TRANSPORT POLICY
A POLICY DISCUSSION NOTE
Commissioned by Brian Binley MP

By Transport Watch

TRANSPORT WATCH is an independent association not connected with any business or political party funded by a private trust and dedicated to making the best use of land already committed to transport in the interest of the community as a whole.

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Acknowledgement

I am especially grateful to Jim Russell, a past PTE Director General and past senior airline executive. He has been most generous with his time and has responded to my queries in a way that has assisted me enormously in formulating the recommendations in this paper.

The December issue of 'Focus; the Journal of the Chartered Institute of Transport' includes an article with the title 'Is Transport Policy Orthodoxy Evidence Based' by Jim Russell. The article establishes that the transfer of demand from car to rail or bus is likely to worsen climate change and some aspects of congestion. That is consistent with our analysis. Jim Russell also calls for a more evidence based approach to developing transport policy. We concur with that sentiment whole heartedly.

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Contents

Sources and notes

The analyses presented here depend on national statistics, principally:

1. Transport Statistics Great Britain (the TSGB) where the data is generally from the 2006 edition.
2. The National Travel Survey data reported in the Transport Statistics Bulletin 2006 (the TSB).
3. National Rail Trends by the Office of the Rail Regulator.
4. Network Rail Annual Reports
5. Energy trends quarterly from the department of Business Enterprise Regulation and Reform, the BERR, formerly the DTI.
6. The Rail Safety and Standards report T618 Improving the Efficiency of Traction Energy use.
7. Special requests to staff at the BERR, ORR and RSSB.

Other sources are as noted in the text.

In the text we convert national expenditures to costs per household on the basis that there are 25 million households in the UK.

Foreword

This discussion note was commission by Brian Binley MP. It deals almost exclusively with road and rail although there are some slight reference to pipe lines, air travel and shipping.

Our broad conclusion is that there must be a complete break with the Transport Policies developed by the present Government. That is because they are not adequately based on the facts. Indeed in many cases the gap between the reality and the assumptions are so large as to beggar belief. Hence, the first objective for any new administration is to have the facts properly debated and understood. That in itself is a major task. The present assumptions are deeply embedded. Indeed those to do with road and rail are underpinned by a century in which the romance of rail has dominated the popular imagination. Consequently rational debate is now very difficult indeed.

To illustrate, the present Government's presumption has been that congestion may be tackled by providing a public transport alternative to the car. However, it is clear from both the numbers and common experience that the overwhelming majority of journeys are made by car – 87% of passenger-miles go that way, leaving 6% to rail and 6% to bus. Indeed it is the car that has enabled the dispersed land use that we now have and, by implication, only the car can serve that land use. If it were otherwise today's dispersal would have been existed long before the car.

The disconnect between fact and reality with regard to rail is even more acute. There, and quite contrary to popular belief, we find that, if the railways were paved, express coaches and lorries would discharge the national rail function at one quarter the cost of the train. All London's crushed rail commuters would then have seats while occupying only one seventh of the capacity of the network in the peak hour. Death rates would be cut by a factor two and fuel consumption and carbon emissions reduced. That is underpinned by detailed calculations none of which can be challenged in a debate devoted to finding the truth. In any event, at the Inquiry into the West Coast Main Line Modernisation Programme the best that Raitrack's immensely expensive Inquiry team could do when faced with the same was to indulge in the childish sport of shooting the messenger thereby effectively conceding the argument, see closing statements available on the Transport-Watch web site.

Because the gap between reality and the myths upon which present policy is based is so great a period of debate and reflection is necessary if policy based on the reality is ever to replace policy based on myths.

Meanwhile we advocate a single track authority for both road and rail charged with making the best use of transport land in the interests of the community as a whole.

We also call for an end to the apparent war on the motorist in favour of education and the encouragement of mature, deferential and polite driver behaviour.

December 2007

Executive summary

Changes in travel patterns.

1. Between 1955 and 2005 passenger-miles per head by bus fell by a **factor** of 2.2 and cycle use by a factor of 5 while car use increased by a **factor** of 7 and rail use by a factor of 1.16. At the same time total passenger-km per head increased by a factor of 3. Today bus and rail each account for some 6% of passenger-km leaving 87% to the car. In contrast in 1955 public transport accounted for nearly 60% of passenger-km. Those overwhelming changes have been accompanied by a dispersal of land use with office, retail and industry deserting town centres in favour of out of town locations.

2. None of those changes could have occurred without the car. Hence, by implication it is impossible to serve those that dispersed land use effectively by bus and train. If it were otherwise passenger-km in 1955 would be the same as today's and we would be looking at a shift between modes. Instead we are looking at both a shift in mode and a threefold growth in total (motorised) miles per head, see main text figure 2.

3. Policy which does not recognise that will fail as illustrated by the Government's 10 year transport plan. That plan mobilised great investments to increase bus use by 10% and rail use by 50% upon the presumption that the action would greatly reduce road congestion. However, since bus and rail together provide 12% of people's need for vehicular travel, it is a matter of simple arithmetic that no significant general impact on congestion can be achieved by these policies even if the targets are met.

4. That failure provides an illustration, supposing any were needed, of the importance of having policy evidence based rather than otherwise.

Traffic management and road safety

5. Over the past decade traffic management measures and junction designs have been developed purely with safety in mind. That has led to layouts across the land that cause congestion and air pollution where none previously existed. Simultaneously we have the speed camera campaign supported by tens of thousands of speed humps that have spread across minor and major roads alike.

6. Despite all that, the previously long established decline in road deaths (32% for the decade 1986 to 1996), far from accelerating, flattened off - the reduction in the 9 years to date amounts to only a further 11%.

7. Meanwhile our inspection of the research, which purports to prove that speeding, or more precisely, breaking the speed limit, is a major cause of road accidents, suggests that, contrary to that official line, speeding is one of the most minor causes of road traffic accidents.

8. When that is understood and properly defended there may be the most tremendous backlash against the camera campaign. After all it has led to the prosecution of millions and to the loss of livelihood for perhaps tens of thousands, most of whom were, by any reasonable measure, driving sensibly.

9. In place of that coercive approach we advocate a cooperative one where drivers are given back responsibility and where, via education, a polite and deferential driver population is developed.

Congestion charging

10. Conversations with DfT staff suggest 90% of vehicle miles are in uncongested conditions. For all of those miles there are no benefits to be had from congestion charging that could not be achieved by a tax on fuel, with the added benefit of encouraging fuel economy. If all fixed taxes were transferred to fuel then the pump price would rise by (30-40)%. If, for reasons other than reducing congestion, vehicle use were to be suppressed then higher taxes could be charged.

11. Where there is congestion charging has an appeal. However, the proposed nation-wide scheme has significant disadvantages, namely (a) the capital cost (values range from £10 billion to £60 billion) (b) the cost of running the system for which there appear to be no estimates (c) the time scale (10-20 years) (d) most importantly, privacy/civil liberty issues. Nevertheless nation-wide systems have clear operational advantages over a piecemeal local approach.

Road and rail compared

Subsidy and taxes

12. Subsidy to national rail (including loans guaranteed by the Government) may average £5 billion per year for the 20 years ending 2015. That is equivalent to:

(1) £200 per year for every household in the land (£4,000 for the 20 years)
(2) £156,000 per year per track-km (£250,000 track-mile).
(3) 12 pence per passenger-km (19 per passenger mile) if freight is ignored
(4) 8 pence per km (13 pence per mile) if passengers and tonnes are added together.

13. Annual taxes on road users including VAT on motor vehicles etc. amount to £50 billion per year of which some £9 billion is spent on the roads. Dividing the net tax take by 25 million yields £1640 per year for every household in the land.

14. If the net tax take is apportioned according to vehicle miles then the strategic road network contributes some 13 billion per year to the exchequer. That is equivalent to:

(1) £520 for every household in the land
(2) £250,000 for every lane-km) £400,000 per mile
(3) 6 pence per passenger-km (9.5 pence per mile)
(4) 4 pence per km (6.4 pence per mile) if passengers and tonnes are added together.

15. The huge subsidy to rail contrasts starkly with the very large contribution made to the exchequer from roads. The drain on the exchequer imposed by the railways is tolerated in the belief that:

(a) Rail has a far higher capacity than road.
(b) London's rail commuters could not get there any other way.
(c) Rail uses much less fuel than road transport.
(d) Rail is far safer than road ever can be.
(e) High speed rail is essential.
(f) Rail brings development in its wake.
(g) Rail is in some way "sustainable" compared with road transport.
(h) Railways are far too narrow to be converted to roads.

However, as we shall see, none of those beliefs can be sustained in a discussion devoted to finding the truth. Indeed in all those vectors road outperforms rail, often by a very wide margin indeed.

The networks

16. Network Rail's rights of way are in total some 10,000 miles long and contain 20,000 miles of track. The network serves the hearts of our towns and cities where rights of way are typically at least four tracks wide. Elsewhere the network is generally double track. Within tunnels the width is nearly always sufficient for the carriageway of a two-way trunk road void of marginal strips (7.3 metres or 24 feet). Elsewhere on straight sections the typical level width is 8.5 metres. On bends the width is greater to accommodate carriage over hang. Generally headroom is sufficient for all but the tallest road vehicles. Alignments are superb and gradients minimal.

17. In contrast the strategic road network (motorways and Trunk roads) is 7,600 miles long and contains 30,000-35,000 lane-km (excluding hard shoulders and central reserves). That network generally peters out at the edges of our towns and cities. Although there

are many modern sections of road, historic A-roads have unpredictable alignments, are often only 6 metres wide and contain many road bridges with inadequate headroom.

Use, journey lengths and equity

18. Each lane-km of the strategic road network is used 2.5 to 3 times as productively as is each track-km of the national rail network. (The measures are passenger or tonne-km per km of lane or track).

19. Averaged over the network, national rail carries the equivalent of only some 300 express coaches plus lorries per day per track. Even in central London the passengers using surface rail are sufficient to occupy only one seventh of the network's capacity if it were paved and if those passengers all had seats in 75-seat express coaches. Outside the peak that network is a place of dreams. To check that we advocate a lunch time visit to the platforms of any London terminal.

20. Half of all rail journeys are less than 20 miles long and 90% are less than 80 miles long, including the journeys to and from stations. The corresponding numbers by car are 4.5 miles and 20 miles. Hence, for nearly all journeys "high speed" is not of great importance.

21. Nation-wide, half of us use a train less than once a year. Those from the richest 20% of households travel 5 times as far annually by rail as do those from the bottom 40%. The corresponding factor for the car is 2.7. Hence, it is clear that, rather than promoting social equity, subsidy to rail benefits the rich to a far greater extent than the poor.

Safety

22. The railway lobby likes to say that every day more people are killed on the roads than passengers in a year on the railways. However that statistic exaggerates in favour of rail by a factor of 18 by ignoring usage and by a further and similar factor by comparing deaths to passengers in so called train accidents with all those system-wide including pedestrians, cyclists and people on motorbikes killed on the road system.

23. In contrast our calculations show that over the 10 years 1996 to 2005 inclusive:

    (1) The deaths per passenger-km to passengers by rail within the envelope bounded by the ticket barriers was at least 50% above that for buses and express coaches on motorways and rural trunk roads.**(Now, 2010, we do not make this comparison because of the annual variation in the data).**

    (2) The all-in deaths per passenger-km by rail, including trespassers but not suicides, was more than 50% above that imposed on society as a whole by traffic on the motorway and trunk road system. Further, if pedestrians, cyclist and bikers are excluded from the road statistic, as would happen if the remaining traffic could occupy a reserved road system such as enjoyed by rail, then the death rate would be half that by rail.

24. Further, since 1915 1,370 people have died in train accidents where more than 5 passengers were killed. That amounts to 14 per year but the fact does not stop the railway lobby boasting that "no passenger died in a railway accident" following those years when none have died that way.

Fuel and carbon

25. The data <u>for passenger</u> rail is based on the returns from Train Operating Companies provided to the Rail Safety and Standards Board for it's report series T618 to do with fuel consumption and produced in 2007. That data is probably well based.

26. Astonishingly the only data dealing with the energy used by rail freight available to the nation appears to be from an e-mail dated 23rd September 2003 to us from Rachel Howells of Network Rail. The RSSB used the same data, citing us as the source, in its analyses. In that e-mail Ms Howells made it clear that the data was an approximation.

27. Despite the weakness of the freight data we have used the information in calculations. The results suggest that, given rail's rights of way, the express coach and lorry may discharge the national rail function using some 25% less energy than required by the train while emitting 10% less carbon.

28. That differs from the official analyses, which always show rail as the more economical mode. The reason is two fold, namely the official comparisons (a) refer to coach and lorry operating *in standard (congested) conditions rather than on a motor road* (b) use vehicle occupancies and freight loads that correspond to national averages rather than values relevant to the railway function.

In summary

29. Contrary to the accepted belief, express coaches and lorries could discharge the national rail function at one quarter the cost of rail, given rail's rights of way. Further, that would cut the deaths per passenger-mile by a factor of two and reduce both the fuel consumption and the carbon footprint. Additionally, countless lorries and other vehicles would be able to divert from the unsuitable rural roads and city streets that they currently clog and many thousands of hectares of derelict railway land would at last be released for development.

30. Again contrary to accepted beliefs, the widths available on the railways are sufficient for carriageways the same width as those on two-way trunk roads. On the approaches to towns and cities widths are often sufficient for dual 2 or 3-lane motorways. Headroom is generally adequate for all but the tallest vehicles.

Rural rail

31. Rural rail provides great psychological support to communities. However, services are punishingly expensive, e.g. subsidy to the Government's Community Rail network amounts to £230,000 per year per route-mile or to 127 pence per passenger-mile. Further services are infrequent often amounting to no more than a one or two-car train every couple of hours.

32. Most of these routes should be converted to motor roads. They would then perform a useful function. The previous rail services would be provided by express coaches or mini bus operating at greater frequency and at a fraction the cost of rail. The new motor roads would also extract many thousands of lorries and other vehicles from the unsuitable rural roads that they currently burden.

High-speed rail and domestic air

33. If prevailing seat occupancy rates apply then high-speed rail and domestic air would have similar carbon footprints. However, rail is many times as expensive as air travel. Indeed our calculations show that if high speed rail were to cover its operating cost along with servicing capital and maintenance expenditure then the return between London and Edinburgh may cost up to £1,000 compared with perhaps £30 by profitable air. For those reasons we encourage policy makers to reject high speed rail.

Light rail and tram systems

34. There is a belief that steel wheels on steel rails held together by massive weight are infinitely preferable to rubber tyres on asphalt. In reality both may provide moving floor space configured to serve any situation. However the steel-tyred option is by far the more expensive. When segregated such systems ensure that immensely expensive track can be used to only a fraction of its potential - providing perhaps one tram every 5 to10 minutes at peak times.

35. The circumstances where such systems can be justified are, in our view, very limited if non-existent. Hence the Treasury should cease use taxpayers money to subsidise tram and light rail proposals unless there is clear and unbiased evidence that a bus based system would be more expensive.

Policies

36. First and foremost there is a crying need for policy to be evidence based. That is perhaps our most important recommendation. However, our analyses do lead to some specific proposals, namely:

Organisation

37. A single track authority for road and rail should be established. That authority should be charged with making the best use of transport land in the interests of the community as a whole.

38. Rather than subsidising any particular mode of transport, subsidy should be paid to those in need leaving them to decide how to travel. Further special attention must be paid to the facts of the case rather than finding rail, as of now, raised almost to the status of a religion – beyond rational analysis.

Area specific

39. Although not addressed elsewhere in this note we comment that policies appropriate for one area, e.g. London, may be completely inappropriate for other areas such as shire counties. Hence policy should be locally based rather than driven from the centre – as is currently or recently the case with the Transport Innovation Funding where, if bids are to be successful, they must contain congestion charging proposals, or be unnaturally biased towards public transport.

Roads

40. Any appearance of war on motorists must be avoided. The motor car is our primary source of transport. Arbitrary enforcement of unnecessary restrictions, e.g. unduly low speed limits, destroys respect for even necessary restrictions. In particular:

    (1) There should be a presumption that the overwhelming majority of motorists aspire to and do behave responsibly. Hence, the current coercive approach should be abandoned in favour of education with the objective of developing a responsible, polite and deferential driving population.

    (2) If cameras are to continue to generate prosecutions for breaking speed limits then those prosecutions should be limited to cases where the limit is exceeded by wider margins than at present, or to cases where the driver is in the top 5% of speed. The cameras may then be hidden so as to catch the truly dangerous along with those with no tax or insurance.

    (3) Wherever possible junctions should be improved so as to enable the capacity of the intervening road links to be utilised. Similarly bus lanes should be opened to other classes of vehicles so as to avoid wasting scarce road space.

    (4) The need for a national congestion charge system should be re-examined. An interim measure would be to shift fixed taxes to tax on fuel. Where, as in the larger conurbations and on some motorways, that is insufficient, relatively low cost camera based schemes should be considered.

Rail

41. There should be a moratorium on capital expenditure on national rail pending a wholesale re-examination of the system's operational and financial performance. We are confident that such a review would lead to the radical step of paving most railways thereby cutting costs by a factor of four and bringing the rights of way into effective use. That applies particularly to rural and lightly used lines subject to closure.

Carbon emissions

42. The differences in emission rates attributable to different modes of transport are often marginal and contentious. Hence, rather than using those differences as a driver for transport policy, policy should be aimed at increasing the fuel efficiency of all forms of transport.

MAIN TEXT

The importance of the numbers

43. Nobody would disagree that policy should be based on careful analysis rooted in national statistics and the rules of ordinary arithmetic. Alternatively nobody would support the notion that policy should be developed in denial of such analyses. Nevertheless it is extraordinary how often that is ignored.

44. A high profile example is the support provided by the Commission for Integrated Transport and many others for Labour's Ten Year Plan. There the key target for solving road congestion was to increase rail use by 50% and bus use by 10%. However since rail and bus use each amounted to only around 6% of passenger-miles it followed that if half the proposed increases could be extracted from those travelling by car then car travel may reduce by less than 2% below its natural growth of 15%. The diagram below illustrates.

45. Clearly the reduction in road traffic that the policies could achieve were, in global terms, imperceptible or too small to measure with any certainty. Despite that billions of pounds have been wasted on the presumption that congestion really could be solved that way.

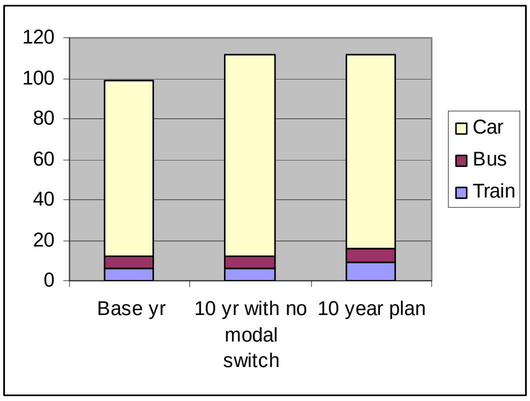


Figure 1 Passenger-km % base year

Changes in travel patterns.

46. Tables 1.1 of Transport Statistics Great Britain (TSGB) provides passenger-km by mode per year. Those numbers include non-residents. Dividing by population yields distances per head as follows: (the populations were 49.8 million in 1955 and 58.4 million in 2005).

Table 1 Passenger-km per head 1955 and 2005

	1955	2005	Change
Bus	1,826	820	Down by a factor greater than 2
Car	1,665	11,600	Up by a factor of 7
Train	763	890	Up by 16% (mostly since privatisation)

As for cycling, the annual distance travelled by that mode has declined by nearly 80%.

47. Today, and in percentage terms, bus and rail each account for only 6% of passenger-km leaving 87% to the car. In contrast in 1955 the bus and the train, including London underground accounted for nearly 60% of passenger-miles.

48. Those numbers, illustrated by figure 2 overleaf, are overwhelming. The reality is that the car has enabled and serves a dispersed land use that is almost impossible to serve by bus let alone the train. That leaves the train and the bus to serve the declining proportion of jobs and retail that remain routed to town centres.

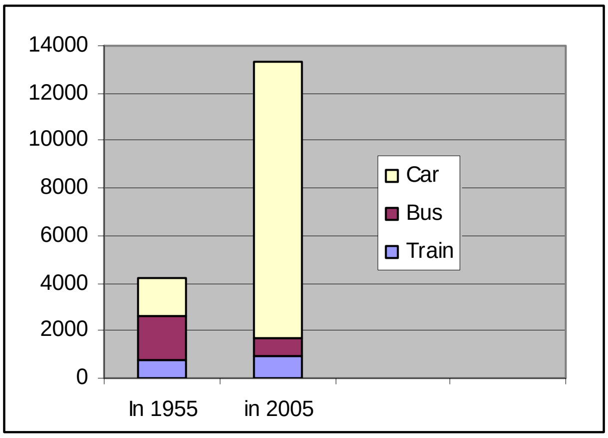


Figure 2 Passenger-km per head by mode

49. Against that background the ides of "getting people out of their cars" by improving bus or rail services seems far fetched. Instead, if the car vanished, journeys previously using the car would also largely vanish, or transfer to the bicycle.

50. Further, and separately from that, any person who substitutes a train journey for one by car may well be selecting a different destination. If so, instead of travelling 8.7 miles on average they will travel 30 miles (25 on the line haul and the rest to and from the stations). That would negate the effect of the lower fuel consumption and passenger casualty rates that are attributed to rail.

Traffic management

51. Over the past decade the prime objective of most traffic management schemes has been to reduce road accidents. That has led to junction designs that have reduced capacity at precisely the points where capacity is most needed. E.g. at roundabouts channelisation ensures that the major turning movement is often congested while there are empty lanes for the minor movements.

Similarly at signal controlled junctions. There the fashionable and dedicated right turning lanes for the smallest of movements have removed much needed capacity.

52. Meanwhile one-way systems and banned turns force detours that are sometimes over a mile long. Such detours increase traffic flows generally and may lead to more accidents than would have occurred had the original turn been allowed.

53. In addition the number of signal controlled pedestrian crossings, costing £50,000 to £80,000 each, has greatly expanded. These show red long after the pedestrians have passed bringing traffic on major routes to a complete standstill. We also have bus lanes which, even in peak hours, are substantially empty.

54. A consequence is that we now have congestion and air pollution over extended periods where none need exist. Further, the level of control imposed undermines the driver by removing from him reasonable decision making.

55. Against that background we recommend a reversal of policy.

(1) Channelisation schemes should be removed and, wherever possible, lanes should be added on the approaches to junctions to enable the intervening link capacities to be utilised. That should be supported by re-educating drivers as to how to make best use of the road space. In principle all that is required is to instil deferential or polite behaviour leaving the driver to make sensible decisions.
(2) Bus lanes should at least be opened to commercial vehicles
(3) Pedestrian crossings should be organised to allow motorists to continue if there is no pedestrian actually crossing.

Road safety, speed cameras and speed humps

56. In "Tomorrow's roads, safer for everyone", Labour set a target of reducing deaths and serious casualties by 30-40% over the decade. How have they fared?

57. Well, in 1986 there were 5,382 deaths compared with 3,598 in 1996, a decline of 32%. However in the 10 years, 1996 to 2006, deaths reduced to 3172, a further decline of only 11%. In comparison serious injuries declined by 35% (from 69,000 to 40,400) between 1986 and 1996 compared with a further fall of 29% (40,400 to 28,683) between 1996 and 2006.

58. That flattening off of a very beneficial trend happened despite the installation of tens, if not hundreds of thousands, of speed humps, endless traffic management measures and the speed camera campaign itself. The latter provided some 6,000 cameras, supported by the use of countless mobile camera patrols. It has led to the prosecution of millions and to the loss of license of 30-35,000 people per year. Many of those may have lost their livelihoods or resorted to driving without a licence and hence with no insurance.

59. As to serious injuries, we note that the British Medical Journal of June 2006 reports an increase of 1% for road accidents over the decade. In comparison the DfT statistics cite a decline of 30%. The DfT believes that that anomaly arises because the hospital reporting became more accurate under the impact of target driven performance. However, we note that the ratio of serious to killed casualties fell from 12.8 in 1986 to 11.2 in 1996 and to 9.2 in 2006. That may have arisen from better medical attention but it is nevertheless surprising. Another explanation is that there has been a relative under-reporting of the seriously injured. After all, consistency over the decades, or between geographical areas, is difficult to achieve.

60. Meanwhile, data in the traffic and road research reports cited by the DfT in support of the speed camera campaign appear to provide equal or greater support for the opposite view. Here is the background to the present and contrary belief.

61. Traffic and Road Research paper LR 323 published in 1998 found that in only 7.3% of accidents was "excessive" speed recorded as a contributory factor. Despite that Marie Taylor of the Traffic and Road Research Lab used the data to claim that 30% of accidents were speed related. To do that she combined the following:

(1)	Failure to judge other person's path or speed	10.7%	
(2)	Excessive speed (includes breaking the speed limit)	7.3%	
(3)	Following too closely	4.1%	
(4)	Slippery road	3.0%	
(5)	Aggressive driving	1.4%	
(6)	Weather , e.g. mist or sleet	0.8%	
(7)	Other local conditions	0.4%	
	Total		**27.7%**

62. As a result many came to believe that speeding, or more accurately, breaking the speed limit, caused 30% of road accidents when in practice halving the 7.3% from item (2) above may be a more accurate estimate.

63. Further, Table 6 from the paper with the title "Contributory Factors to Road Accidents" by the Road Safety Department of the DfT provides as follows (where, and for technical reasons, the combination "Both above" does not match the total for the two classes).

Table 2 Speed as a contributory factor 2005

	Fatal		Serious		Slight		Total	
	Number	%	Number	%	Number	%	Number	%
Exceeding the Limit	325	12	1507	7	5482	4	7314	5
Going too Fast	357	14	2371	11	12708	10	15436	10
Both above	686	26	3896	18	18223	15	22805	15

64. We comment, (a) those "Going too Fast" were within the speed limit and would not be influenced by the cameras (b) other contributory factors were also present such as drunk driving, 20%, and unknown percentages who were joy-riding, driving without due care and attention etc.

65. Hence, the data cited above, particularly the combination of Exceeding the Limit and Going too Fast, creates a false impression as to the extent that driving within speed limits would have avoided any of those accidents. Instead it may be reasonable to halve the numbers associated with Exceeding the Limit when considering the potential of the cameras to reduce casualties.

66. Table 2 of the same report provides data on the causes of accidents. That enables speeding (defined as breaking the speed limit) as a proportion of all causes to be calculated. The percentages are: for fatalities, 5%: for the seriously injured 3%: for the slightly injured 1.8% and for all casualties 2.2%.

67. Against that background it is difficult to see why the authorities continue to claim that (a) "speeding" is a major contributor to road traffic accidents (b) speed cameras have increase road safety. No doubt speed is a contributory factor in all accidents. After all, none could happen if all traffic were stationary. However, the data suggest that the proportion due to the narrowly defined term "speeding" may be vanishingly small and that present policies have actually sabotaged the previous decline in road deaths.

68. All that suggests a review is overdue. Probably the present coercive and restrictive policies should be phased out in favour of ones based on education. Such a change might very well be met with a deafening cheer from motorists, balanced by a charge of cynicism and a furious outcry from other sections of society. However, that is a penalty that has to be paid if policy is to be based on the numbers when those numbers contradict previously held beliefs.

Congestion charging

69. The economist's preferred method of allocating scarce resources is by price. We can see no reason in principle why that should not apply to road space leaving the market to drive supply within the constraints of overarching policy. However we note that:

(1) 90% of vehicle-miles may be driven on uncongested roads and for all of them fuel tax is an adequate charging mechanism, in so far as any is needed.
(2) The cost of the Government's scheme ranges up to £60 billion
(3) The time span for implementation is in excess of 10 years
(4) The public may regard charging as an additional tax
(5) Electronic systems, identifying the location of vehicles at all times, have major privacy implications

(6) Further, congestion charging, like town centre parking charges, may have the unintended consequence of diverting the motorist to other destinations so accelerating the dispersal of land use that cannot easily be served by public transport.

70. An interim measure that would reduce motoring, encourage fuel economy and mimic congestion charging to an extent would be to shift lump sum motoring costs, such as vehicle excise duty, on to fuel. That would increase the pump price by about 30%. That could be enhanced by the general adoption of the pay-as-you-go insurance scheme piloted by Abbey.

Road and Rail compared.

Introduction

71. The majority of transport policy is concerned with road and rail. Further public perceptions with regard to rail bear little or no relation to the facts. Hence this section forms by far the largest part of this note.

72. A problem for the reader may be that the data that we present is so different from the expected as to beggar belief. We can do little about that since all, or most, of what we have to say is rooted in national statistics and the rules of ordinary arithmetic – impossible to overturn in a discussion devoted to finding the Truth. In any event that is what Railtrack's immensely expensive inquiry team found at the inquiry into the West Coast Main Line Modernisation Programme – see closing statements available from the Transport-Watch web site. Alternatively see the railway lobby group, Transport 2000's, amusing demonstration that when an argument is beyond doubt and when it overturns the most cherished of beliefs, believers must shoot the messenger. See topic 19 in web site www.transport-watch.co.uk.

73. The following paragraphs provide the calculations that lead to the conclusions in the Executive summary. Those wishing to avoid the detail may skip to emboldened text elements. We do not go on to suggest action based on those findings specifically. That is because the overriding need is to have the numbers understood and accepted. Without that we believe nothing sensible will be done.

Networks lengths

74. The rail network is 16,000 km (10,000 miles) long and contains 32,000 km (20,000 miles) of track. It serves the hearts of our largest towns and cities where the approaches are almost universally at least 4 tracks wide.

75. In contrast the length of the trunk road and motorway network is some 12,000 km (10,200 miles). Our estimate of lane length, set out below, provides the range (50,000 to 55,000) km.

Table 3 motorway and Trunk Road lengths (km) 2005

	Length	Average Lanes (a)	Average Lanes (b)	Lane Length (a)	Lane Length (b)
Motorways	3,520	7	7	24,640	24,640
Trunk roads - duals	3,490	4.5	5	15,705	17,450
Trunk roads single	5,193	2.25	2.5	11,684	12,982
Total	12,203			52,029	55,072

Widths and alignments

76. The track width for a train is "4 feet 8.5 inches". It is derived from the carts being dragged by pit ponies 150 years ago. However, bridge abutments, tunnels and viaducts on double track railways offer a clear width seldom less than 7.3m (24 feet) - the same as the carriageway width required for a two-way trunk road. Elsewhere double-track railways offer a level width of 8.5m (28 feet) on tangents and more on bends. Single-track railways offer 13 feet between bridge abutments but many were built on double track formations. Hence the widths of most railways would accommodate carriageways

the same width as those for new (single carriageway) trunk roads but not the 3m verges that form part of the design standard for green field construction. However, effective verges are generally absent on most ordinary roads and would serve little or no purpose on railway alignments.

North Devon relief road (on an old railway)

10 m between the stanchions here

77. As to headroom, clearances above rail top are normally 4.16m (13 feet 8 inches) increased to 4.77m (15ft 8 inches) where there is overhead electrification. Road level would be 300 mm (1 ft) below rail top. Hence, without altering tunnels and bridges, the clearances available are 4.46m up to 5.07m. In many parts of the world the required headroom is 4.5m.

78. Although car transporters in the UK are often 4.9m high nearly all container lorries are less than 4.3m high. Further, the standard height for international transport is 4m. Double deck buses range in height from 3.9m to 4.44m. A headroom clearance above the vehicles of 200 mm is adequate.

79. For all those reasons any challenge to the effect that rail rights of way lack adequate width or headroom to allow conversion to roads at reasonable cost should be dismissed.

Journey length

80. This section illustrates how short car and rail journeys are and hence how unimportant "high speed" is for most of them.

81. Table 3.4 of the 2006 Transport Statistics Bulletin (TSB 2006) provides the percentage of journeys by distance. Interpolation provides the data in the table below. It shows that half of all rail journeys are less than 19 miles long compared with 4.3 miles for cars, and that 90% of all rail journeys are less than 80 miles long compared with 20 miles for cars.

Table 4 Journey length percentiles:

	50% less than	90% less than
Car	4.3 miles	20 miles
Local bus	3.5 miles	10 miles
Surface rail	19 miles	80 miles

DfT staff have provided data that shows the rail journeys include some 5 miles travelling to and from rail stations. That suggests that for the line haul 50% of rail journeys are less than 14 miles long and 90% are less than 75 miles long.

82. The passenger-km and journeys along with tonne-km and tonnes lifted in the following table are from National Rail Trends for the year 2005-06 (Office of the Rail Regulator). Dividing the one by the other yields the average journey lengths for passengers and the line-haul for freight. Passenger rail journeys on London and South East and Regional services are some 18 to 19 miles long compared with 100 miles for inter city providing an average of 25 miles. (The 25 miles **average** is longer than the fiftieth percentile from the above table because of the distorting effect of the longer journeys).

Table 5 Average rail journey lengths passengers and freight.

	Passenger-km (bn)	Journeys (mn)	Av. Journey Length
London and South East	20.7	720	28.7 km (18 miles)
Regional	8.3	273	30.4 km (19 miles)
Long distance	14.2	89	160 km (100 miles)
Total network	43.2	1082	40 km (25 miles)
Freight	Tonne-km (bn)	Tonnes lifted (mn)	Line haul
	22.11	103.6	213 km (133 miles)

83. Our other sources provide an average journey length by express coach or bus on non-urban roads of 40 km - the same as for rail.

84. The average line haul for rail freight of 213 km (133) miles compares with the value for all road freight of 87 km (54 miles). We have no estimate of the corresponding values for journeys using the motorway and trunk road networks but distances may be double that of the all-road values.

Modal Split, Distances travelled and journey frequencies

85. This section illustrates that far from being important to the life of the nation rail plays a trivial role except for London's commuters and that it benefits those from households in the top quintile if income four times as much as those from either of the bottom two quintiles.

86. Table 3.1 of the TSB 2006 shows that there were 5,700 miles per year per person where car was the main mode compared with 466 miles for surface rail (400 when journeys to and from stations are deducted) and 400 miles for bus and coach (including London buses).

87. TSB 2006 Table 3.4 provides the trips per person per year by main mode of travel. The relevant numbers are 660 by car, 65 by bus and coach and only 16 by surface rail. 70% of the latter are said to have one end in London. Meanwhile Richard Bowker, when Chairman and Chief Executive of the Strategic Rail Authority, trumpeted the fact that "**nearly** half the population uses a train at least once a year" in an attempt to demonstrate the importance of rail to the nation (see the forward to Everyone's railway – the wider case for rail, 2003) However, the corollary, namely that half the nation uses a train less than once a year, demonstrates precisely the reverse.

88. TSB 2006 Table 5.4 shows that those from households in the top quintile of income travel 5 times as far by rail as do those from the bottom two quintiles compared with 2.7 times as far where the main mode is car.

89. TSGB table 1.1 and 6.7 provide 775 bn passenger-km by motorised modes (car, bus, coach and Rail, excluding London underground). Of those 732 bn (92%) where by motor vehicle and 43 bn (6%) were by national rail. Further, calculations based on the data in TSGB table 7.4 show that 30% of non-goods vehicle miles are on the motorway and trunk road network (the strategic road network). Hence, if passenger-km are proportional to that flow the strategic network carried 28% of the total for national rail and all roads, namely 220 bn passenger-km. Those numbers, overleaf, show the trivial contribution made by rail.

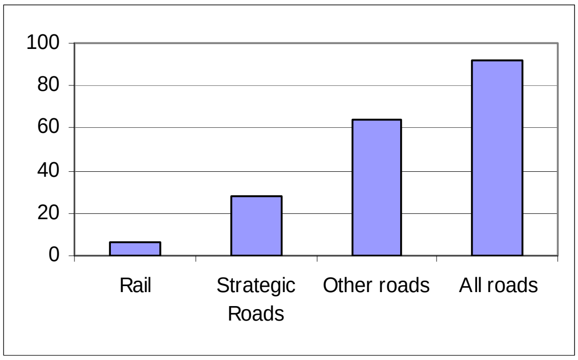


Figure 3 Passenger-km % by rail and road

90. With regard to freight TSGB Table 4.1 provides 163 bn tonne-km (64%) were by road, 59 bn Tonne-km (23)% were by water, 22 billion ton-km (8%) by rail and 11 billion tonne-km (4%) were by pipe line. If we consider road and rail alone 88% of tonne-km are by the road network as a whole with 12% by rail. TSGB table 7.4 sows that 62% of goods vehicle-km were on the strategic road network accounting for 55% of all road plus rail freight. These numbers, illustrate below, show the relative importance of the modes. Again it is clear that rail plays a minor, if not trivial, role.

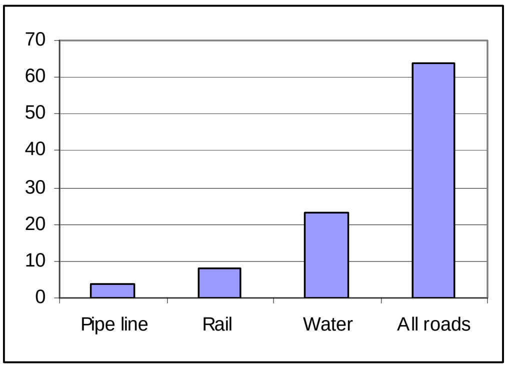


Figure 4 Tonne-km % by mode

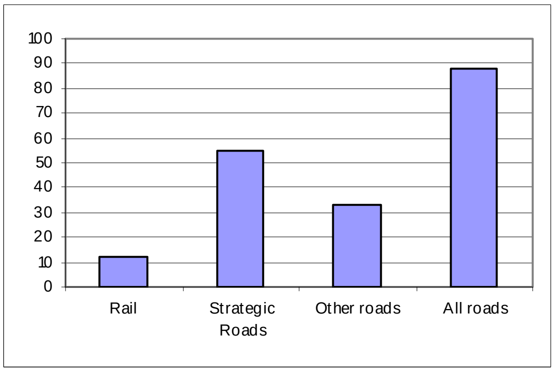


Figure 5 Road and rail Tonne-km %

91. The story that all these numbers tell seems to us to be overwhelming, illustrating, as they do, that, for the majority of the nation rail plays a trivial or non-existent role.

Modal Split – Longer journeys

92. TSB 2006 Table 3.9, reproduced below, provides the percentages of longer journeys by mode. Except for journeys more than 350 miles in length the car is overwhelmingly the most popular. Even at that distance road predominates, carrying 42% of journeys compared with 39% by air and only 12 % by rail.

Table 6. Modal split of longer distance journeys

Miles	Car	Coach	Rail	Air	other	Total
50-75	85	3	11	0	2	100
75-100	86	4	9	0	1	100
100-150	85	5	9	0	1	100
150-250	80	6	12	1	1	100
250-350	72	8	14	5	2	100
350+	42	5	12	39	2	100
Total	83	5	10	1	1	100

Productivity

93. An index of the productivity of track is flow density, calculated by dividing total passenger-km or tonne-km by track length or lane length.

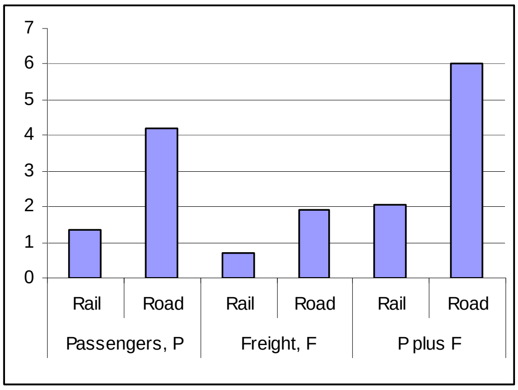
94. Appendix 1 provides the calculations for the Strategic Road network. There we find the network carries 218 billion passenger-km and 101.6 billion tonne-km. Adding passenger-km and Tonne-km as though they were one item yields 320 item-km. *Dividing by lane length, (50,000-55,000)km, yields the following flow densities:*

(1) For passengers (4.0 to 4.36) million passengers-km per km
(2) For freight (1.85 to 2.03) million Tonne-km per km per years
(3) Or if freight and passengers are added as one item (5.85 to 6.39) million item-km per km.

95. For rail dividing the annual 43.2 bn passenger-km and the 22.1 bn freight–km from Table 5 by the track length of 32,000 km yields:

(1) For passengers, 1.35 million passengers-km per km
(2) For freight, 0.7 million Tonne-km per km per years
(3) Or if freight and passengers are added to form one item: 2.05 million item-km per km.

96. The numbers in the two previous paragraphs, are illustrated below. They show that the productivity per lane-km of the strategic road network is 2.5 to 3 times as great as that per track-km achieved by national rail despite the latter serving the hearts of our town and cities.



Figur**e 6 Flow density or productivity index**
(Million passenger-km or tonne-km per yr per km of track or lane, rail and strategic roads)

97. An alternative comparison is to convert the passenger and freight flows by rail to equivalent express coach and lorry flows. The underlying assumption made here is that replacement coaches would carry an average of 20 passengers and that replacement lorries would carry an average of 30 tonnes outbound while returning empty, so yielding an average load of 15 tonnes. Dividing national rail's 43 bn passenger-km and 22 bn tonne-km by those numbers yields 2.1 billion express coach-km and 1.5 billion lorry-km. Adding the two yields 3.6 billion vehicle-km. Dividing by the track length of 32,000 km and by the 365 days per year yields the equivalent average vehicle flow for the network as a whole.

That yields 310 vehicles per day per track, a flow so trivial that it could pass in 20 minutes on one lane of a motor road.

Capacity

98. The commonly held belief is that heavy rail has the highest capacity, followed by light rail or the tram and then by bus and lastly by car. Hence in the Transport Committee's report on the Future of the Railways we have evidence from Bombardier that provides as follows:

"To give a few figures. To carry 50,000 people in one direction we would need:

- a 175 m wide road used by cars, or
- a 35 m wide road used by buses, or
- a 9 m track bed for a metro or a commuter railway".

99. However, the values for buses and cars are appropriate for city streets, not motor roads. In contradiction to Bombardier's figures we offer the following.

(1) ***Welwyn viaduct***. Welwyn viaduct is double track and limits the capacity of the East Coast Main Line. The viaduct carries 14 London bound trains in the peak hour. If each has 10 carriages the flow amounts to 140 per hour, equivalent to perhaps 200 express coaches - sufficient to fill one fifth of the capacity of one lane of a motor road.

(2) ***Central London by surface rail***. In 2005 surface rail commuters to central London numbered 473,000 in the 3 hours from 7 am (Table 1.6 of the TSGB). Hence there are likely to be less than 250,000 arrivals in the peak hour. At least 25 pairs of tracks serve the capital. Hence, in the peak hour there are 10,000 passengers per track Those passengers could **all find seats to spare** in 150 75-seat coaches. In comparison the capacity of one lane of a motor road the same width as required by a rail track is at least 1,000 coaches per hour. Hence the replacement coaches would be sufficient to fill only one seventh of the network capacity available. Outside the peak the hour the surface rail network is a place of dreams as evidenced by a visit to the platforms of any London terminal. Meanwhile most surface rail commuters suffer appalling crushed conditions.

(3) ***The New York bus lane.*** The New York contra flow lane serves the main bus terminal by Route 495. It operates between 6.15 am and 10 am every week day morning. It is two and a half miles long before reaching portals of the Lincoln tunnel. That offers a further 1.5 miles. Hence in-all the length is 4 miles. The lane is some 11 feet wide. It carries 700 45-seat coaches in the peak hour, offering over 30,000 seats. Meanwhile 30,000 crushed passengers arrive at Victoria Main Line in the peak hour where four inbound tracks are available.

(4) **An opinion:** Don Morin, Chief of Public Transport in the US Department of Transport, concluded in the 1970s that a single express coach lane may carry 50,000 passengers per hour. We note that that compares with perhaps 50,000 in the peak hour at Waterloo and 30,000 at Victoria Main Line. In both cases there are four inbound tracks and passengers arrive packed like sardines with many standing.

100. ***The above illustrates that*** our great Victorian rail network is, in highway terms, substantially disused even in the peak hour and in central London and that the official line, as promoted to the Transport Committee of the house of Commons by Bombardier and others, has no basis.

Use of land

101. In a small crowded island such as Britain there is a duty to make the best use of land already committed to transport. The picture of Battersea Power station and the associated rail tracks, reproduced here, illustrates, supposing any further illustration were necessary, how ineffective rail is. This huge swamp of rail lies there doing practically nothing within a stone's throw of Westminster where the surrounding streets are clogged with traffic.

Safety

102. The railway lobby likes to say that every day more people die on the roads than passengers in a year on the railways. Indeed in the Transport Committee's report on the Future of Rail cited those words.

103. However, the statistic overlooks the fact that roads carry 18 times as many passenger-km as do the railways, so exaggerating by a factor of 18 (or by 1,700%) in favour of rail at the outset. Secondly, the comparison is between passengers killed in so-called Train Accidents with all those system-wide including pedestrians, cyclists and people on motor bikes killed on the entire road system. That introduces a further and similar exaggeration in favour of rail.

104. (Meanwhile and separately from that when a year passes in which no passenger dies in a train accident the railway lobby will trumpet the fact. However we have from the Office of the Rail Regulator a record of the deaths in all train accidents back to 1915 in each of which more than 5 passengers were killed. In total 1370 people died in those accidents providing an average of nearly 14 per year. Further, prior to the elimination of slam doors more people died falling out of trains that in train accidents but the fact was not publicised).

105. In contrast to the rail lobby we have calculated the deaths per passenger-km by rail and have compared that with the corresponding death rate for express coaches on motorways and rural trunk roads for the period 1996 to 2005 and with the all-in death rate also on motorways and Trunk Roads for the single year 2002.

106. Particular caveats are that the casualty rates associated with bus and coach depend on assuming a vehicle occupancy. 16 was used. That compares with the value 9 obtained by dividing passenger-km by vehicle-km as available from the TSGB and with the 25 alleged for coaches leaving Victoria Coach Station. Additionally, in the years 1990 to 1995 there were a series of coach accidents that, if included, would have more than doubled the calculated death rates by bus and coach, highlighting the variability of the data and the need for at least 10 year averages when dealing with the small numbers of deaths that arise by rail and coach.

107. Subject to that, the data shows that over the 10 years 1996 to 2005 inclusive:

(1) The death rate to passengers by rail within the envelope bounded by the ticket barriers was at least 50% above that for buses and express coaches on motorways and rural trunk roads.

(2) The all-in deaths per passenger-km by rail, including trespassers but not suicides, was more than 50% above that imposed on society as a whole by traffic on the motorway and trunk road system. Further, if pedestrians, cyclist and bikers are excluded from the road statistic, as would happen if the remaining traffic could occupy a reserved road system such as enjoyed by rail, then the death rate would be half that by rail.

108. As to casualty costs, our estimates show that for the 10 year period 1996-2005 the cost of passengers killed in Train Accidents amounted to only:

(1) 10% of the cost of Killed and Seriously Injured (KSI) passengers hurt in "train" plus "movement" accidents

(2) 5% of the cost of KSI passengers in the envelope bounded by the ticket barriers.

(3) 1.5% of all KSI casualties by rail. (The latter include casualties to staff, postal workers and people on railway business, all of whom are excluded from the category "passenger" within the source data, and crucially trespassers but not suicides).

…………………………….

109. We comment, despite the trivial contribution that passenger deaths in Train Accidents make to total casualty costs it is those casualties alone that the railway industry uses when reporting rail safety. That creates a quite false impression as to the relative safety of rail compared with road or any other vector.

Fuel consumption and carbon emissions

110. The electricity and diesel consumption for passenger rail is from the RSSB publication "Improving the efficiency of traction energy use" June 2007. That data was provided to the RSSB by the Train Operating Companies and is probably well based. It relates to the year 2005/6.

111. The electricity and diesel consumed by rail freight was from Rachel Howells of Network Rail. She provided by e-mail to us on 23rd September 2003 that for the year 2002/3 "…As an industry we use approximately 530 million litres (of diesel) per year. This is an approximation and is split roughly 50/50 freight/passenger." She also provided that rail freight used 95 GWh of electricity per year. Hence it is fair to say that the data for rail freight is relatively weakly based. Both those values, or their equivalents, appear in the RSSB report cited above where Transport-Watch is cited as the source but where the incorrect impression is created that the data relates to 2005/6. Astonishingly that appears to be the only data dealing with the fuel consumption of rail freight that is available to the nation.

112. An analysis of the data available from Energy Trends shows that the energy burnt in generators is 3 times that consumed by end users. The multiplier takes account of the thermal losses along with the electricity used by the generating industry itself and the transmission losses. Similarly we found that the fuel consumed by diesel powered vehicle should be increased by 10% to take account of the energy used in refineries and in transporting the fuel to filling stations.

113. The comparisons with express coaches and lorries relate to the consumptions that would arise if those vehicles were operating in uncongested conditions. That is because (a) we are interested in the consumptions and emissions that would arise if the rail network were converted to a reserved system of motor roads (b) there is in any case little prospect of any large scale transfer to rail so that comparisons between the modes as now operating have little practical application.

114. In deference to the UK vernacular fuel consumptions are expressed in miles per (Imperial) Gallon.

115. Carbon emissions depend on calculations of the carbon emission per GWh produced by the generating industry along with that for burning diesel. The source data for that was Julian Prime of the BERR and the quarterly energy reviews. Mr Prime also confirmed our calculations with regards to the electricity generating industry, all of which are available on our web site or on request.

116. For trains our estimates of fuel consumptions are as follows.

(1) 92 passenger miles per gallon in 2005/6. That compares with 88 passenger miles per gallon in 1990, derived from British Rail data.
(2) 160 Tonne-miles per gallon in 2002/3. That compares with 147 tonne-miles per gallon in 1998, derived from data provided by Tim Murrells of NETCEN citing the National Atmospheric Emissions Inventory.

117. Applying the above values to the 43.2 billion passenger-km and 23.5 billion Tonne-km carried in 2005/6 yields 297 million gallons for passengers and 91 million gallons for freight providing a total of 388 million gallons of diesel equivalent.

118. In comparison:

(1) An express coach may return 10 miles to the gallon when operating in uncongested conditions and contain an average of 20 people. Hence, after allowing for 10% losses attributable to refineries and transporting the fuel to filling stations, such a coach returns 180 passenger miles per gallon, or double that of the train. Similarly, a diesel powered car may return 60 miles per gallon. If it contains the national average of 1.6 people then, all-in, it returns 86 passenger-miles per gallon – which is very similar to the train.

(2) A lorry operating in uncongested motorway conditions may return 8 miles per gallon equivalent to 7.27 miles per gallon after allowing for the energy consumed in refineries etc. If its average load is 30 Tonnes out back empty providing an average of 15 Tonnes then it returns 109 Tonne-miles per gallon after allowing for refinery losses etc.

119. Applying the values for express coaches and lorries to the 43.2 billion passenger-km and 23.5 billion Tonne-km carried in 2005/6 yields 150 million gallons for passengers and 134 million gallons for freight providing a total of 285. ***That is 26% less than the 388 million gallons required by the trains.***

120. With regard to emissions we have:

(1) For Rail we have 18 gms of carbon per passenger-km and 11.4 gms per tonne-km providing a total emission in 2005/6 of 1045 thousand Tonnes.

(2) For road we have 11.4 gms per passenger-km in express coach and 18.8 per tonne-km by lorry. That would provide a total emission of 934 thousand tonnes if applied to the national railway function, 10% less than produced by the trains.

(Note, these values are **carbon emissions.** To convert to carbon dioxide the values should be multiplied by 3.67.)

121. Furthermore Jim Russell points out that electrification may increase the life of coal fired power stations. For that reason he suggest the emissions associated with electicity should not be the average value as here but the value associated with coal, which is double the average. If that approach is adopted then, rather than reducing rail's carbon emissions by 10%, replacement buses and lorries would reduce it by 36%.

122. Separately from that we note that 15%-20% of electricity is from nuclear sources. Hence, the comparisons we, and others, present understate the environmental impact of rail by omitting the effect of nuclear waste

Noise

123. Traffic noise is of course endemic. Motorways in particular can be heard over distances in excess of one mile. In contrast rail is perceived as benign. However, that is because most rail rights of way are, in highway terms, scarcely used. In reality a high speed train makes one of the loudest noises in the environment – reaching the threshold of pain for those on platforms. That is why in France property is bought up and compensation paid within 250 metres of a TGV line.

Profits from roads losses from rail

124. **Rail:** We have the annual operating subsidy back to 1954. The average for the period at 2004 prices is £2.5bn compared with £2.0 bn for the 10 years to 2003 and £3.7bn for the single year 2003. Since there is indeed operating subsidy it is unreasonable to expect that loans or capital expenditure can ever be repaid from the fare box. Instead the capital and loans should be added to subsidy as though both were current expenditure.

125. In the past we have made several separate estimates of the annual cost to the taxpayer of national rail all of which tend to £5 billion per year. E.g. Table 6.2(a) of National Rail Trends provides the annual support at outturn prices given to the rail industry. The

total for the decade 1995/6 to 2005/6 at June 2007 prices amounts to £28.7 billion. Outstanding loans amount to £18.3 billion. Adding the two provides a total of £47 billion. Meanwhile Table 12.1 of the White paper, Delivering a Sustainable Railway, published in July 2007, anticipates support of £15.3 billion plus loans of £ 6.1 billion, yielding a total of 21.4 billion for the 5 years 2009/10- 2013/14. That excludes Scotland where further £1 billion per year is anticipated. Hence for that 5 years we have £26.5 billion or over £5 billion per year.

126. ***Against that background it is fair to say that subsidy to national rail will have amounted to £5 billion per year over the 19 year period 1995/6 to 2013/14,suggesting a total of £100 billion over20 years.***

127. Dividing the £5 billion by the circa 25 million households in the land or by the 32,000 km (20,000 miles) of track or by the circa 43 billion passenger-km or by the 62.5 billion passenger plus tonne-km yields:

(1) £200 per year for every household in the land (at a time when half of us use the train less than once a year)
(2) £156,000 per year per track-km (£250,000 track-mile).
(3) 12 pence per passenger-km (19 per passenger mile) if freight is ignored
(4) 8 pence per unit if freight and passengers are added together.

(In comparison Appendix 5 of the SRA's Annual Report for 2005 provides operating subsidies in 2002/3 of only 5.28 pence per passenger-mile, 8 pence in 2003/4 and 3.8 pence in 2004/5. The reason for the discrepancy is that the SRA value represents payments direct to the Train Operating Companies. That ignores support and grant to Network Rail itself and (of course) all capital expenditure and loans guaranteed by the Government).

128. **Roads:** the following table provides an estimate of the total tax take in 2005 from the motor industry the sources are the TSGB, HMRC and the Association of Motor Insurers.

Table 7 Taxes on motoring

Item	£(billion)
Fuel Excise duty	23.0
VAT on fuel	8.5
Vehicle Excise duty	4.7
VAT on new cars	7.0
Company Car Tax	3.0
Insurance Premium tax	0.6
VAT etc on car servicing	3.0
Total	49.8

The £49.8 billion is equivalent to £2,500 for every household in the land. Deducting annual expenditure of circa £9 billion yields a net tax take of £41 bn. That corresponds to a net take equivalent to £1,600 per household.

129. If the net take of £41 billion is apportioned according to the 32% of all vehicle miles on the strategic road network then that network contributed £13.1 billion to the exchequer. Dividing the £13.1 billion by the 25 million households or the previously calculated lane lengths (50,000-55,000 Km and flows [218 bn passenger-km or and 320 bn (passenger plus tonne)- km] yields:

(1) Net Tax take per household £525
(2) Tax take or profit per lane-km, £250,000 to £260,000.
(3) Profit per passenger-km, 6 pence.
(4) Profit per item if passengers and tonnes are combined, 4 pence.

130. ***The bar chart below illustrates the numbers in the previous paragraphs. They show that in terms of the tax-take the strategic road network is immensely profitable. In contrast the rail network is a massive drain on the exchequer.***

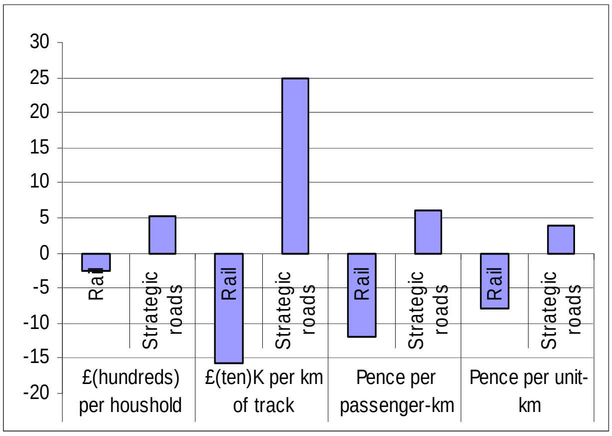


Figure 7 Profits from roads losses from rail

Capital Recovery Factors

131. In the following the annual cost of capital is obtained by multiplying the first cost by a "capital recovery factor". That factor generates the sum that, if paid annually, would repay capital plus interest over the intended pay-back period. The following table tabulates the factors for selected payback periods and for a range of other interest rates so as to enable readers to test the effects of using different rates and payback periods. E.g. if the interest rate is set to the Treasury value of 3.5% and if capital is to be repaid over 30 years then the annual repayment will be the capital multiplied by 0.0544.

Table 8 Capital recovery factors

Rate/years	5	7	10	15	20	25	30	35	40	60
3%	0.2184	0.1605	0.1172	0.083	0.0672	0.0574	0.0510	0.0465	0.0433	0.0361
3.5%	0.2215	0.1635	0.1202	0.0868	0.0704	0.0607	0.0544	0.0500	0.0468	0.0401
6%	0.2374	0.1791	0.1359	0.1030	0.0872	0.0782	0.0726	0.0690	0.0665	0.0619
8%	0.2505	0.1921	0.1490	0.1168	0.1019	0.0937	0.0888	0.0858	0.0839	0.0808
10%	0.2638	0.2054	0.1627	0.1315	0.1175	0.1102	0.1061	0.1037	0.1023	0.1003
12%	0.2774	0.2191	0.1770	0.1468	0.1339	0.1275	0.1241	0.1223	0.1213	0.1201
15%	0.2983	0.2404	0.1993	0.1710	0.1598	0.1547	0.1523	0.1511	0.1506	0.1500

Capital for track

132. At the Public Inquiry into the West Coast Main Line Modernisation Programme the cost had the range £6.3 billion to £9 billion. Subsequently the cost rose to £13 billion only to be cut back to allegedly £7.3 billion. It now stands at £8.1 billion. At the inquiry Railtrack said that the expenditure was concentrated on the core 1000 km of track. Hence the current unit cost is **£8.1 million per track-km.**

133. The East Coast high-speed rail proposal was to cost £36 billion providing 4 tracks over 495 miles at a unit cost of **£11 million per track- km**. The cheaper alternative costs £8 billion and provides 200 miles of double track, yielding a unit cost of **£12.5 million per track-km**. (Source is the SRA).

134. Alternatively consider the cost of Railtrack's original modernisation programme. It ranged from £50 billion to £70 billion excluding new high-speed line proposals. Probably the expenditure was concentrated on not more than one quarter of the track length. At any rate the West Coast Main Line Modernisation was concentrated on only 1,000 km of its 2,800 km of track. On that basis the cost of the national programme had the range **£(6.25-8.7) million per track-km.**

135. In contrast to that the Independent of 17th February 1999 reported a Treasury study which estimated the replacement cost of the M1 as £2.1 billion for all works and land, or £2.3 billion at 2004 prices. The lane length, assuming 3 lanes all the way from the M25 to Leeds, is 1800 km. That provides a cost of **£1.3 million per lane-km**.

136. Alternatively consider the Highway Agency's estimate for a dual 3-lane motorway complete with hard shoulder of £25 million per mile. That included a 45% optimism bias and VAT. Stripping those out yields £1.18 million per lane-km. Those costs include land, 12%, earth works, 20% and structures, 45%.

137. Hence new motorway construction is 6-7 times less costly per lane-km than mending and modernising the West Coast Main Line is per track-km, 10 times less than the East Coast High Speed line, and 5 to 7 times less than the somewhat speculative estimate of the cost per track-km of Railtrack's original network-wide rail modernisation programme.

Track maintenance

138. In 2005 the capital expenditure on strategic roads amounted to £0.867 bn, and current account expenditure to £1.474 bn, reference TSGB table 1.15. Previous discussions with the DfT suggest half the capital may be in the category heavy maintenance, renewal, and enhancement. Adding that to the current account expenditure provides close to £2 billion. Hence, with a lane length of (50,000-55,000) km the cost per lane-km has the range £(36,000- 40,000).

139. In contrast, Network Management statements suggest that maintenance for national rail will range between £2bn and £3 bn per year for the decade. The track length is 32,000 km. Hence the annual cost per track-km has the range £(62,500-93750), approximately double the values for the strategic road network.

140. Alternatively we may add passengers-km and tonne-km to form a single unit and divide the costs by those totals. From above we calculate that the strategic road network carries 320 billion passenger plus tonne-km. Hence the cost per unit has a value of 0.6 pence. The corresponding flow for rail is 63.2 bn providing a unit cost in the range (3 to 4.7) pence - five to eight times higher than for the strategic road network.

141. We conclude that, in terms of the passengers and freight carried, track maintenance for rail is up to 8 times as expensive as equivalent road transport.

Rolling stock

142. Railway carriages cost at least £1 million each and may have 75 seats. Modern stock may last 30 years. The corresponding capital recovery factor is 0.0544. Annual maintenance may be set to 7.5% of capital. Hence the annual cost of capital and maintenance amounts to 13% of capital. Dividing by the number of seats yields £1,725 per seat per year.

143. A basic express coach with 50 seats may cost £150,000. The vehicle may last 21 years. 7 of which may be in "first use", 7 in "second use" and 7 in "third use" e.g. as a school bus. Against that background we will here assume a life of 15 years, yielding a capital recovery factor of 0.0868. As for rail we will also assume annual maintenance at 7.5% of capital although we have the range 2% to 12.5% from the industry.

144. ***On that basis the annual cost per seat on an express coach is £485 – 3.6 times less than for the railway carriage****.*

145. If maintenance costs are ignored (for reasons of uncertainty) then the annual cost for capital alone amounts to £725 per seat for rail and to £260 for a seat on an express coach. If the life of the express coach is cut to 10 years then the annual cost of its capital increases to £360.

146. We conclude that on an annualised basis a seat in an express coach costs up to 3.6 times less than does a seat on a train.

Signalling

147. At one time capital for signalling and train detection systems was set at £6 billion. If that were to be repaid at the treasury discount rate of 3.5% over 30 years and if maintenance amounts to 5% of capital then the annual cost would be 0.6 billion per year. Subsequently the cost was reduced to £3.6 billion implying an annual cost of £0.37 billion. Those enhancements were forecast to save less than 2 lives per year (excluding lives supposedly saved by attracting people out of cars into trains). The cash value of that saving plus the value of lesser casualties in train accidents is of the order of £10 million.

148. We conclude that expenditure of signals for railways or at any rate on the advance train passenger detection systems exceeds the value of casualties saved by a factor of at least 35. Meanwhile signals are almost entirely absent from the (very much more heavily used) motorway network.

A financial effect of (rail) modernisation

149. Prior to Railtrack's receivership in 2000 the share price fell from a high £17 to £10 and finally to below £5. There were half a billion shares. Hence at receivership the value of the company was below £2.5 billion. That happened despite the replacement cost of the system being in excess of £200 billion and despite an effective guarantee that £60 billion would be spent on modernisation. Hence, in purely financial terms, the £60 billion, now partly spent, is being entirely wasted - equivalent to burning the residential accommodation sufficient for 1.3 million people, or wasting the wages of 60,000 doctors or 130,000 nurses or 108,000 school teachers or policemen for 30 years.

150. Separately from that we note that the New Zealand railway network was at one time sold to the private sector for £1 and sold back some years later for the same amount – illustrating, if any such illustration is necessary, that rail systems are indeed worthless in the market place unless supported by the taxpayer.

151. We conclude that when the Government speak of "investing in rail" there is a misuse of words. An investment should bring a financial return. In contrast to that expenditure on rail is subsidy and can never be recouped. The scale of that subsidy is immense – sufficient to damage the economy as a whole let alone the fact that rail is for the most part enjoyed by the better off.

Economics of conversion

152. The Hall Smith Study, Better Use of Railways 1976, carried out by Reading University under contract from the Department of the Environment, found conversion would yield first year rates of return of up to 500% and beyond. (In one case the scrap value of surplus land exceeded the cost of construction). Generally that was because of the low capital costs and large social benefits measured in terms of time and accident savings.

153. We have carried out calculations that show that if the study were repeated using today's values for time, accidents and construction costs the conclusions would be strengthened.

Conclusion

154. The foregoing shows that the accepted beliefs to do with rail and road have no basis. Instead they are a figment of the railway man's imagination and a product of his propaganda. Indeed as long ago as 1973 Stuart Joy, previously Chief Economist to British Railways, wrote in his book the *Train that ran away* that there were those "in the British Transport commission and the railways who were prepared, cynically, to accept the rewards of high office in return for the unpalatable task of tricking the Government on a mammoth scale. Those men," Joy wrote, "were either fools or knaves". There were no libel actions but Joy had been forced out – too honest to work with railway men.

155. We regard that as a continuing tragedy, now at least 50 years old. It may take years of persuasion and discussion to undo the damage and to have the facts understood and generally accepted. That is a prerequisite if a sensible policy is to be developed. Hence, we encourage our readers to go on to the facts sheets in our web site, for that is where the detailed proof resides. All of it is, of course, in dramatic conflict with beliefs cherished by many. However we note that they and the railway lobby, furious as they are at our message, appear unable to overturn any of it

Rural rail

Introduction

156. We separate this section from the above and provide some elaboration. That is because it is rural railway lines that are most likely to be closed and lost to transport use. After all, 9,000 route miles worth were lost following Beeching, including the Great Central Line linking Marylebone to Leicester. That loss arose partly because the Railway Act forced the sale to the highest bidder – often a developer - so that route integrity was lost – and partly because there was no strategic authority with the imagination to appreciate how valuable the rights of way would be, if retained for transport use.

157. We regard that as a tragedy. The rail routes overlaid an entirely inadequate collection of rural roads. Instead of being abandoned, those rights of way could have provided bypasses to towns and villages while simultaneously creating entirely new axes for development.

158. Hence it is here that policy can bear some fruit - preserving superbly engineered rights of way for transport use in the interests of the community as a whole, should more closures be threatened.

159. To illustrate the poor use to which rural rail is currently put, and hence the threat of closure that must exist, we have two examples, although there are endless others. Namely, the Trans Pennine route between Manchester and York and Community Rail as identified by the SRA.

Trans Pennine

160. The Yorkshire Post, 1st January 2005, reported the "success" of Trans-Pennine Express company in carrying "173,171" passengers per year from Manchester to York. However, the "173,171" amounted to only 240 per day in each direction - enough to fill five 50-seat coaches each way – illustrating the trivial use to which this invaluable right of way is put. As a road, penetrating to the heart of Manchester and York, one would expect the route to carry at least 15,000 vehicles per day.

Community rail

161. **Introduction:** Despite the £300 million per year that the SRA claims the taxpayer contributes to Community Rail, astonishingly little useful data is available from the SRA's February 2004 consultation paper or from the Development Strategy, published in November. The following summarises:

162. *From the Consultation paper we have*: Community Rail contains 1,300 route miles, or 12.5% of the national network, and 420 stations (17% of the total) and that is all.

163. From the Development Strategy we have:

(1) The network length is now 1,200 miles.
(2) Annual infrastructure costs are £100,000 per track mile – including station renewal.
(3) Rolling stock costs for leasing and heavy maintenance are £100,000 per year per vehicle representing 50-75% of total vehicle costs.
(4) Government cash support for the rail industry ran to £2.6 billion in 2002/3.
(5) Subsidy to Community rail costs approximately £300 million per annum.

164. There is no estimate of passenger or freight usage, no schedule of the track lengths for the routes provided in the appendices and the SRA had no idea of the proportion of the network, which has double track formation, i.e. the widths. Likewise there is no comparative data for the adjacent road network.

165. Against that background the SRA quote the Institute of Chartered Accountants as finding three-quarters of its members believe local rail is important to the business economy of their region. How any person could come to any conclusion, let alone that one, in the absence of data, remains a mystery. In any event here are some of the blanks:

166. **Flows:** Although not included in the publications, the SRA say that the 1,300 miles of the Community Rail Consultation network carries 23.6 million passenger-journeys per year. The network contains 60 lines. Hence the average line length is 21.6 miles. The average journey length may be half that or 10 miles (compared with 25 miles for the entire network). On that basis the Community Rail network may carry 236 million passenger-miles annually. Dividing by the network length and by the days in the year yields an average daily two-way flow of 500 people, or 250 in each direction.

167. If the 250 transferred to coaches, each carrying 20 people, 13 vehicles per day, or one half-full coach every hour, would suffice - illustrating the trivial use to which these routes are put. Many of them offer perhaps a 1 or 2-car "train" every couple of hours.

168. **Subsidy:** Community Rail's annual subsidy was cited as £300 million annually. That corresponds to:

(1) £5 million per year per line or to
(2) £230,000 per year per route-mile or to;
(3) 127 pence per passenger-mile
(4) Add the fares and we can see at a glance that the cost is substantially above that of an ordinary car, let alone by coach. Probably an on-demand minibus would do the job at a fraction of the cost of the trains.

169. **Likely effect on local economies:** National rail carries 2% of motorised passenger-journeys or 5.5% of passenger-miles, concentrated in the South East. Hence in areas served by the Community Rail network it would be surprising if more than 0.5% of journeys or 1.5% of passenger-miles went by rail. Probably the £300 million subsidy if spent in the local economies would do far more that the couple of one or two-car trains per hour that the subsidy buys.

170. **Infrastructure cost:** Infrastructure costs for Community Rail are cited as £100,000 per track-mile. In contrast the estimate of maintenance costs on the motorway and trunk road network (including structural maintenance allocated to the capital account) are circa £40,000 per year per lane-mile – less than half that required for the scarcely used Community Rail network.

171. **Rolling stock costs:** The cost per carriage for Community Rail is set by the SRA at £100,000 per year for leasing and heavy maintenance, amounting to between 50% and 75% of vehicle costs. Hence full annual vehicle costs have the range £133,000 - £200,000. If there are 75 seats the cost per seat per year has the range £1,800 to £2,770. In comparison a brand new 50-seat motor coach costs circa £150,000. If that were to be repaid over as little as 10 years at 3.5% and if maintenance costs amount to 7.5% costs of capital then the annual cost would be £30,000, providing a cost per seat of £585 per year - 3 to 4.5 times less than for the railway carriage.

Conclusion

172. We conclude that rural rail routes are not worth preserving as railways. Instead these lines should be converted to motor roads. Express coaches or mini buses would then replace the trains while countless other vehicle could divert from the unsuitable

rural roads that they currently burden. Eventually these new roads may link with a wider network, bringing untold benefits to the community at large.

Rail and social equity

173. The historical data in this section is from Leon Mannings' PhD thesis, "From Accommodation to Constraint: an Analysis of shifts in the UK", University of London 2004 (except for the price conversions which are from Appendix 2)

174. In the 19th Century increased use of railways gained widespread political support as a means of solving the chronic overcrowding problems suffered by the urban poor. The 'remedy' was to allow them to live further out from the squalid central areas that were close to their workplaces.

175. However, between 1853 and 1901 developing London's rail network displaced over 76,000 persons, mostly the poor. Indeed, by 1851 the spread of railways was already being described in the title of a poem published in the *Builder* as an 'Attila in London". Further, train fares were unsustainably high for low paid workers although under the remnants of Gladstone's 1844 Railway Regulation Act, railway companies were at least compelled to provide fares at rates of 1d a mile (the Parliamentary Trains). In theory these fares would enable the working classes to commute. However, the initial effects were soon reversed since of those who migrated to the suburbs, large numbers in the eighties wished to return because their incomes could not sustain the higher cost of living there. After all, one old penny in 1840 is equivalent to circa 30 pence at today's prices or 87 pence in terms of today's wages. Hence a ten mile return cost between £15 and £20 in terms of today's wages. Further the "Parliamentary Trains" were deliberately scheduled at inconvenient times and were extremely slow.

176. Thus the impact of railway expansion was to increase the size to which towns might grow, and the extent to which some social stratas of urban populations could spread but, far from providing equity between rich and poor, or relieving town centre overcrowding, the reverse was the case.

177. National Travel Survey Table 5.4 shows that today those from households in the top quintile of income travel nearly 5 times as far per year by rail as do those from households in either of the bottom two quintiles. In contrast, those in the top quintile travel only 2.7 times as far by car as do those in the bottom two quintiles.

178. Despite that the illusion that rail is in some way a social service lingers to this day - with concessions for the elderly and students along with propaganda from the likes of Transport 2000 to the effect that rail is, in some magical way, socially inclusive.

179. The reality is that subsidy paid to the railways does, and always has, benefited the well off rather than the poor. An alternative for any government that wishes to promote social equity would be to pay the money to the disadvantaged, leaving them to decide how to spend it.

Organisation and control of track

180. It is fashionable to forget the losses and unreliability of rail prior to privatisation and to overlook the astonishing growth in passengers that has arisen since privatisation compared with the previous stagnation. Nevertheless the drain on the taxpayer has if anything increased. Against that background there are perennial calls for reorganisation or re-nationalisation in the (vain) hope that tinkering with the management structure will miraculously reduce the losses if not turn them to profits.

181. However those problems have little or nothing to do with the management structure but are instead inherent to the technology of rail. Instead of minor changes we advocate a more radical approach, namely the creation of one overarching track authority for road and rail combined. That authority should be charged with making the best use of Transport Land in the interest of the community as a whole. The

purpose of that would be to facilitate the exchange of rights of way between rail and road so that our great Victorian rail system or parts of it may at last be put to effective use.

Maglev and high speed rail

182. A cost quoted for Maglev from London to Scotland was £30 billion (strangely less than the £36 billion for the high speed line). We comment, if the £30 billion were to be repaid at the Treasury discount rate of 3.5% over 30 years the annual cost would be £1.63 billion. Adding maintenance and operating costs would increase that bill by (50-100)% providing the range £(2.45-3,26) bn. If there were as many as 20 trains each way each carrying 500 passengers every day then there would be 7.3 million one-way journeys per year. Hence, if the fares were to cover costs the return fare would have the range £660 to £900. Probably the fares actually charged could cover no more than one third of that. Consequently this project, if built, may cost the taxpayer around one billion pounds annually for ever and ever. Moreover, if usage matches that of ordinary rail, those in the top quintile of household income will use the system four times as much as those from either of the bottom two quintiles. Meanwhile £10 million may be needed just to study the proposal.

183. As for the relative carbon footprints of domestic air and high speed rail, our detailed analyses found that if the 30% seat occupancy claimed by rail and the 80% claimed by Ryan Air and others prevailed then the carbon footprint of the two modes would be similar – see the Transport-watch facts sheets 5.

184. For all those reasons we counsel against "investing" in high speed rail- any such expenditure being a subsidy not an investment.

Light rail and trams

185. Light rail and tram systems are extraordinarily popular with the planners and in the public mind. However, given such rights of way, the bus or express coach would perform the same function at a fraction the cost while enabling other vehicles to use the route, provided only that the "track" should be managed to avoid congestion e.g. by congestion charging on Lexis lane principles pioneered in the US.

186. The systems for which data is here presented are Docklands, Strathclyde, Manchester, Tyne and Wear, Sheffield, Centro (West Midlands) and Croydon. Detail is in the data table in Appendix 3. It shows that:

    (1) The capital cost at 2003 prices for Manchester, Tyne and Wear, Sheffield, West Midlands and Croydon amounts to £1.8 bn. If Docklands is added the bill is £2.93bn. In addition to that Merseytram had the option of spending £225mn, Manchester hoped to spend an additional £900mn, South Hampshire was bidding for £270 million and Edinburgh for £375mn, providing a total of £1.77 billion. Adding that to the historic expenditure of £2.93bn yields £4.7bn as in 2004.
    (2) With the exception of Sheffield no system covers operating costs. When the costs of capital and maintenance are added, the total cost is between 3.2 and 5.8 times larger than receipts.
    (3) Including the annual cost of capital and maintenance the annual subsidy per journey has the range £2.50 (for Manchester) to £4 (for Tyne and Wear).
    (4) In highway terms, rail rapid transport systems are substantially disused. E.g. the average one-way flow per track for the systems has a range equivalent to 92 to 525 buses per day, each bus containing an average of 20 people. That may be compared with a potential of up to 10,000 vehicles per day for a single lane of a motor road managed to avoid congestion. The comparison suggests a catastrophic under-use of valuable transport land.
    (5) The number of employees per car (or per tram) has the range 4.3 to 10.9.
    (6) Average journey lengths have the range 3.2 to 10.5 km.

(7) The average train or tram load ranges from 17 to 50, excluding Docklands, which has 69 passengers.

(8) Capital costs per route-km have the range £7.6 million to £10.4 million excluding Docklands for which the value is £43 million.

187. We have sought fuel consumptions but with little success. However, data from 1990 provided the equivalent of 51 passenger-miles per gallon for Tyne and Wear, 55 for Strathclyde. Also data from 2003 for Croydon's Tramlink provides 92 passenger-miles per gallon (it has phyrister control - using breaking to provide energy for traction). In comparison buses returning 8 miles per gallon (as they may do on rights of way such as these systems enjoy) and contain the average passenger loads associated with UK tram systems (the range is 17-50 excluding Docklands) would return 135 to 400 passenger-miles per gallon.

188. We conclude that none of these systems would have been built had the costs, and operational limitations been properly understood. (Of course the Europeans are famed for trams. However, is it merely a case of the grass seeming greener over there? Whatever the case Sir Terry Mulroy said, at an Institution of Civil Engineers meeting held on 21st November 2002, that, "if one asks the Planners in Geneva, Home of the Tram, if they would do it again, they will say quietly, never again – far too expensive". Meanwhile "the town of Grenoble is renewing its tram network after only 10 years").

189. As for London, in 1949 the trams were seen as an embarrassment to the capital's post-war planners. In that year Lord Latham, chairman of the London Transport Executive, delivered a speech outlining the plans for the tramways conversion programme in which he stated "the loss on the trams is about £1,000,000 per year" equivalent to £20,000,000 at today's prices. Now we have Ken Livingstone's plan to bring some of them back.

Carbon emissions.

190. The analyses reported above illustrate that the differences in carbon emission of bus, car and train are not large and not necessarily in favour of the train or bus. Further, a transfer from car to public transport can only be marginal. It follows that, rather than concentrating on that margin, reducing the emissions of vehicles (road and rail) should be the focus of policy.

191. Furthermore, all or nearly all comparisons omit the carbon required in manufacture and disposal. As an illustration of the scale of the effects we note that the carbon emission for manufacture and scrappage of a car is said to be equivalent to one to two years worth of running. Further there is a report by CNW marketing that purports to show that "dust to dust" a supposedly green hybrid vehicle produces more carbon than does an ordinary one. Similarly, railway rolling stock and infrastructure may contain an unexpectedly large carbon footprint as may road construction. Those emissions, when included, may very well change the order in which different modes of transport are said to perform particularly where the differences are marginal.

CONCLUSION

192. The Government's Transport policies, ranging from the railways to road safety campaigns, have been immensely costly but have largely failed. That is because, for the most part, they are based on sentiment rather than the facts, particularly with respect to rail.

193. Our most important recommendation is that there should be a period of reflection in which the evidence may be evaluated and its consequences made clear. That is a major task since the beliefs now embedded in the public mind, particularly with regard to rail, are long established but have little or no basis.

194. We advocate a single authority for surface transport charged with making the best use of land already committed to transport in the interests of the community as a whole.

Subsidies if any should be given to the needy would be Traveller, leaving them to make their transport choice. To apply subsidies to a particular mode of transport, such as rail, stands in the way of progress. Where would U.K.'s transport be today if there had been subsidies to keep horse drawn vehicles on the road after the invention of the powered vehicle?

195. Carbon emissions of the transport system may best be reduced by improving the efficiency of the vehicles (road and rail) rather than by attempting to have people transfer from one mode to another"

196. There should be an end to the apparent war on the motorist. He should be credited with the good intentions that most people have. That should be supported by educational programmes and publicity designed to promote polite and deferential driver behaviour.

197. The junction designs that have become fashionable over the past decade should be phased out in favour of ones where the objective should be to match the capacity at those critical points to the capacity of the road links. Such a change would greatly reduce the congestion and air pollution suffered daily by motorists throughout the land.

198. A more flexible approach should be taken to speed control leaving the cameras the catch the truly dangerous along with those without insurance or road tax.

Appendix 1 Passenger-km and tonne-km on the strategic road network

From table 7.4 of the TSGB we find that in 2005 there were 499 vehicle-km on the entire road network. Of those 29 billion were goods vehicles and 470 were cars, vans and buses. The strategic road network carried 160.5 billion vehicle-km, of which 18 billion were goods vehicles and 142.5 cars light vans or buses. ***Hence the strategic road network carries 32% of all road traffic, 62% of goods traffic and 30% of non-goods traffic.***

Table 1.1 of the TSGB provides a total of 726 billion passenger-km by car, light van and bus on all roads. Hence, if passenger-km on strategic network is proportional to the non-goods traffic there were 726 x 0.3 = 218 billion passenger-km on that network. Similarly there were 163 billion tonne-km of freight by all roads. Hence, if 62% was carried by the strategic road then that network carried 101.6 billion tonne-km. Adding passenger-km and Tonne-km as though they were one item yields 320 item-km. *Dividing by lane length, (50,000-55,000)km, yields the following flow densities:*

(1) For passengers (4.0 to 4.36) million passengers-km per km
(2) For freight (1.85 to 2.03) million Tonne-km per km per years
(3) Or if freight and passengers are added as one item (5.85 to 6.39) million item-km per km.

These are the values cited in the main text.

Appendix 2: Inflation since 1840

1. This note estimates the value of the 1d per mile parliamentary fare (a) relative to prices and (b) relative to wages. That fare was in response to the needs of the poor who could not afford ordinary fares. However, it is clear that even at 1 old penny per mile the fares were beyond their means.

2. We have, from the House of Commons Research paper 02/44 dated 11th July 2002, estimates of price inflation from 1750 until 2001. The index had the value of circa 10 in the 1840s and 630 by 2001. Between 2001 and 2005 the RPI grew from 173 to 192. Hence we have a prices growth form the 1840s to 2005 of (630 x 192)/(10 x 173) = 70.

3. We have from the ONS the Average Gross Weekly Earnings Index from 1938 to 2005. It suggests growth of approximately 518/3.5 = 148 in earnings between the two dates. In comparison the earlier source provides a grown in prices of 42.4 for that period. That is 3.5 times less than the corresponding growth in wages. Hence if we may hazard that between the 1840s and 2005 earnings grew by a factor at least 3 times that of prices then wages grew by a factor of 210.

4. Other relatively anecdotal data in support of the wage inflation used here is that in the early part of the 19th Century, agricultural wages were seven and sixpence (one third of a pound) per week. If currently an agricultural worker may take £10,000 after tax then that implies a wage inflation multiplier of 570. Further, a stipend for a clergyman was as low as £60 per year whereas an equivalent status job today may pay £15,000 to £30,000. That implies a wage inflation multiplier in the range 250 to 500. Hence our multiplier of 210 may be conservative. (As to the change between "the early part of the 19^{th} Century" and 1840-1850, the first reference shows that prices actually fell by circa 10%-20%. Hence, perhaps wages were then static).

5. It follows that an old penny in the 1840s would be worth circa 30 pence at 2005 **prices** (i.e. with 240 old pennies to the pound we have 1 old penny equal to 70 x 100/240 = 29 pence). Alternatively, in terms of wages we have one old penny worth at least 210 x 100/240 = 87 pence and possibly much more.

6. The implication is that a parliamentary fare of 1 old penny per mile would amount to between £10 and £15 for a return trip of 10 miles each way, in terms of today's wages, hardly a sum that a low paid worker could afford on a daily basis.

Appendix 3 Light Rapid Transit data

Data is from the 2004 Edition of TSGB and the DfT Light Rail Facts leaflet except the emboldened which are calculated. Prices are at the 2003 base. Add 10% to generate June 2006 values.

	Dock lands	Strath Clyde	Man chester	Tyne and Wear	Shef field	Centro	Croydon	Totals Av Ex Docklands
Capital costs 2003 prices £mn, see notes	1162	NA	359	739	302	159	212	1771
Operating costs to 31st March 2003 £mn	63.7	-	25.8	95.7	7.97	6.35	25.53	161
Capital cost per route km £(mn)	**43.04**	**-**	**9.21**	**9.47**	**10.41**	**7.95**	**7.57**	**9.13**
Annual cost of track £(mn) (see note)	**120.85**	**-**	**37.34**	**76.86**	**31.41**	**16.54**	**22.05**	**184.18**
Annual cost of rolling stock at £1.2mn per car	**14.55**	**6.35**	**4.95**	**10.84**	**3.87**	**2.48**	**3.72**	**25.85**
Total annual cost £(mn)	**199.1**	**-**	**68.09**	**183.4**	**43.25**	**25.37**	**51.3**	**371**
Costs minus receipts £(mn)	161.7	-	47.19	152	34.05	20.17	35.2	288.6
Subsidy per journey pence	333	-	250	401	277	395	183	309
Operating costs divided by receipts	1.7	-	1.23	3.05	0.87	1.22	1.59	1.94
Total annual cost divided by receipts	5.32	-	3.26	5.84	4.7	4.88	3.19	4.49
Receipts (£million) 2003/4	37.4	10.3	20.9	31.4	9.2	5.2	16.1	82.8
Journeys (million) 2003/4	48.5	13.3	18.9	37.9	12.3	5.1	19.2	93.4
Passenger-km (million) 2003/4	235.5	42.7	169.3	283.9	42	53.5	105	653.7
Train-km (million) 2003/4	3.4	1.1	4.6	5.8	2.5	1.7	2.5	17.1
Stations/Stops 2003/4	34	15	37	58	48	23	38	204
Seats 2003/4		1,508	2752	6120	2200	832	1680	13584
Rail cars	94	41	32	70	25	16	24	167
Route-km	27	11	39	78	29	20	28	194
Cars per train	3	2	2	NA	1	2	2	NA
Staff as at 2001	405	NA	303	710	272	147	186	1618
Staff per car	**4.3**	**-**	**10**	**10.1**	**10.9**	**9.2**	**7.8**	**9.7**
Av. journey length km	**4.9**	**3.2**	**9**	**7.5**	**3.4**	**10.5**	**5.5**	**7**
Passengers per train	**69.3**	**38.8**	**36.8**	**48.9**	**16.8**	**31.5**	**42**	**38.2**
Passengers per car	**23**	**NA**	**18**	**NA**	**16**	**16**	**21**	**NA**
Capital costs 2003 prices £mn, see notes	597	266	297	249	99	183	257	231
Operating costs to 31st March 2003 £mn	0.79	0.73	1.05	1.34	0.6	0.87	0.74	0.95

Notes:

(1) The annual cost of track capital is based on repayment over 30 years at the Treasury discount rate of 3.5%, (providing a multiplier of 0.054 on capital) plus maintenance at 5% of capital providing a combined multiplier of 0.104.

(2) The annual cost of rolling stock is again based on a 30 year life and 3.5% interest rate but with maintenance set to 7.5% of capital providing a combined multiplier of 0129.

(3) Outturn prices have been converted to the 2003 base using the Retail Prices Index.

(4) Docklands: Capital costs: £77 million in 1987, £294 million in 1991, £280 million in 1994, £250m in 1999, a total of £901 million at outrun prices or £1162 at 2003 prices.

(5) Croydon Tram link: Opened May 2000 at a construction cost of £200 million, providing £212 million at 2003 prices.

(6) Midland Metro: Opened 1999 at a construction cost of £145 million providing £159 million at 2003 prices.

(7) Manchester Metro link: Opened 1992 at a construction cost of £140 million, Extended in 2000 at a cost of £160 million, providing a total of £359 million at 2003 prices.