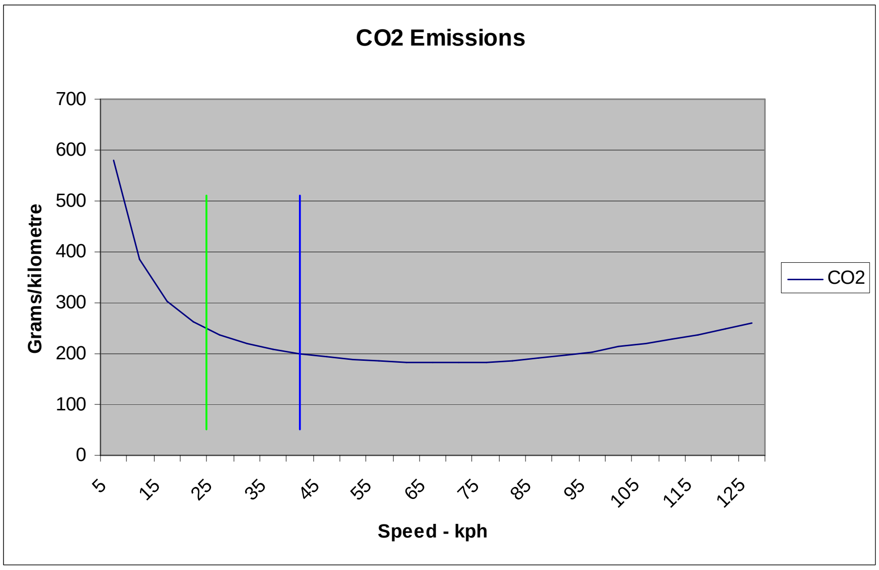
Source: National Express Timetables for 1959 and 2006

Building new roads will not have a material effect on climate change

New road capacity both increases traffic – which raises Greenhouse Gas emissions (GHG) – and reduces congestion – which reduces them. The balance between these two effects depends on local circumstances. In most cases however it is to be expected that new road capacity will result in more GHGs, but the scale of this is likely to be small.

Out of a total of 27 billion tonnes of carbon dioxide emitted globally in 2004[16] Britain contributed 552 million[17] – just over 2%. Total greenhouse gas emissions from all forms of road transport constitute about eighteen percent of the national total[18], which is less than 0.5% the global total. As shown above, road building can generate additional traffic whilst at the same time reducing congestion. This means that on the one hand GHG emissions increase if more traffic is generated, but they can also be reduced if stop start motoring is eliminated. The relationship between speeds and emissions is also worth noting (See: Figure 13).

Figure 13: Relationship between traffic speeds and CO_2 emissions



Source: Highways Agency (2006)

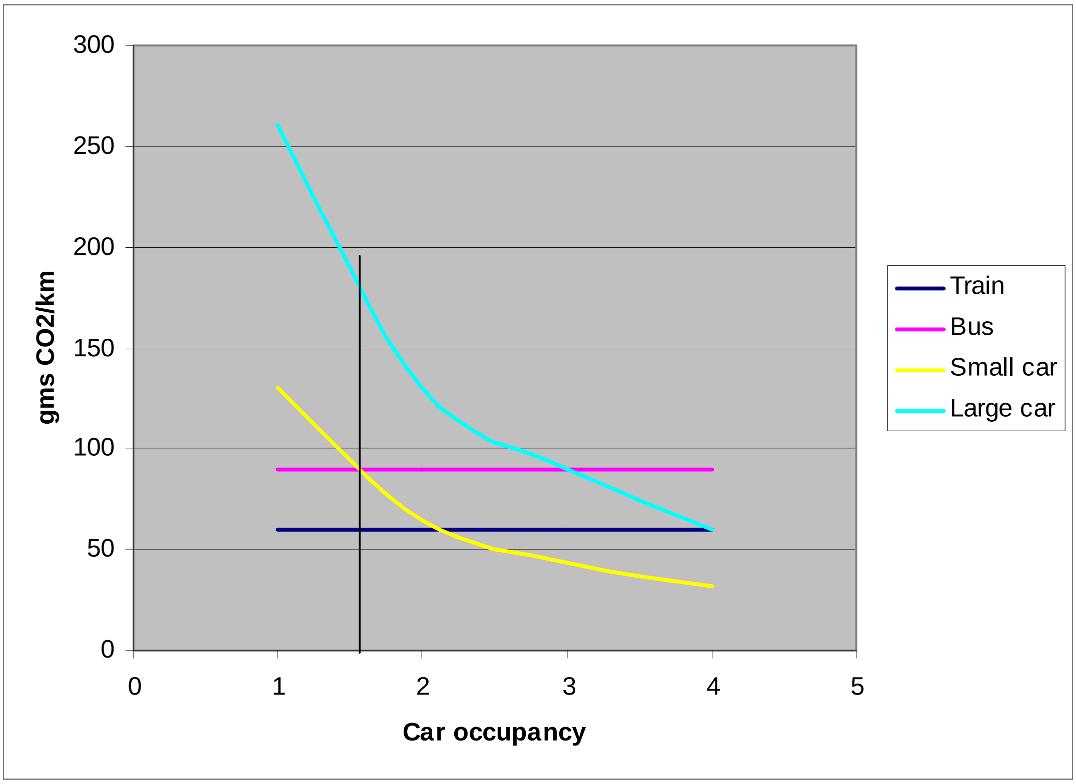
Where road improvements improve flows to the left of the green line the substantial reduction in emission rates will more than outweigh generated traffic and carbon emissions will fall.

[16] US Energy Information Administration, (2007) page 6
[17] Department for Transport (2007e) table 3.8
[18] National Statistics (2007c), table 2

Between the green and blues lines reduced emission rates will be broadly balanced by extra traffic and the effects will be neutral and to the right of the blue line increase speeds will result in progressively higher emissions.

This issue was addressed in the recent Eddington Study which came to similar conclusions. From the modelling done for the Eddington study it was estimated that with a strategic road building programme of 360 lane kilometres a year between 2015 and 2025 together with associated major road and junction improvements traffic volumes would increase by 0.6% and CO_2 emissions by 1.0%[19]. The analysis carried out of a larger programme of 600 lane kilometers a year over the more extended period from 2010 to 2041 in Roads and Reality concluded that this would result in an increase of road transport carbon emissions of 4.6%[20] - equivalent to 1% of the national total.

Figure 14: CO_2 emissions of cars, buses and trains



Source: Transport Direct

Given the difference in scale of these programmes, and the fact that efficient pricing in Roads and Reality includes a significant carbon tax, these two figures are broadly consistent.

[19] Department for Transport (2006a) p37/38
[20] Banks, Bayliss & Glaister (2007b) figure 4.9

Whilst provision of additional road capacity would, on its own, increase carbon emissions the introduction of an efficient pricing scheme could have a larger positive impact by reducing carbon emissions by almost 15%[21] and changes in road transport technology would have an even greater effect[22].

Roads provide space for cars, lorries, buses and motorcycles, but it is often assumed that car travel is a much more potent agent of climate change than using the bus or train. This is an exaggeration on average and can be very misleading in particular circumstances. Figure 14 compares carbon dioxide emissions of average buses and trains with cars with varying occupancy levels. The black vertical line represents average car occupancies in Britain (1.58[23]); and from this it can be seen that there is little difference between CO_2 emissions of small cars and buses. A well-loaded family car can also be as efficient as a train in this respect. The bus and train figures reflect average loadings (bus 10[24] and rail 105[25]) and clearly changes in these would affect the levels shown.

Current averages are not necessarily a guide to the GHG emission impacts of transport policies. If car drivers could simply be switched into empty seats on existing buses and trains then there would clearly be GHG emission savings. However if car drivers are to switch, then good public transport provision and incentives must be provided. A recent study[26] of the implications of achieving the High level Output Specification[27] for the National Railways showed that the additional CO_2 emissions from rail service improvements would heavily outweigh the reductions in road transport CO_2 emissions resulting from car drivers switching to rail.

Building roads will benefit low-income groups

Wealthier people spend more on transport overall including the purchase and use of cars. However all income levels, on average, depend on cars for transportation more than all other forms of travel combined. Wealthier people make more absolute use of roads but all income groups rely on roads for over 92% of their surface travel - except the wealthiest twenty percent who only make 88% of their travel by road.

Households in different income ranges use the car as their main means of transport (See: Figure 15). It is clear that, whilst people travel more as they get wealthier, cars are now (and have long been) the most important form of transport for each and every income quintile.

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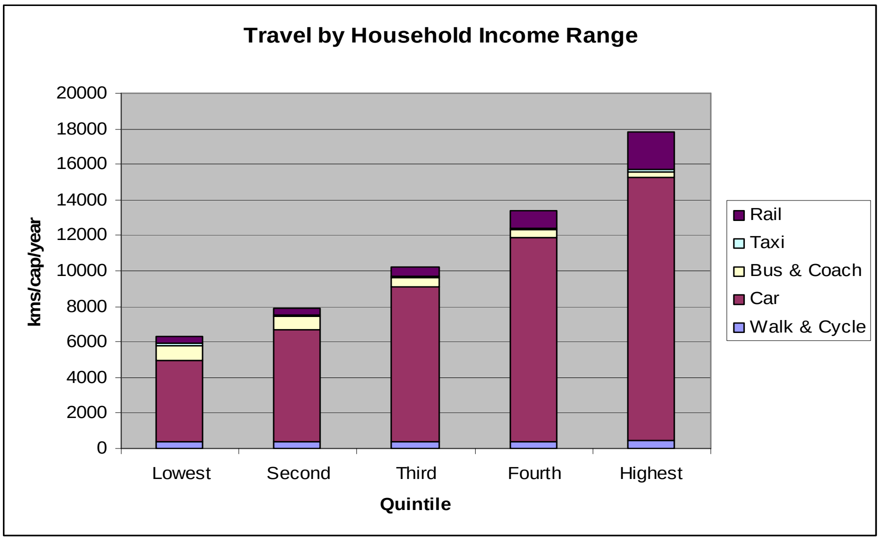
[21] Banks, Bayliss & Glaister (2007a) figure 5.2
[22] King J. (2007), chapter 7
[23] Department for Transport (2007b), table 6.2
[24] Department for Transport (2007c), table A2
[25] Office of Rail Regulation (2007) tables 1.1b & 1.4 with allowance for unfulfilled schedules
[26] Department for Transport (2007f), Delivering a Sustainable Railway, Cm 7176, TSO, Norwich, July
[27] Department for Transport (2008), Network Modelling Framework and Appraisal for HLOS - The Evidence Pack, DfT, London, January

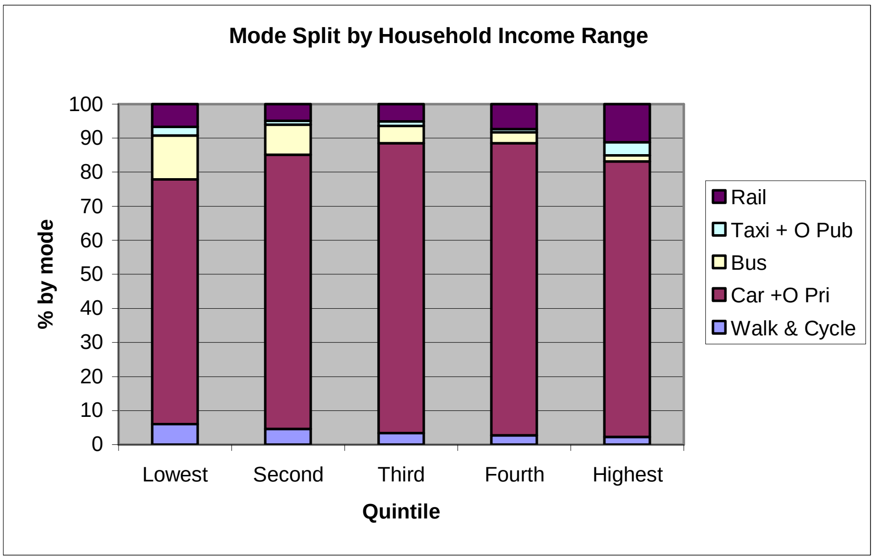
Walking and cycling do not vary much between people of different income levels. On average people travel by about 1,700 kms a year on public transport with people in the top quintile travelling over 3,000 kms a year because of their high use of rail. Of the four lower quintiles the lowest makes the greatest use of public transport (mainly buses) but the other quintiles also make use of public transport even as incomes rise.

<u>Figure 15: Personal travel by income quintile, Great Britain 2006</u>



Source: Department for Transport (2007b) table 5.4

<u>Figure 16: Modal split by income quintile, Great Britain 2006</u>



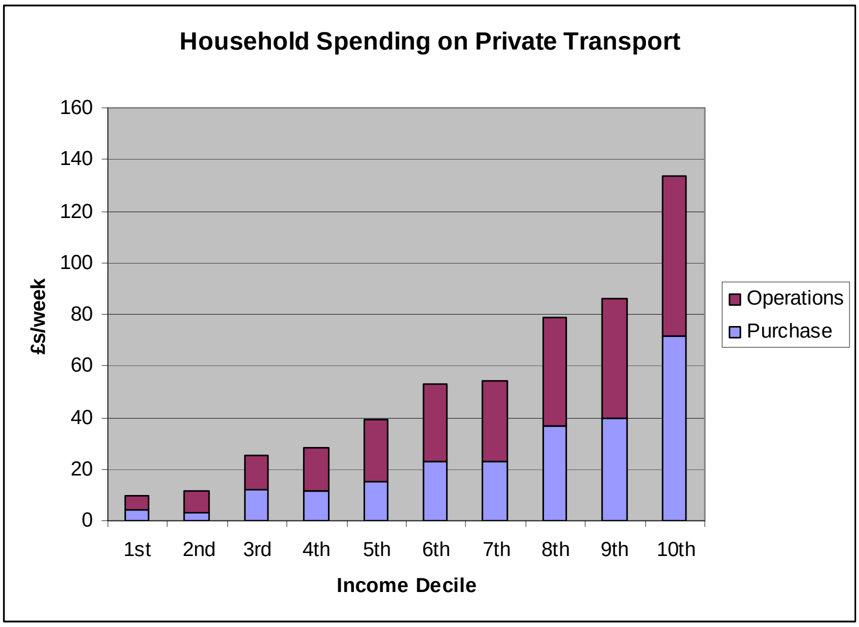
Sources: Department for Transport (2007b) table 5.4

Looking at the *shares* of the different overall amounts of travel by income level, as shown in figure 16, cars dominate with all income levels making 70% or more of travel (by distance) by car or some other form of motorised private transport. Bus and coach use as well as other mode shares, decline with higher incomes but, after a reduction between the lowest and the second lowest income quintile, rail travel rates (and shares) grow strongly with higher incomes.

These differences are reflected in what people spend on transport, with wealthier people spending more on both private and public transport as shown in figures 17 and 18. Overall spending on private transport is an order of magnitude greater than on public transport and even people in the poorest twenty percent on average spend over seven times as much on private transport as they do on public transport – compared with eleven times for the richest twenty percent.

People in the richest 20% spent 38p/km on private transport and 22½p/km on public transport compared with 11½p/km and 7¼/km for the poorest 20%. This three to one difference in unit costs reflects the fact that richer people buy more expensive cars, and replace them more frequently than poorer people. Those on low incomes also use trains less than wealthier people, despite the fact that many have access to concessionary public transport travel. It is clear from differences in private transport cost rates that people on low incomes are prepared to accept 'cheap' private transport in order to enjoy the enhanced mobility it provides.

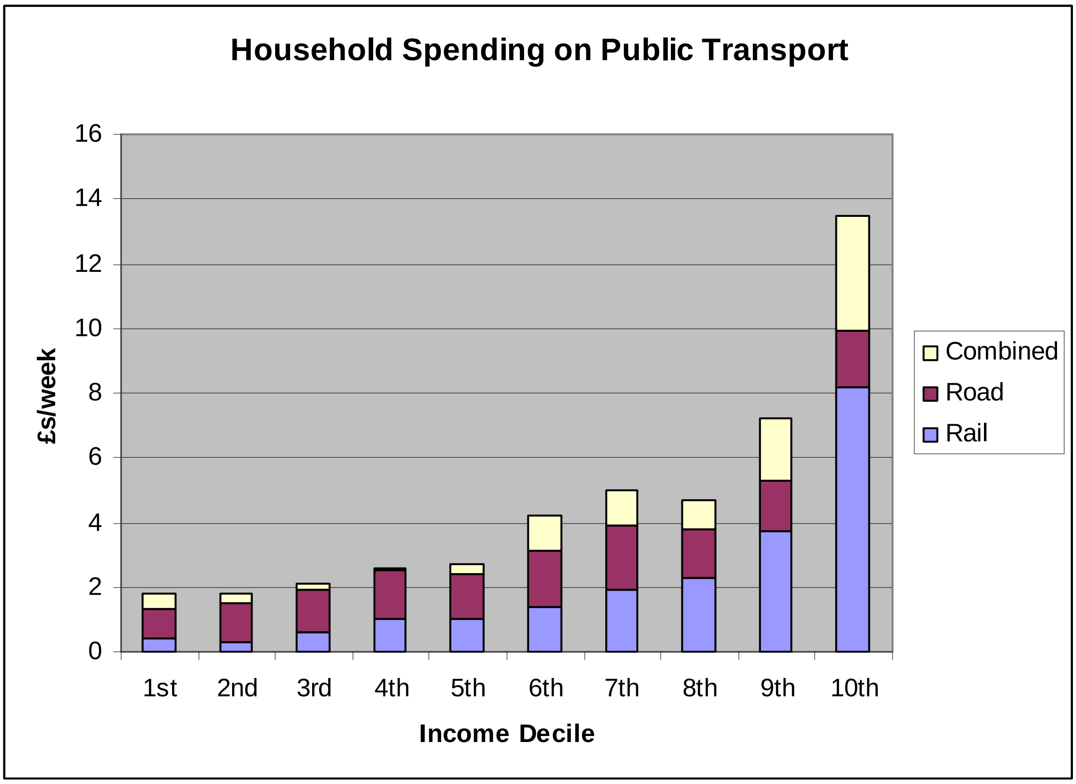
Figure 17: Spending on private transport (£s/week 2006) by income decile



Source: National Statistics (2008) table A8

The rate of increase in spending with higher incomes is half as fast again for private transport as for public transport. The poorest fifth of households spend about 7% of their total outgoings on (all forms of) transport compared with an average of over 17% for the richest fifth. Spending on private transport accounts for a significant part of transport spending as people get wealthier.

Figure 18: Spending on public transport fares (£s/week 2006) by income decile



Source: National Statistics (2008) table A8, excluding 'Other travel and transport'

The high expenditure on and use of rail by higher income groups is noteworthy as this attracts a higher rate of government support than that for roads. In 2006/07 support for rail travel amounted to about £6.3bn[28]. For London Underground and the Docklands Light Railway it was over £1.2bn[29] and with support for other light rail systems the total for rail approaches £8bn. This amounts to about 14p per pkm of rail travel which compares with a public expenditure figure of £8.33bn on the road system in 2005/06[30] - less than 1p per passenger kilometre[31].

[28] Office of the Rail Regulator (2007) table 6.2a
[29] Transport for London (2007) page 46
[30] Department for Transport (2007e) table 1.15
[31] Department for Transport (2007e) table 1.1 – 763bn pkms

Even if the £1.5bn support for the bus industry (excluding concessionary fares support)[32] is taken into account this comes to less than 1.2p per passenger kilometre. Taking no account of freight traffic (for which road transport is the main carrier), support for roads, in relation to their use, is very much lower than for rail.

Traffic pollution is not getting worse

Noxious emissions from road transport have been reducing for many years and will continue to do so as progressively stricter standards for older, more polluting, vehicles are developed and implemented, although this will be partly offset by greater traffic volumes. Emissions from the major types of pollutant have reduced by at least a third and most much more than this. Three of the most noxious emissions have almost been eliminated. Substantial progress has been made in quietening road vehicles but noise nuisance remains a significant problem.

Of the thirty-five or so emissions (excluding green house gases) that impact on air quality and are measured in the UK, transport contributes to nineteen of these to varying extents. A good deal of effort has been put into making road vehicles less polluting over the last two decades. This has resulted in fewer noxious emissions despite there being more traffic. Between 1970 and 2005 road traffic volumes increased by a factor of 2.5[33] yet the emission of atmospheric pollutants reduced considerably. Figures 19 & 20 show how the most important of these have reduced in absolute terms since 1992.

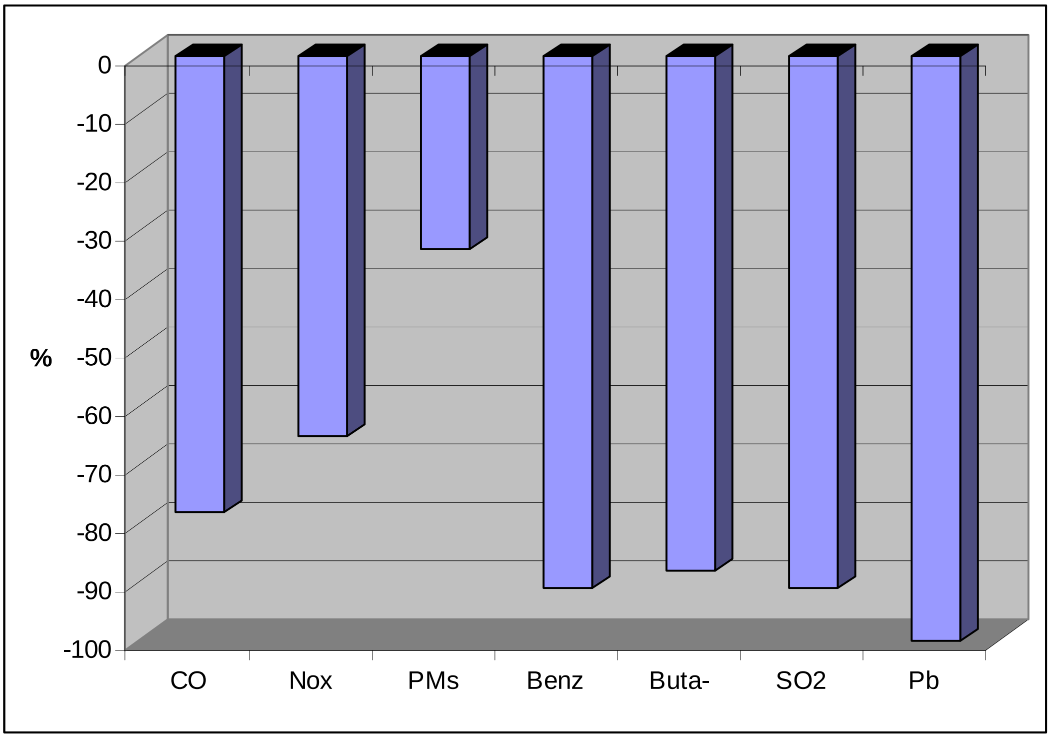
Since 1970, of the fifteen pollutants that have been monitored, total emissions fell from 6.8m tonnes/year to 2.2m tonnes a year. This has been mainly due to reductions in carbon monoxide and lead – which is now virtually eliminated. Other pollutants that have been almost eliminated or reduced by a factor of ten or more include hydrochloric acid, benzene, sulphur dioxide and dioxins. Of the nineteen measured pollutants increases in emissions have occurred in seven (ammonia and the metals copper, selenium, vanadium, zinc, beryllium and tin). This increase is either a reflection of traffic volumes (e.g. copper from tyre and brake wear) or because they are used as fuel additives (e.g. vanadium) to improve engine efficiency or reduce emission of other pollutants. Overall the emission of heavy metal pollutants has reduced from about 6,600 tonnes in 1970 to less than 700 in 2005.

For new petrol engine vehicles the noxious emission rate has fallen to 5% or less than that of fifteen years ago[34]. For diesel engine vehicles, the improvements have been less, but there have still been improvements of two or three fold for most pollutants.

[32] Department for Transport (2007c) table F
[33] DfT (2007e), table 7.1
[34] Department for Transport (2007e) table 3.6

Controls over emissions of noxious gases and particles were first introduced in the USA and Japan in the late 1960s and later, in the early 1980s, in Europe. By the early 1990s pollutant rates from petrol engine cars had been reduced by two thirds and halved for diesels[35]. Figure 19 illustrates progress since then (including the prospective Euro 5 standards). Since the early 1970s, overall permitted emission rates have reduced by an order of magnitude for diesels and two orders of magnitude for petrol cars.

Figure 19: Car and van pollutant emission changes 1992 - 2005

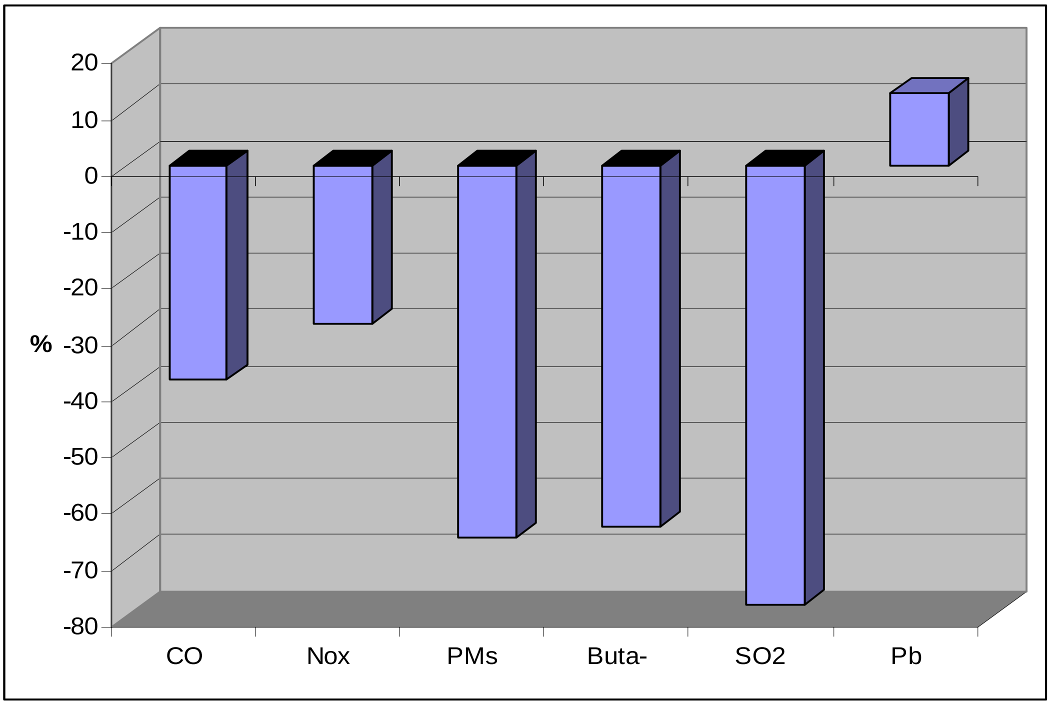


Source: Department of transport (2007e) table 3.9

The combination of periodically tightening standards and the scrapping of older vehicles which has resulted in the emission reductions shown in Figures 19 and 20. Further reductions in emissions will certainly continue as a result of the process indicated in figures 21 and 22.

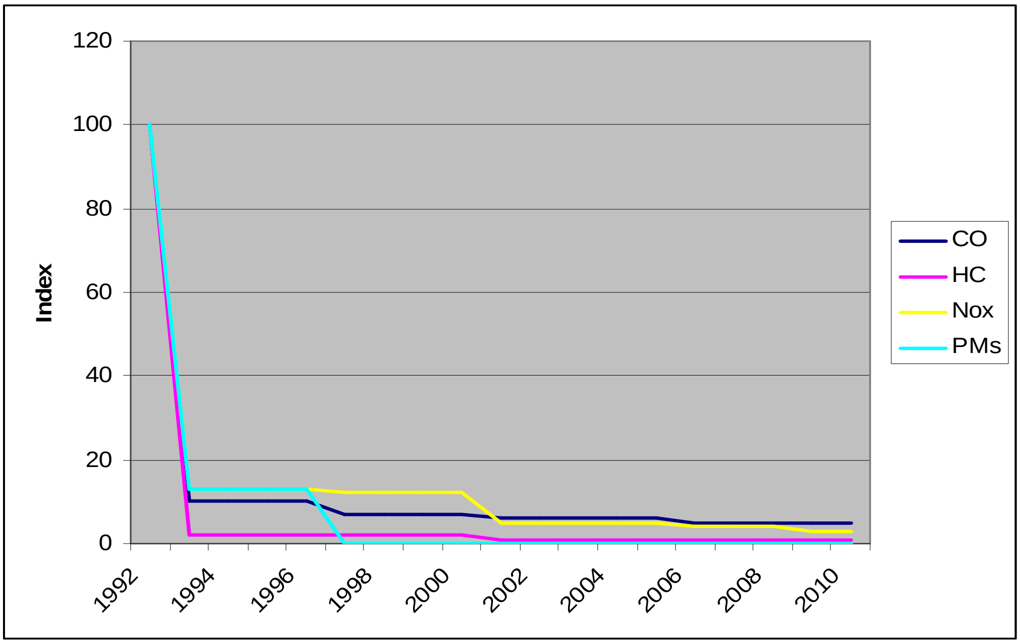
[35] Hohmeister N. L. (2001)

Figure 20: HGV pollutant emission changes 1992 – 2010 (Euro 1 to Euro 5)



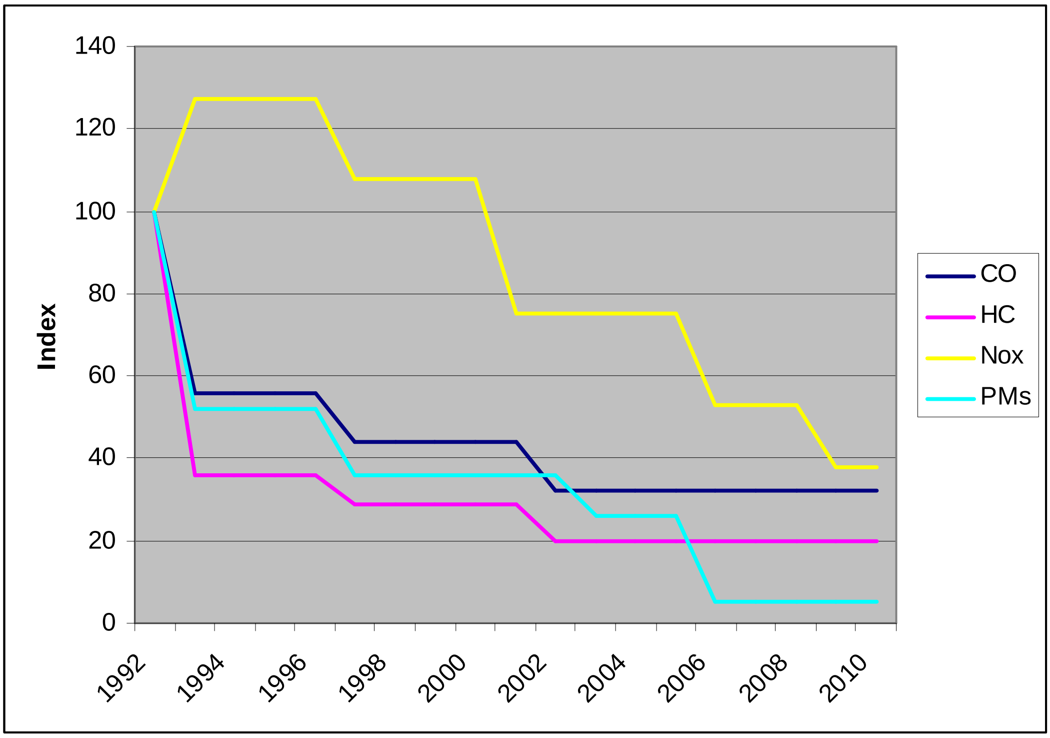
Source: Department of transport (2007e) table 3.9.

Figure 21: Improvements in petrol car emission standards 1992 – 2010



Sources: Department of transport (2007e) table 3.6. & Wikipedia (2006)

Figure 22: Improvements in rigid HGV emission standards 1992 – 2010



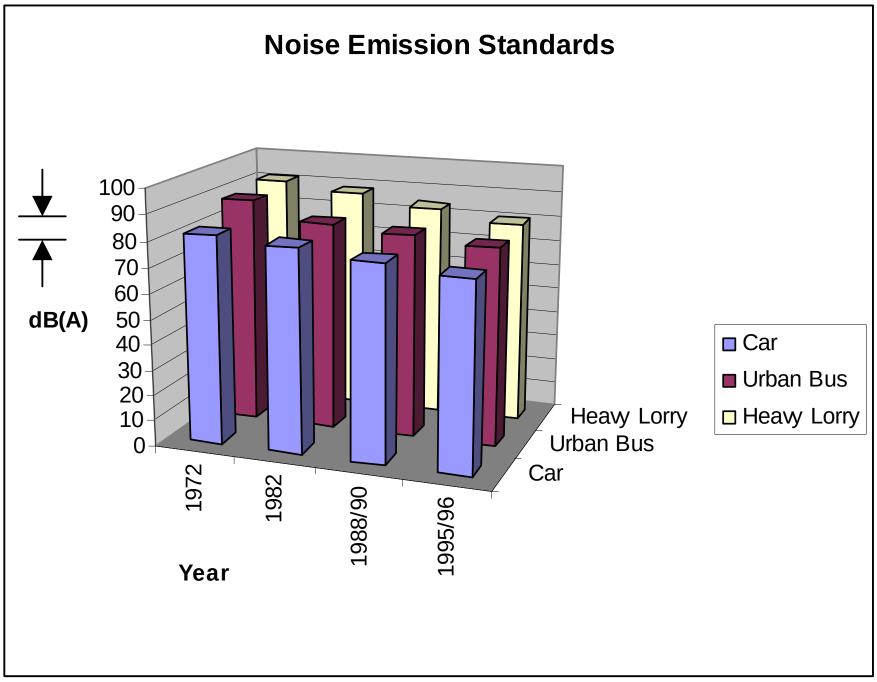
Sources: Department of transport (2007e) table 3.6. & Wikipedia (2006)

Road traffic also causes noise, and traffic noise is the most significant form of noise nuisance. However, vehicles have been getting quieter and this has offset traffic growth. Between 1991 and 1999 the volume of road traffic grew by 13.5%[36] yet the percentage of people affected by traffic noise grew by less than 5% from just under 30% to just over[37]. Most properties are on minor roads and consequently traffic volumes of trunk roads will contribute little to overall noise perception. The improvements in the required noise standards for new vehicles, over the last thirty years, are shown in figure 23.

Noise levels are measured on a logarithmic scale so a reduction of 10 dB(A) [shown by the arrows in figure 23] is equal to a halving of sound energy. Since 1972 car noise levels have fallen by 8 dB(A) and bus and lorry standards by 11 dB(A). This means that overall noise levels from individual vehicles have nearly halved and a modern lorry is no noisier than the levels permitted for cars in 1972.

[36] Department for Transport (2007e) table 7.1
[37] Department for Environment, Food and Rural Affairs (2008) tables 5 & 6

Figure 23: Road vehicle noise emission standards 1972 – 1995/96 (Arrows indicate a halving of noise levels)



Source: Mayor of London (2004)

The construction industry could accommodate a substantial increase in road building

Of the £100bn+ construction activity in Britain in 2006 less then 2% was road-building. Past construction rates have been much higher and the increasing globalisation of the construction industry means there is little doubt that a major increase in road construction could be accommodated by the industry.

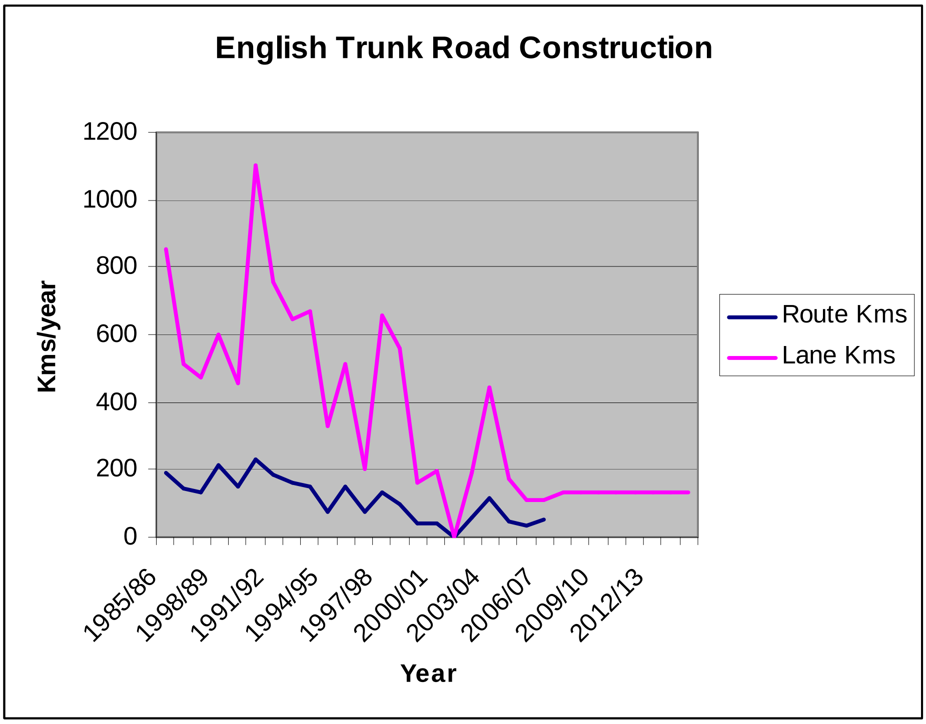
Roads building and maintenance work forms only a small part of construction activity in Great Britain. In 2006 there was £112bn of construction activity[38]. Of the £64.4bn of new works £6.53bn was on infrastructure and, of this, £1.87m (29%) was on roads[39]. Therefore, at present, new road construction forms only a small proportion (about 1.66%) of total national construction activity and less than a third of infrastructure works.

Between 1996/96 and 2006/07 the amount of trunk road construction slumped from 514[40] to 110 lane kilometres/year[41].

[38] Department of Trade and Industry (2007) tables 2.4 & 2.6
[39] Department of Trade and Industry (2007) tables 2.8
[40] Department of Transport (1996), table 2.19
[41] Department for Transport (2007e) table 7.16

This compares with an average of almost a thousand lane kilometres a year of Motorways alone in the 1970s[42] with an average annual spend of around £2¼bn a year at today's prices. This is illustrated in figure 24 along with the average future level of construction in the Targeted Programme of Improvements as estimated for the Eddington Review.

Figure 24: Trunk road capacity expansion in England (Completions) 1985/86 - 2006/07 and the Targeted Programme of Improvements



Sources: Department of transport (1996) table 3.19, Department for Transport (2007), table 7.16 & Department for Transport (2006), table 5.1

If an average of 600 lane kilometres a year of new trunk road capacity was built between 2010 and 2041 as recommended in the Roads and Reality report[43] this would be similar to the average of 590kms/year between 1988/89 and 1998/99 when the curtailment of the national roads programme, introduced in 1997, started to bite.

When construction of infrastructure has had high priority it is remarkable what has been achieved.

[42] Department for Transport (2007e) table 7.6
[43] RAC Foundation 2007a, page 11

Perhaps the most compelling example was during the Second World War when, in less than five years, the concrete placed for airfields was equivalent to the construction of 6,348 kilometres of dual three lane motorway[44]. This is about 1.75 times the size of the current motorway system, which has been built over a forty year period. Even the peak construction rate of the Motorway network in the early 1970s - averaging 180 kms of new motorway a year[45] pales into insignificance compared with this effort.

It is likely that new road construction would have to be to high environmental standards and this would include a measure of tunnelling and cut and cover. Tunnelling is a specialised type of civil engineering requiring particular skills and equipment, however it is now an international construction activity and many long tunnels have been built recently for transportation (road and rail) and water supply. The Channel Tunnel and its link to central London involved over 76kms of tunneling[46] and the London Water Ring main 80kms of narrow bore tunnels[47]. More recently the 34km Loetschberg tunnel was completed and, over the last ten years over 35kms of road tunnels have been constructed on the Island of Madeira alone[48] in Europe. If a national road programme involved 300 kms of tunneled route the average annual rate of 10 kms (20 kms single bore) over thirty years should not present major construction capacity problems.

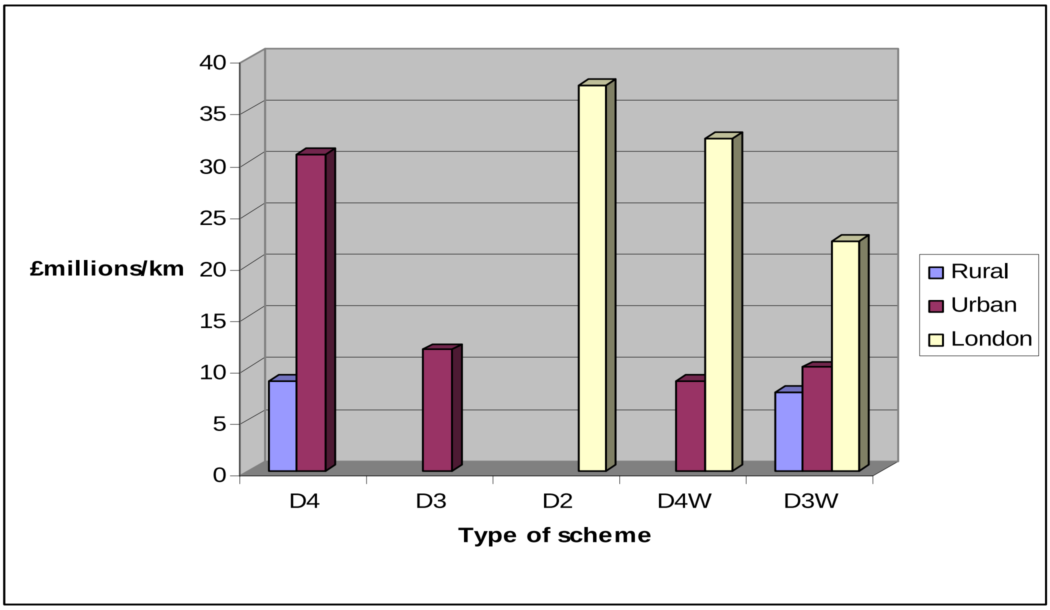
Building new roads is not too costly

Expenditure on all road construction amounts to about 2½% of spending on road use and less than 13% of specific motoring taxes. A trunk road programme of 100kms of new and 100kms of widened roads would cost less then 2% of users' spending. So road building is affordable if it is economically justified and there are many potential schemes with good rates of return.

The costs of new and widened roads depends on the form of construction used, the type of terrain they are built in, land take and measures to mitigate environmental impacts. Consequently it is very difficult to generalize. Archer and Glaister[49] have made estimates for the costs of constructing and widening main roads. These are summarized in figures 25 and 26 which indicate that widening existing roads is very expensive, for the capacity provided, compared with the construction of new routes, even in urban areas. The costs shown can be compared with the cost estimate in the Eddington study for a high speed rail line between London and Scotland of £33bn or about £50m per kilometre[50] - much higher than that of Motorways – which would have a capacity of twelve trains per hour in each direction[51].

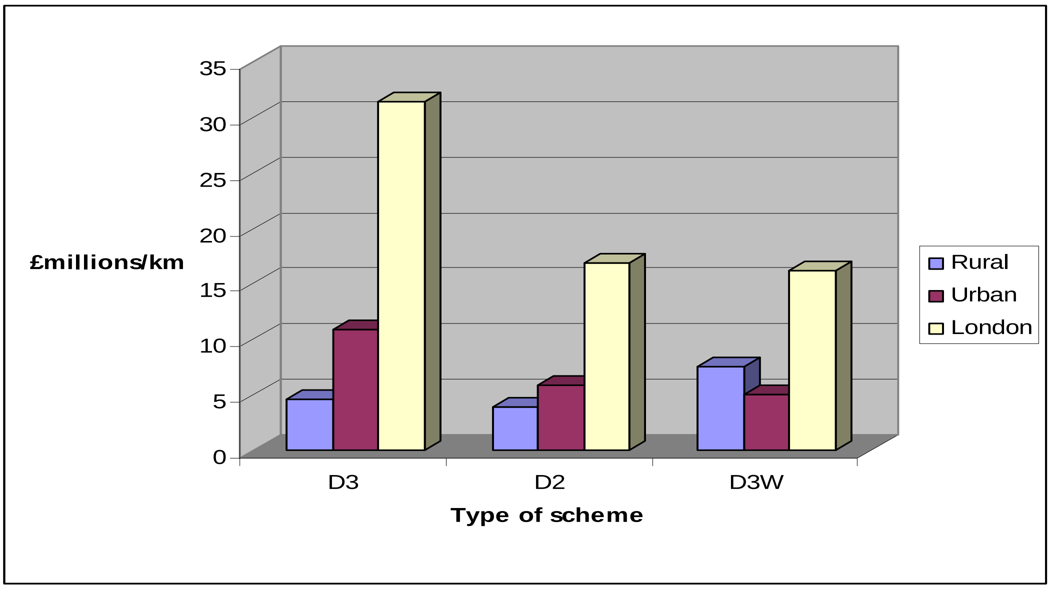
[44] New Civil Engineer (1999)
[45] Department of Transport (1993), table 9.12
[46] Department for Transport (2006c)
[47] Thames Water (2008)
[48] Merzagora E A (2006)
[49] Archer C & Glaister S (2006) tables 17 & 18
[50] Eddington R (2006) figure 4.11
[51] Atkins (2004)

Figure 25: Capital costs of new and widened motorways (2008 prices)



Source: Archer and Glaister (2006) tables 17 & 18

Figure 26: Capital costs of new and widened dual carriageway all purpose trunk roads (2008 prices)



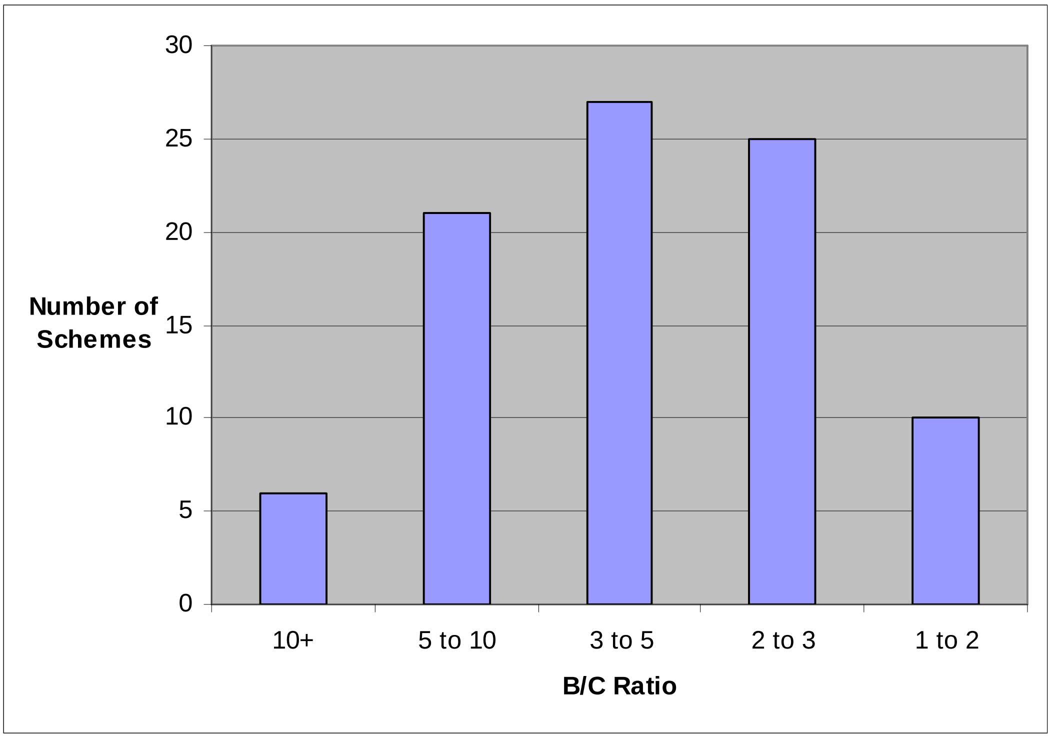
Source: Archer and Glaister (2006) tables 17 & 18

An annual programme of 100 kilometres of new and 100 kilometres of widened main roads would have a capital cost of less than £2bn a year.

This compares with the trunk road capital spending level in 1993/94 – a recent peak-spending year – of £2.5bn[52] that at today's prices, amounts to £3.3bn. Whilst not all this expenditure was on new construction it serves to illustrate that substantial road building activity has been affordable in the past.

In 1993/94 fuel tax and VED raised £16.35bn[53] and in 2005/06 the amount raised by these means was £28.1bn[54]. If the same proportion was allocated to trunk road capital expenditure as in 1993/94 this would come to £4.3bn. So, in terms of motoring taxes, a programme of this scale is affordable. The total yield from road user taxes in 2006/07 was estimated as £45bn. Compared with the £132bn[55] car users' spend on motoring, a programme of 100 kilometres of new and 100 kilometres of widened trunk roads would amount to less than 2%.

Figure 27: Cost / benefit ratios for a range of trunk road schemes



Source: Department for Transport (2006b)

However the acid test of whether new roads are too costly is whether their benefits are sufficient to match their costs and this can only be determined on a case-by-case basis.

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[52] Department of Transport (1995) table 1.7
[53] Department of Transport (1993) table 1.21
[54] Department for Transport (2007e) table 7.15
[55] Road Users Alliance (2007) page 7

There is evidence though that there is a substantial pool of road schemes with healthy benefit to cost ratios. As illustrated in figure 27 the evidence base for the Eddington Study shows that there is a stock of trunk road schemes with strongly positive economic returns[56].

Road traffic pays its way

Road users pay almost £45bn a year in motoring related taxes. This dwarfs the direct cost of running the road network, which is little more than £10bn annually. Even if road users were put in the unique position of having to pay all their external costs as well, they would only be paying £22bn or so annually to the Exchequer in addition to their general taxes.

Road Users pay specific taxes in addition to those paid by the community as a whole. Individuals pay income tax on their earnings, National Insurance Contributions, Capital Gains tax, VAT on most of their purchases and Inheritance Taxes on their estates. Property owners pay Stamp Duty, Council Taxes and Non Domestic Rates. Companies pay Corporation Tax. A share of each of these arises from transactions associated with road use. Additionally road users pay taxes levied specifically on transactions related to road use.

In 2006 road transport duty amounted to £23.5bn, VAT on fuel duty £4.1bn and Vehicle Excise Duty £5.0bn. This 32.6bn comprised over 90% of all government revenues from environmental taxes[57]. In addition to this, road users paid VAT on vehicle purchases and other motoring costs as well as company car taxes. If all these are added together the tax revenue from road users as such came to £45bn in 2006[58].

Expenditure on roads was much lower than collected taxes. In 2005/06, central and local government spent £8.34bn on roads in Great Britain. Additionally, local authority car parks made a surplus of £0.54bn and bus services received fuel duty rebates to the tune of £0.36bn [59]. Together this totals £8.4bn. There are other costs of operating the road system (not included in this figure) such as policing and running the DVLA, and it is hard to know what these add up to; but making an allowance for all these would not be likely take the total to much more than £10bn annually.

It is often argued that road users should pay for their ‘external’ costs such as congestion, climate change impacts, pollution and accidents. However many of these (e.g. congestion and some accident costs), are already borne by road users themselves. There are some true externalities such as Green House Gas (GHG) emissions; and arguably road users should be charged for these.

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[56] Eddington R. (2006) Volume 3 Figure 1.5 and para. 1.22
[57] National Statistics (2007b), table 13.7
[58] Road Users Alliance (2007) page 7
[59] Department for Transport (2007) table 1.15

However there is no good reason for singling out road users for a GHG tax as GHGs have the same effect irrespective of their source. In 2005 road transport in the UK emitted 120m tonnes of carbon dioxide[60]. This is equivalent to 117½m tonnes of CO_2 for Great Britain. If the estimated social cost of these emissions recommended by the Department of Environment, Food and Rural Affairs of £25.5/tonne[61] for 2007 is taken, the total cost of road user carbon emissions would come to £3bn. If this were levied across the whole of the economy it would yield £14.2bn.

In addition to climate change, road traffic causes environmental damage and accidents. Estimates of the costs of road traffic externalities were made for the Department of Environment Transport and the Regions in 2001[62]. Making allowances for the improvements in emissions (See: Figure 19), noise and accident rates[63] over the last decade, these amount to about £9½bn/year. Thus of the £45bn paid in motoring taxes of the order of £10bn are spent directly on operating maintaining and improving the road network. The excess of £35bn/year is almost three times the estimated costs of climate change, atmospheric pollution, noise and external accident damage.

Whilst these estimates are necessarily approximate, there can be little doubt that motoring taxes exceed public expenditure on roads by a factor of about four and by far exceed the cost to society of road traffic by many billions of pounds a year.

The main class of road user that does not pay their full share of costs are bus passengers who receive over £2bn a year in subsidies of one kind or another[64]. This includes a partial rebate in fuel duty. If the fuel duty paid by bus operators is taken into account the net subsidy amounts to £1.5bn or about 6p/pkm[65].

A major 'external' cost that has not been included in this estimate is the cost of congestion. This cost falls on road users and therefore it would be wrong to expect them to compensate the rest of society for it: it arises from and falls on the users of road themselves.

It would be a mistake to assume that road users' tax revenue in excess of public expenditure on roads is used to mitigate the externalities referred to above. Of the £35.27bn environmental taxes collected in 2006[66] only £5.42bn is identified as public expenditure on environmental protection and, of this, only £0.31bn on protection of ambient air and climate[67].

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[60] Department for Transport (2007e) table 3.8
[61] Department for Environment Food and Rural Affairs (2007), table 2
[62] Sanson T Nash C Mackie P Shires J & Watkiss P (2001), sec 7
[63] Department for Transport (2007d), table3
[64] Department for Transport (2007c) table F
[65] Department for Transport (2007c) Annex a table 2 (25.8bn pkms in 2006/07)
[66] National Statistics (2007b), table 13.7
[67] National Statistics (2007b), table 13.10

Public transport is not a ready alternative to the private car

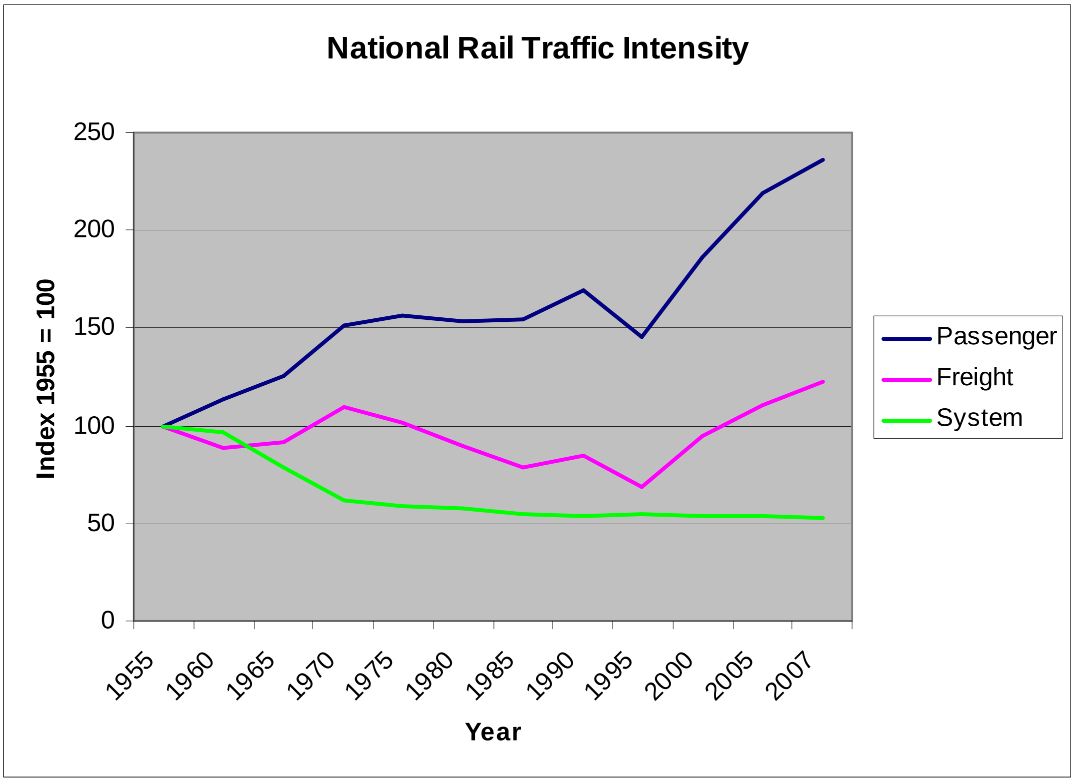
Public transport presently carries about 13% of personal travel[68]. The railways are busier than they have been for decades and have little spare capacity. Moreover the sparseness of the network means that only a fraction of journeys are well aligned to train travel. Bus services, whilst being more widespread, are slow and rarely offer the comfort and convenience of cars. Moreover both bus and rail fares are higher than marginal car running costs for most types of travel. Whilst bus and rail serve particular parts of the travel market very well, their ability to provide an attractive alternative to most car travel is limited by a combination of network sparseness, travel times, inconvenience and price.

Whilst there are some car journeys that might be reasonably made by public transport, many cannot for a number of compelling reasons. Perhaps the most obvious at present is in respect of the rail system which has little spare capacity. After over a decade of growth, passenger rail travel is at its highest since the end of the Second World War. Figure 28 shows that passenger use of the railways is now more than twice as intense as in the mid 1950s, during which time the length of the network has shrunk by almost a half[69], and many services are heavily crowded at peak times. Moreover, this crowding is most intense at just those times and places where rail offers an attractive alternative to the car: commuting in large cities (especially London) and on the busier intercity routes. London Underground is also more intensively used (38%) than in 1955[70] but not by as much as National Rail.

The railways are also very sparse compared with roads. They are 1/25th as dense[71] and have an average station density of one per 92 km^2. This means that the great majority of journeys would have to make two, or more, interchanges if they went by rail. Also the railways serve quite distinct markets. The London and South East's railways carry two thirds of all national rail passenger journeys, almost a half of passenger kilometres and 44% of all inter regional journeys have one end in London[72]. Of all other rail use (metros & light rail), 92% is on the London systems[73] and out of all rail journeys in Britain just below 80% are accounted for in London and the South East. London contains one third of all National Rail stations[74] and almost all London Underground's stations, which reflects its dominance in the rail market.

[68] Department for Transport (2007e), table 1.1
[69] Department for Transport (2007e), table 6.1
[70] Department for Transport (2007e), table 6.1
[71] Department for Transport (2007e), tables 6.1 & 7.1
[72] Office of the Rail Regulator (2007) tables 1.1b, 2.2b & 7.1
[73] Department for Transport (2007e), tables 6.2
[74] Department of the Environment, Greater London Council, British Railways Board & London Transport Executive 1974 table 5.3 & Department for Transport (2005b) table D

Figure 28: Intensity of national rail traffic 1955 – 2007 (note stretching of the scale 2005-2007)



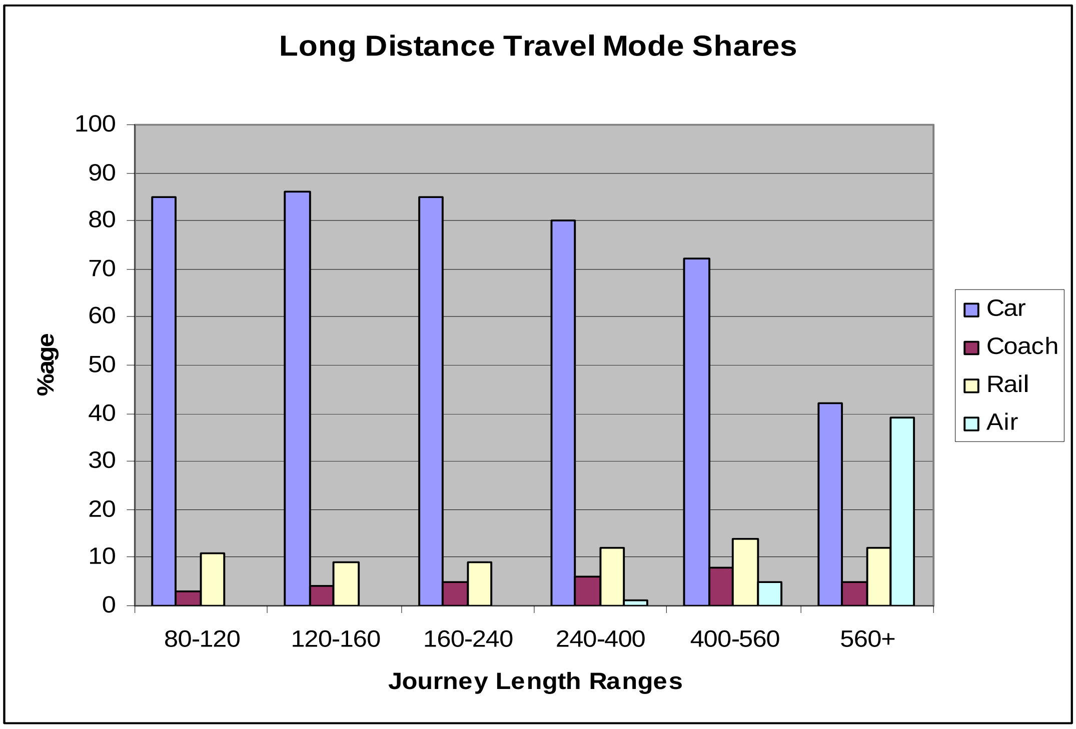
Source: Department for Transport (2007a) tables 4.1 & 6.1

The sparseness of the railways means that they are rarely suitable for short journeys. The average length of rail journeys is 51kms compared with only 13.7kms for car drivers[75]. 58% of all car journeys are also shorter than 8kms in length[76]. Even for those journey lengths where rail might be expected to come into it's own the car dominates.

Figure 29 shows the dominance of the car for long distance journeys. This is because so many journeys are poorly aligned with the rail network and relatively few longer distance journeys are between city centres - one of the two core rail markets - which rail serves so well.

[75] Department for Transport (2007b) table 3.2
[76] Department for Transport (2007b) table 3.4

Figure 29: Modal split for long distance journeys in GB 2004/06



Source: Department for Transport (2007b) table 3.9

Bus services are more ubiquitous than rail; but less so than roads. In London for example bus routes cover about three thousand kilometres of its 12,900 km road network – 23%. As London's bus network is one of the densest in the country the national average can be expected to be significantly lower than this – no more than a fifth the density of the road network. Bus stops are much denser than railway stations but again, taking London as an example, its 17½ thousand bus stops[77] compares with over 3⅓m properties[78] almost all of which will have one or more direct accesses to the road network. Nationally 6 out of 7 people are within a 6-minute walk of a bus stop[79] but bus travel is relatively slow and this is why the average journey length is short at 6kms in London and 7.7kms outside[80]. Figure 30 illustrates this with bus journey speeds nationally being just one third of car journey speeds. Moreover the fact that there is a bus service nearby does not guarantee that it provides a direct or frequent connection to the desired destination.

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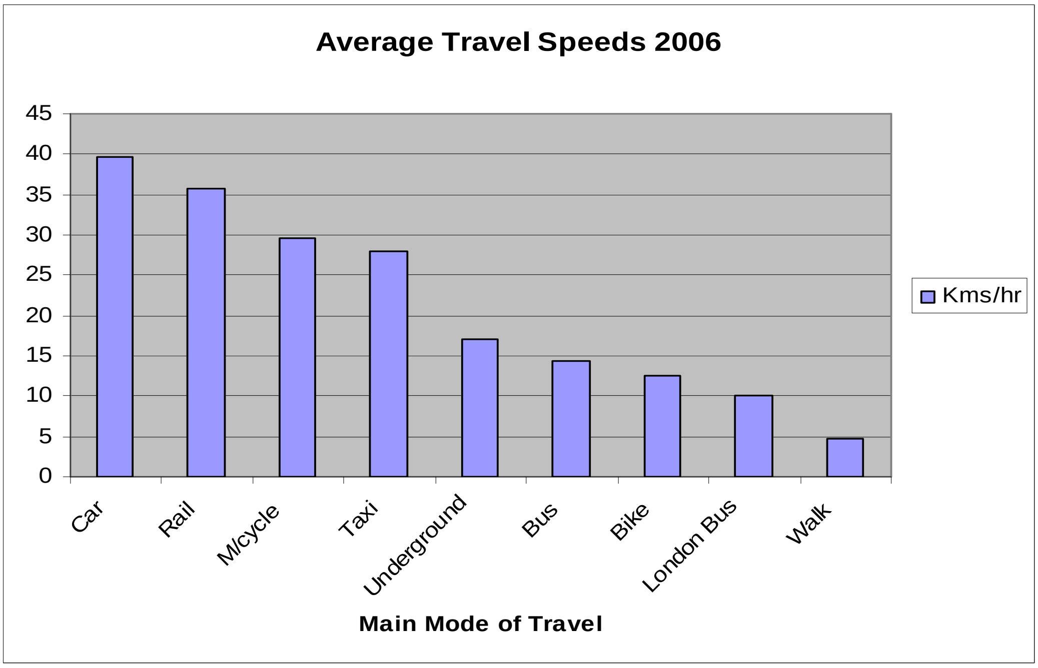
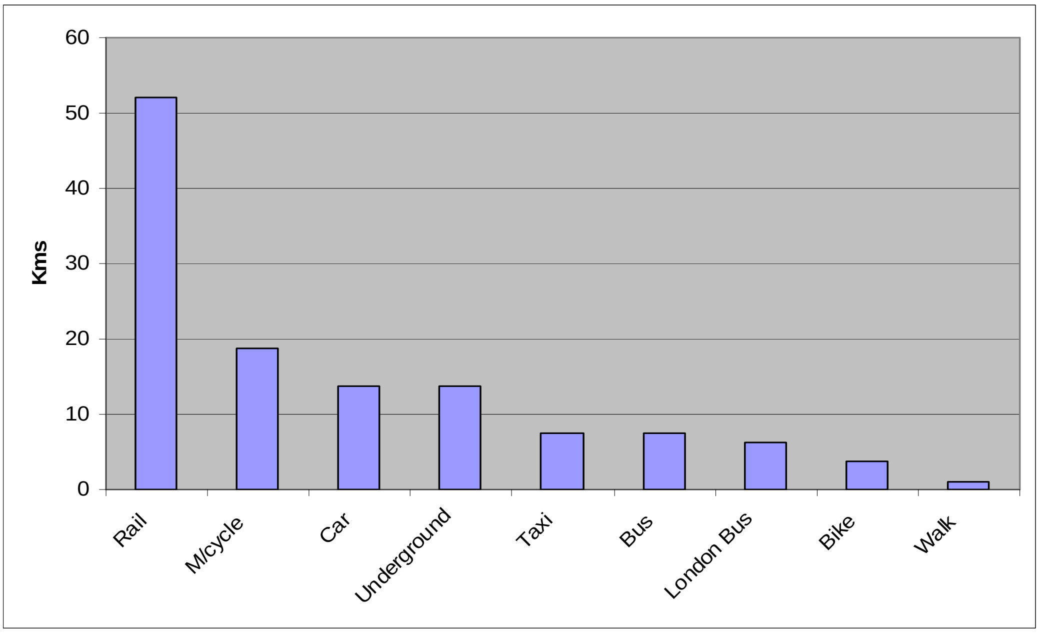
[77] Transport for London (2007c) page1
[78] National Statistics (2000) table 3.6 & National Statistics (2007c) table 8.1
[79] Department for Transport (2007c) table 5.5
[80] Department for Transport (2007b) table 3.2

Figure 30: Average travel speeds by main mode, Great Britain 2006



Source: Department for Transport (2007b) tables 3.1 & 3.5

Figure 31: Average trip length by main mode of travel Great Britain 2006



Source: Department for Transport (2007b) table 3.2

As a general rule, these speed differences are reflected in journey lengths, with the slower modes being used for shorter journeys. Trip lengths by mode are shown in figure 31. The exceptions to this rule are rail, taxi and pedal cycle. The length of rail journeys reflects the structure of the network, as long intercity connections increase the average length of many journeys, especially the commute. The short length of taxi journeys reflects their high cost (important to low income users) and most high-income travellers will have cars available for longer journeys. The relatively short bike journeys reflect the physical effort and exposure to the weather they entail.

The speed differences are significant; especially between bus and car. If an average car journey switched to local bus travel, all other things being equal, the travel time would increase from 21 minutes to 58 minutes which for a return journey adds up to almost an hour and a quarter extra.

Given that people have consistently spent, on average, about an hour a day travelling[81] for many years, to have to add an additional hour and a quarter would mean a very large increase in people's travel time budgets. Put another way, if average car journeys switched to bus journeys of the same duration the area within reach would reduce by 87%. Taken with the comfort, convenience and personal security of car travel, it is to be expected that switching from car to bus is an unattractive option for most journeys when a car is available and parking is convenient and affordable.

Costs have an influence on mode choice; local bus fares averaged 14.6p/pkm in 2005/06 and other bus fares 7p/pkm[82] whilst average car variable running costs were 11.6p/vkms[83] which amounts to 7p/pkm at an occupancy of 1.58 persons/car[84]. The corresponding figure for the national railways in 2006/07 was 10.8p[85]. Taxi fares are, of course much higher on this basis. Parking charges, which are sometimes used as a disincentive to using cars in congested areas, cost the average household less than £1 a week[86] which for most journeys will not be a significant disincentive to car use. These relative costs are shown in figure 32.

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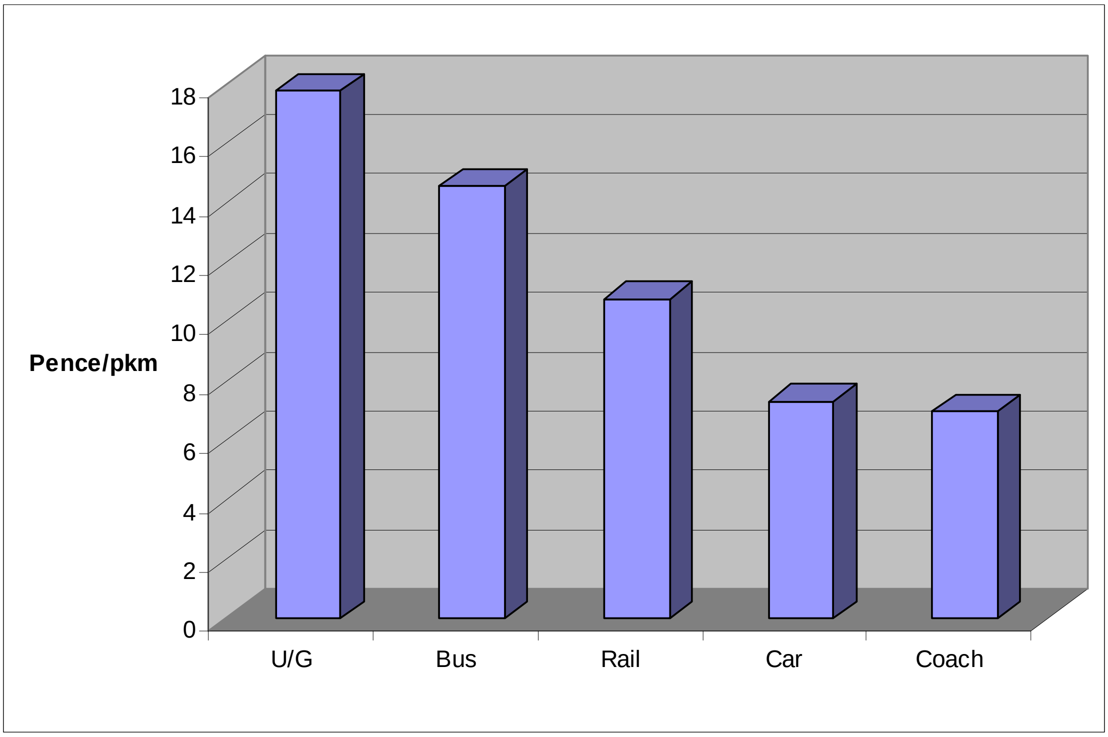
[81] Department for Transport (2007b) table 2.1
[82] Department for Transport (2007c) Annex A tables 2 & 4
[83] Automobile Association (2007) pages 4 & 5
[84] Department for Transport (2007b) table 6.2
[85] Department for Transport (2007c), table D
[86] National Statistics (2008) table A.1.7.2.4.3

<u>Figure 32: Marginal out of pocket costs of travel</u>



Source: Department for Transport (2007b) table 6.2, Department for Transport (2007c), table D

These factors mean that the propensity to switch from car to bus is low and has implications for the car related benefits of improving bus use. Improving a typical urban bus service by 50% can be expected to increase its use by between 19% (short run) and 33% (long run)[87]. Taking the higher figure of 33%; 31% of these additional riders would come from cars[88]. If the number of people on the bus before the service change was 10[89] then the additional passengers from cars would be just over one and allowing for car passengers the car travel reduction would be 6½ kms for every 5 additional bus kilometres. This would result in less traffic. However, a car causes only about a third as much congestion as a bus so the net effect could be an increase in congestion. Similarly cars emit less pollution and GHGs than buses, so these two would increase. This is not to say that there aren't ways of improving bus services which reduce congestion and pollution (as well as improving services for existing riders) but care needs to be taken in making claims that better public transport reduces congestion, pollution and greenhouse gas emissions.

[87] Balcombe R. et al (2004) table 7.5
[88] Balcombe R. et al (2004) table 9.9
[89] Average bus occupancy in 2005/06 was 9.2 – Department for Transport (2006c) Annex 2, tables 2 & 4

Conclusions

Common perceptions about its road building and implications are too often wide of the mark. Roads are frequently portrayed as significant consumers of land and less efficient users of land than rail. It is also argued that we cannot afford to improve our road system and road users do not pay their way. None of these stand up to close scrutiny.

Public transport is widely advocated as a practical alternative to using cars and rail freight to the use of lorries. Building more roads, it is argued, will materially affect climate change and richer people are said to rely more on roads for their mobility than poorer people. There is a grain of truth in all of these but the extent to which they are valid is very limited and typically much exaggerated.

Roads are regarded as environmentally damaging and it is often forgotten that the environmental impacts of road traffic have been steadily reducing and that this is set to continue. Moreover, improving the road system, if it is done sensitively, provides opportunities for reducing the environmental impacts of road traffic.

Road traffic is a substantial contributor to GHG emissions and new fuel regimes will be needed if this is to be reduced. However improving the road system would result in only small GHG emissions and the introduction of efficient pricing could bring these down overall.

It is also frequently argued that new road space 'simply fills up with traffic' back to its former level. Both theory and practice show this to be a false claim.

Finally, Britain is characterised by some critics of its transport policies, as being too dependent on roads for its mobility. Road travel in Britain is in fact much the same as in Western Europe, but road provision is, by any reasonable standard, significantly inferior.

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