

FOCUS ON FREIGHT





Focus on Freight

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Introduction

Focus on Freight is the first in an occasional series, designed to bring together information about the freight and logistics industry in Britain. The aim is to present data on aspects of the situation in the freight sector in a way which draws out the main messages in a readily understandable form. In the main, the presentation relies on charts, supplemented by tables to provide additional detail where necessary. While *Focus on Freight* has been compiled largely by the staff of Transport Statistics Freight division, using material previously published in *Transport Statistics Great Britain*, it includes data drawn from a number of sources where this has been helpful in providing a fuller picture of the freight sector. A notable example is the data in the 'Maintaining Standards' section, provided by the Vehicle Inspectorate, the Maritime and Coastguard Agency and the Civil Aviation Authority.

No definitive set of statistical indicators, either for transport as a whole or for the freight sector in particular, has yet been developed. The indicators chosen for inclusion here are intended to allow future initiatives and policies to be monitored but this list is no more than a starting point and comments on the choice of indicators and suggestions for improvements or additions will be very welcome.

Staff in Transport Statistics Freight division are able to provide many more statistics than those included in this publication. Many of these are available in more specialist publications. Also, a wealth of unpublished material is available on request, as is a service (subject to the availability of resources and confidentiality constraints) providing customised analyses for clients. Potential customers can be provided with advance quotations for charges where necessary. Details of these services may be obtained from the address below or the various contact points given in the publication.

Any suggestions you have to improve the relevance and usefulness of *Focus on Freight* will be gratefully received. Please write to:

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Note: all tables and charts in Focus on Freight refer to Great Britain unless otherwise stated.

Overview of freight transport

Freight transport is an essential element of any national economy and indeed of the world economy. An efficient freight transport sector makes a major contribution to competitiveness while an inefficient one can stifle development. Even so, the movement of goods, and in some cases services, is not an unmixed blessing. There is a price to pay in terms of congestion, accidents and pollution.

This new publication attempts to paint a picture of the state of the UK's freight transport sector as it stands today, considering trends over the last ten years or so with a longer perspective where this is helpful. It covers all the main modes of transport (road, rail, water, pipeline and air) both from a domestic perspective and an international one as far as possible. It covers not only the development of freight transport itself but also its wider impact as outlined above.

Significant features to emerge are.

- The economy is not becoming more freight intensive, all modes included, measured in tonne kilometre terms. (*Chart 1*).
- Road freight intensity as measured by Heavy Goods Vehicle (HGV) miles has tended to decline in relation to GDP since the mid 1960s. (*Chart 4*).
- Nevertheless, road's freight share has increased in petroleum, coal and coke traffic and the broadly defined 'other' group. Water has maintained its dominance in movements of petroleum products. (*Chart 8, Chart 9 and Chart 10*).
- Within the road freight sector, there has been a significant shift to the use of larger, articulated vehicles even though rigid HGVs remain dominant in numbers of registrations, with a long 'tail' of older rigid vehicles. (*Chart 11, Chart 12, Chart 13 and Chart 14*).
- While still remaining a major problem, the number of deaths in accidents involving HGVs has fallen from around 900 a year in 1986 to under 600 in 1996. A high level of disregard of speed limits by goods vehicles (particularly the 30 mph limit in urban areas) may suggest potential to improve this record still further. (*Chart 15 and Chart 16*).
- On the measure of tonne kilometres of freight moved per tonne of oil equivalent consumed, HGV operators appear to have achieved some improvement in energy efficiency by the switch to more efficient, larger vehicles. (*Chart 19*).
- Total NO_x and particulate emissions from transport are forecast to reduce substantially. But within the falling total, HGVs' share of NO_x is forecast to rise over the period up to 2025. (*Chart 20*).
- In international freight, the main features have been the emergence of rail with the opening of the Channel Tunnel and the steady increases in air freight volumes and in unitised traffic (containers, lorries etc) through the ports. (*Chart 24, Chart 25 and Chart 26*)

Section 1 Domestic freight

1.1 Long term trends - freight transport

Since the early 1950s, the growth in freight transport as measured in tonne kilometres for all modes has been broadly the same as that of GDP. Chart1 shows three distinct periods:

- 1953 to 1975 when the growth in tonne kilometres was substantially slower than GDP.
- 1975 to 1979 when the start of North Sea oil production created a major new demand for transport, clearly reflected in the water transport figures.
- 1979 to 1996 when the earlier declining trend in freight tonne kilometres in relation to GDP re-emerges.

Overall, it seems clear that the 'freight intensity' of GDP measured in terms tonne kilometres has been on a declining trend since 1953 if the emergence of North Sea oil production is discounted.

Nevertheless, in absolute terms, the rapid and continuing growth of road freight has

Chart 1 Index of freight intensity of GDP

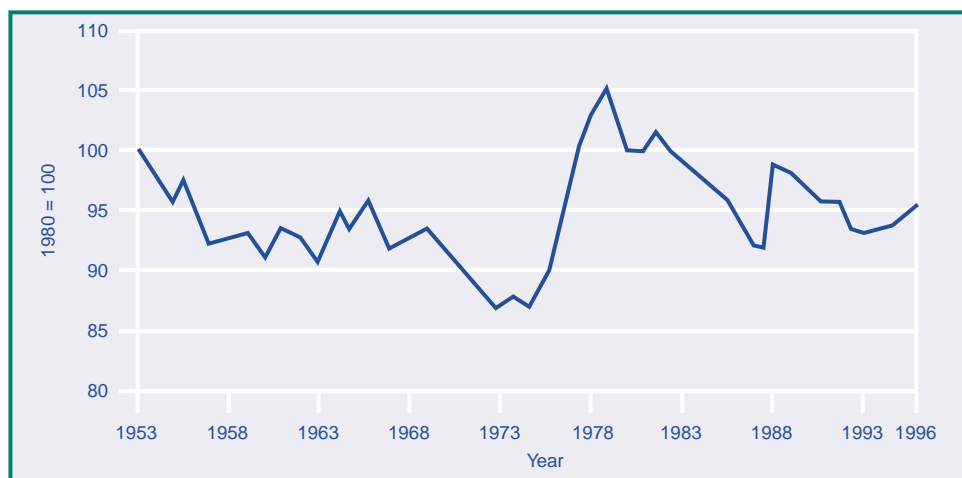
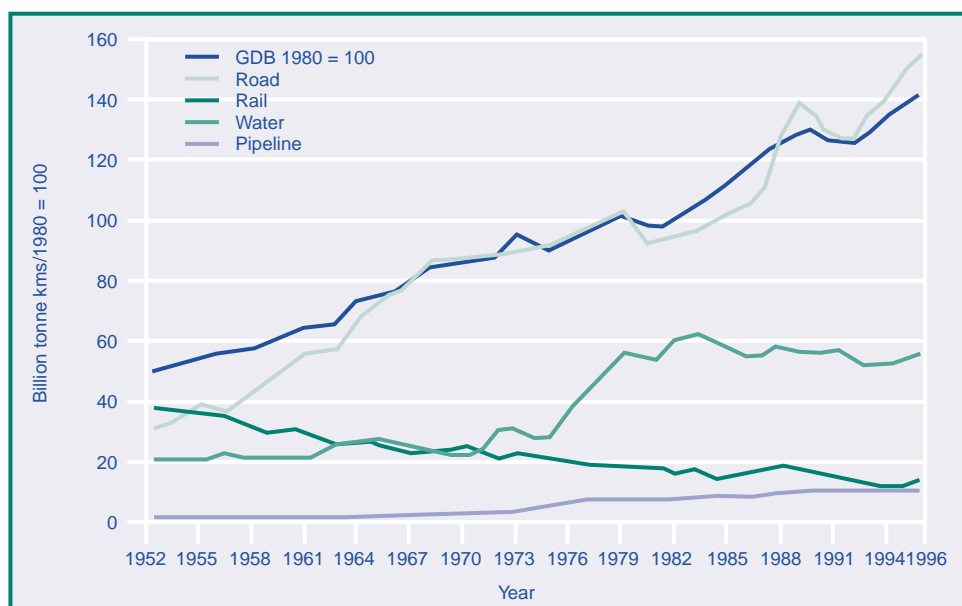
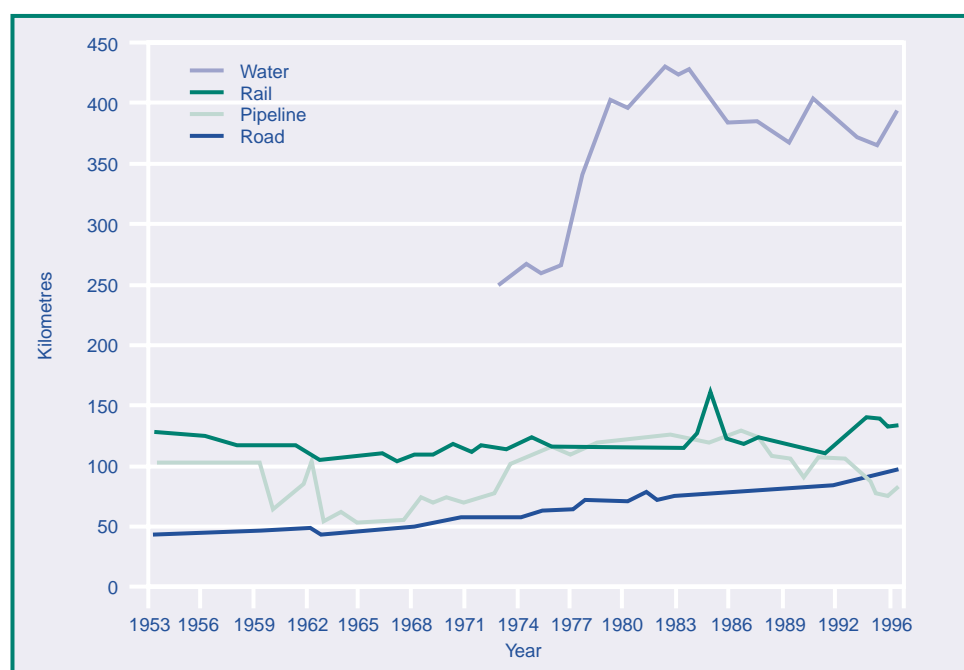


Chart 2 Longer term trends in freight transport - goods moved



been the dominant feature of development over the same period. In 1952, freight moved by road was less than that for rail alone. By the mid 1960s, road accounted for more than half of all freight moved. Its dominance has increased in more recent years and road represented two thirds of all freight traffic in 1996. It is clear that the economy has become much more dependent on road freight. Among the reasons for this are changes in the mix of commodities carried and the flexibility, efficiency and adaptability of the road haulage industry. It also reflects the major investment in the roads infrastructure undertaken in the last 45 years, although the trend towards road was apparent before the main road building programme began. Rail has also received substantial levels of investment but its share of goods moved has fallen from a leading position in the early 50s to a minor six per cent in 1996. Water transport rose significantly at the end of the 70s as the North Sea oil fields came on stream. Otherwise, its contribution has been relatively stable. In 1996, water accounted for nearly a quarter of freight traffic, much the same as in 1952. Inland pipeline movements, largely aviation fuel to airports but excluding gas and water, have grown from virtually zero in the early 1950s to around five per cent of the total in 1996.

Chart 3 Long term trend in average length of haul



One major feature of the rise of road freight has been the increase in the average length of haul over which goods have been carried by road. Chart 3 shows the trends in this measure for all the major modes. As can be seen, the average length of haul by road has increased from under 50 kilometres in 1953 to around 90 kilometres in 1996. The figure for rail has fluctuated between 100 to 150 kilometres over the whole period, except in 1984, a year when rail was affected by industrial action in the coal industry. For water, figures are only available from 1972 and these show a large rise from 250 kilometres then to around 400 kilometres currently. This shift is associated with the start of oil production in the North Sea and the related transport requirement which includes the transport of oil from the production fields to a UK port and possible onward movement.

Chart 4 and Table 1 shows the trend in an index of HGV vehicle mileage per unit of GDP. An increase shows the *road transport intensity* of GDP growing in HGV

mileage terms. After reaching a peak in 1964, road transport intensity has tended to decline although with substantial variation about the falling trend in recent years associated with economic cycles in the economy at large.

Chart 4 HGV mileage intensity of GDP

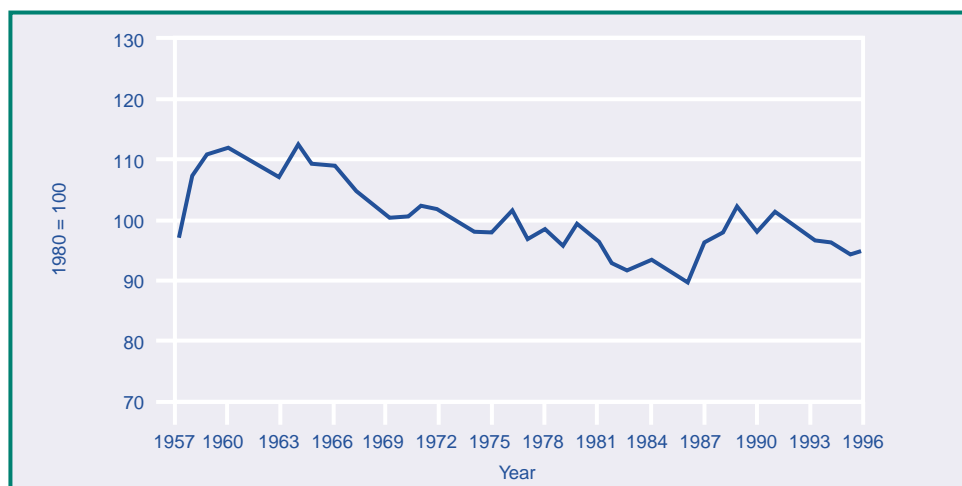


Table 1 Long term trends in freight

	Index of freight intensity of GDP ¹		Goods moved (Billion tonne kms)				Index of HGV mileage intensity 1980=100
	1980=100	1980=100	Road	Rail	Water	Pipeline ²	
1953	49	100	32	37	20	-	..
1956	55	97	38	35	22	-	..
1961	62	94	53	29	22	1	110
1966	74	95	73	24	26	2	109
1971	84	90	86	22	22	4	103
1976	92	90	96	21	30	6	101
1981	100	94	18	53	9	97	
1986	111	93	105	17	55	10	91
1991	130	96	130	15	58	11	101
1996	139	96	154	15 ³	56	13	95

¹ An increase in the index means that goods moved by all modes as measured by tonne kilometres are increasing faster than GDP.
² Oil pipelines only (excluding offshore pipelines)
³ Financial year figure

1.2 Recent trends

The charts and table in this section exclude ‘one port’ traffic (aggregate dredging, waste dumping, off-shore oil installation traffic etc) from waterborne freight.

Between 1986 and 1996, road freight increased its dominance both in terms of freight moved (*Chart 5*) and in terms of tonnes lifted (*Chart 6*). The rise in road freight was more substantial for freight moved, reaching over 150 billion tonne kilometres, but there were also rises for water and pipeline transport. Rail freight moved declined between the two years. As *Chart 6* shows, the picture for freight lifted was different; the rise in road freight was more modest while water freight was little changed. Pipeline tonnage rose substantially. These differences are accounted for by the change to the average length of haul (*Chart 7*). For water, which has by far the longest haul, it rose to around 500 kilometres in 1996 (*see note above*). Rail (126 kilometres in 1996) and road (89 kilometres) also showed increases while the average length of haul for pipeline decreased to 78 kilometres, the shortest distance for any of the modes.

Table 2 also shows the impact of the rapid growth in road freight on the share of total freight moved. Between 1986 and 1996, the road share has increased from 60 per cent to 68 per cent. Water’s share fell from 24 per cent to 20 per cent and

Chart 5 Freight moved by mode

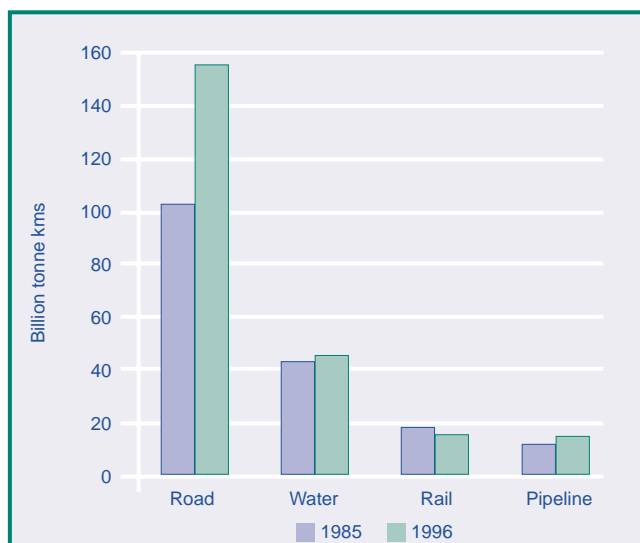


Chart 6 Freight lifted by mode

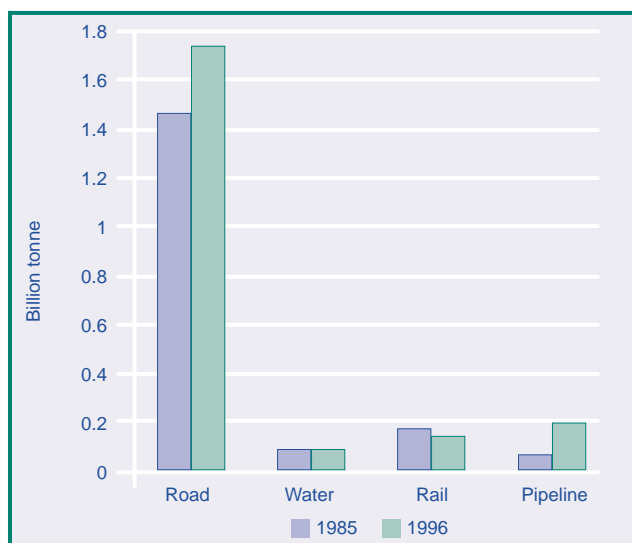


Chart 7 Average length of haul

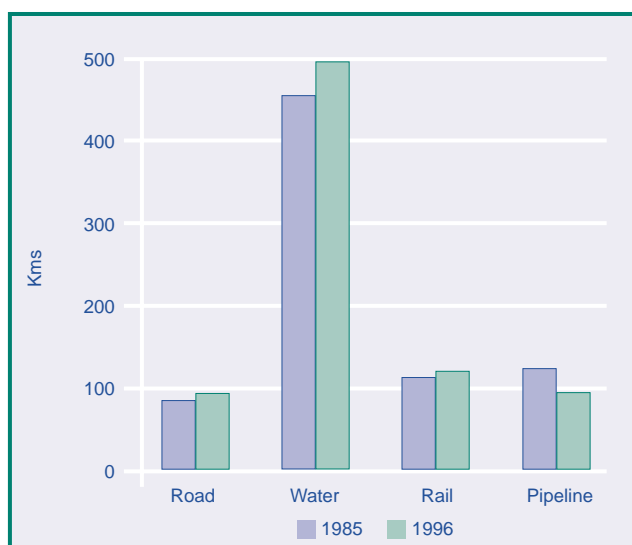


Table 2 Trends in freight traffic 1986/1996

	Freight lifted		Freight moved				Average haul	
	(Millions tonnes)		Billion tonne-kms		Per cent		(Kms)	
	1986	1996	1986	1996	1986	1996	1986	1996
Road	1,473	1,730	105	154	60	68	72	89
Rail	140	100	17	15	10	6	119	126
Water	93	93	42	46	24	20	451	499
Pipeline	79	171	10	13	6	6	132	78

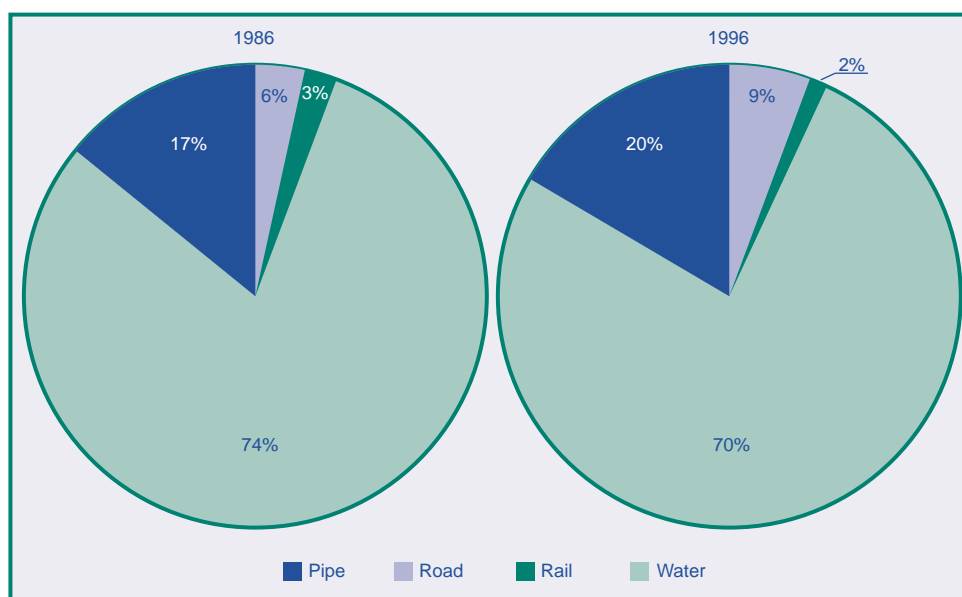
rail's from ten per cent to six per cent. Pipeline, in contrast, maintained its share at six per cent in both years, the large increase in tonnage outweighing the fall in average length of haul.

Domestic air freight, while of growing importance, remains too small in tonnage terms to be shown on the charts in this section.

1.3 Freight commodities moved by mode

- Chart 8 shows that over the last ten years water transport has dominated movements of *petroleum products*, being responsible for over two thirds of the traffic.
- Much of this is accounted for by the transport of North Sea oil shipments.
- Even so, road and pipelines have gained market share in that period, road's share rising from six per cent in 1986 to nine per cent in 1996.
- Table 3 shows that the total level of oil movements rose from 62 billion tonne kms in 1986 to 67 billion tonne kilometres in 1996.
- In contrast, *coal and coke* movements declined from 12.5 billion tonne kilometres to 6.9 billion tonne kilometres between 1986 and 1996.

Chart 8 Petroleum: tonnes moved: modal shares



Note: Excludes North Sea pipelines.

Table 3 Commodity traffic by mode

Year	Per cent				Billion tonne kms: total
	Road	Rail	Water	Pipeline	
Petroleum Products					
1986	6	3	74	17	62.2
1996	9	2	70	20	67.4
Coal and Coke					
1986	30	41	30		12.5
1996	36	55	9		6.9
Other Products					
1986	87	8	5		112.5
1996	89	6	5		164.0

- As Chart 9 shows, much of the fall occurred in movements by water, where the share declined from 30 per cent in 1986 to nine per cent in 1996.
- As a result, rail's share of the total rose from 41 per cent in 1986 to 55 per cent in 1996.
- Road's share also increased from 30 per cent in 1986 to 36 per cent in 1996.
- *Other freight commodities* make up more than two thirds of freight transport.
- Total tonnage moved increased by 46 per cent from 113 billion tonne kilometres in 1986 to 164 billion tonne kilometres in 1996.

Chart 9 Coal and coke tonnes moved: modal shares

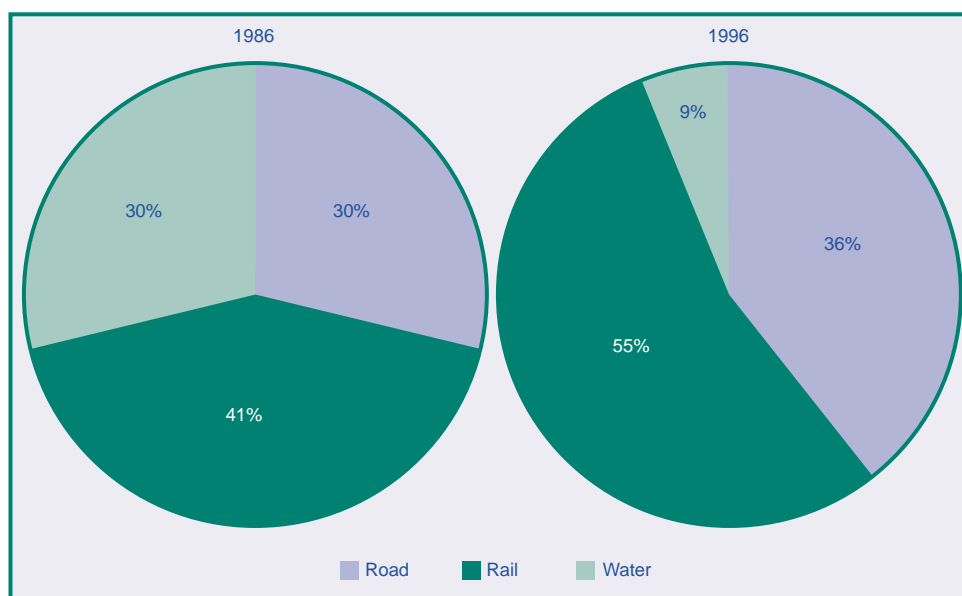
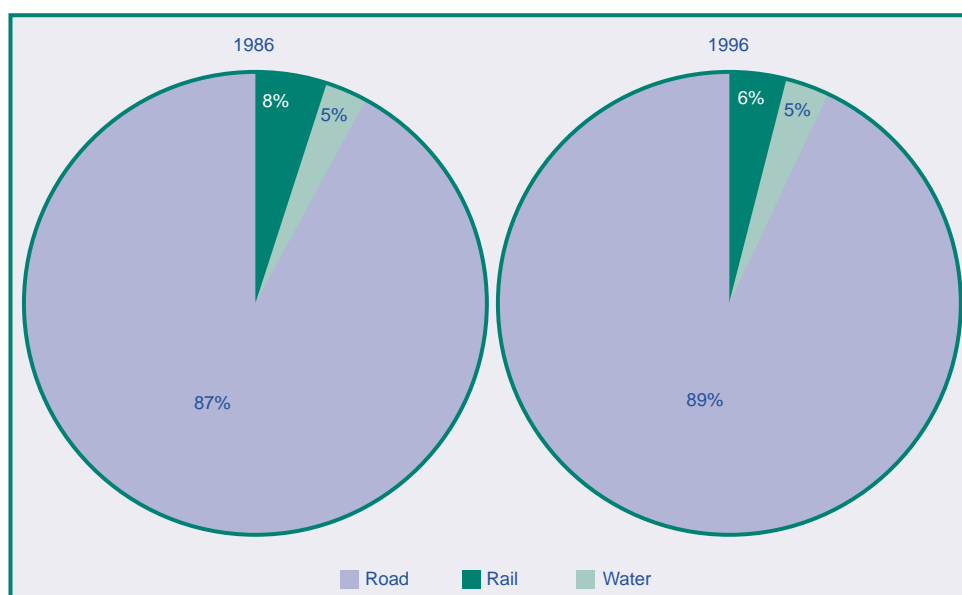


Chart 10 Other freight tonnes moved: modal shares



- Road dominated throughout the period, taking 87 per cent of the total in 1986 and 89 per cent in 1996 as Chart 10 indicates.
- Rail's share dropped from eight per cent in 1986 to six per cent in 1996.
- Water maintained a five per cent share in both years.

1.4 Road freight by heavy goods vehicle class

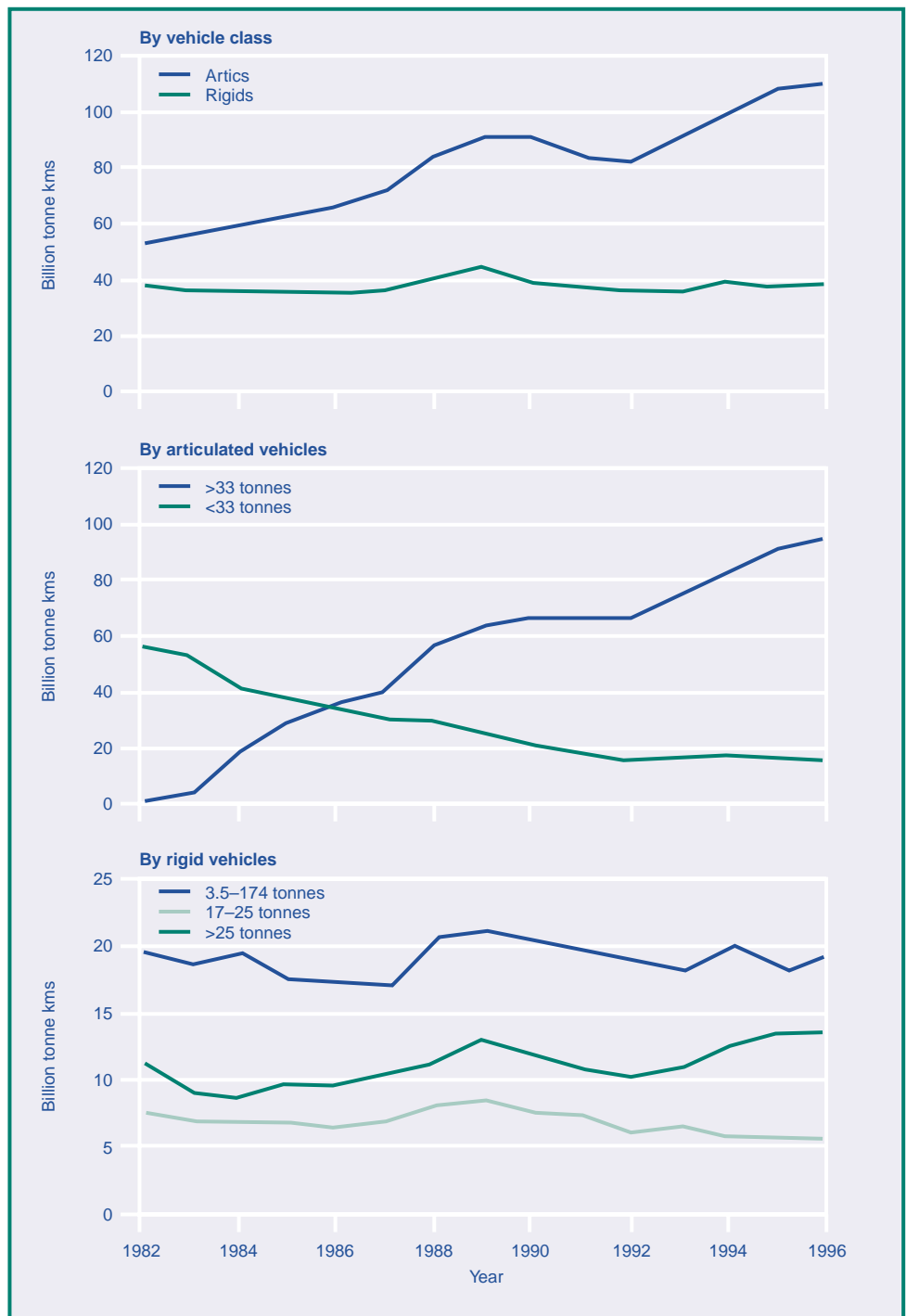
As the previous sections have shown, road freight has become the dominant form of transport in the domestic market. As a result, the effectiveness and the efficiency of the UK economy has come to depend to a significant extent on the effectiveness and efficiency of the road freight industry. This section examines some of the detail behind the broad picture.

In terms of freight overall:

- Road accounts for 68 per cent of total freight *moved* (tonne-kilometres) and 83 per cent of total tonnes *lifted* (tonnes).

- Ninety-five per cent of road freight is transported by heavy goods vehicles, that is, goods vehicles over 3.5 tonnes gross vehicle weight. Gross vehicle weight is the maximum possible weight of the vehicle and its load.
- Since 1982, articulated vehicles have accounted for all the growth in freight moved.
- Within the articulated class, larger vehicles of over 33 tonnes have more than accounted for this trend, with the amount moved by smaller vehicles falling in absolute terms.
- For rigid vehicles, the shares of the broadly stable total moved in favour of the larger vehicles (over 25 tonnes) at the expense of the middle range (17 -25 tonnes).
- The amount of freight moved by the smaller rigid vehicles (3.5-17 tonnes) remained relatively stable.

Chart 11 Freight moved



1.5 Road freight: heavy goods vehicles

In terms of total vehicle registrations:

- Rigid HGVs account for some three quarters of all HGV registrations.
- The numbers of rigid HGVs registered have declined to a little over 300 thousand at the end of 1997.
- Articulated HGV registrations have risen, reaching over 100 thousand at the end of 1997.

Chart 12 HGV registrations

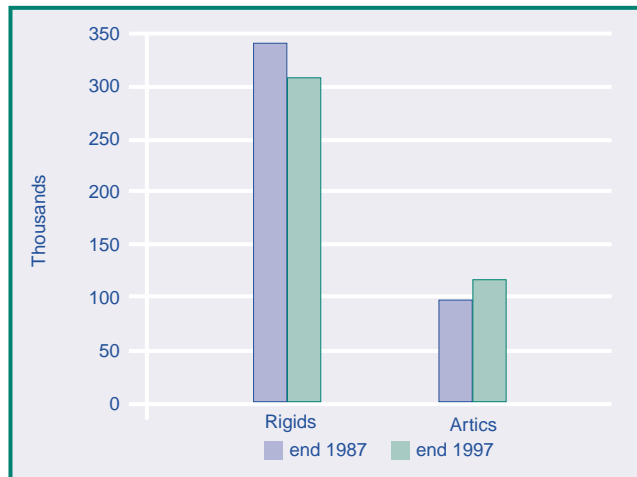
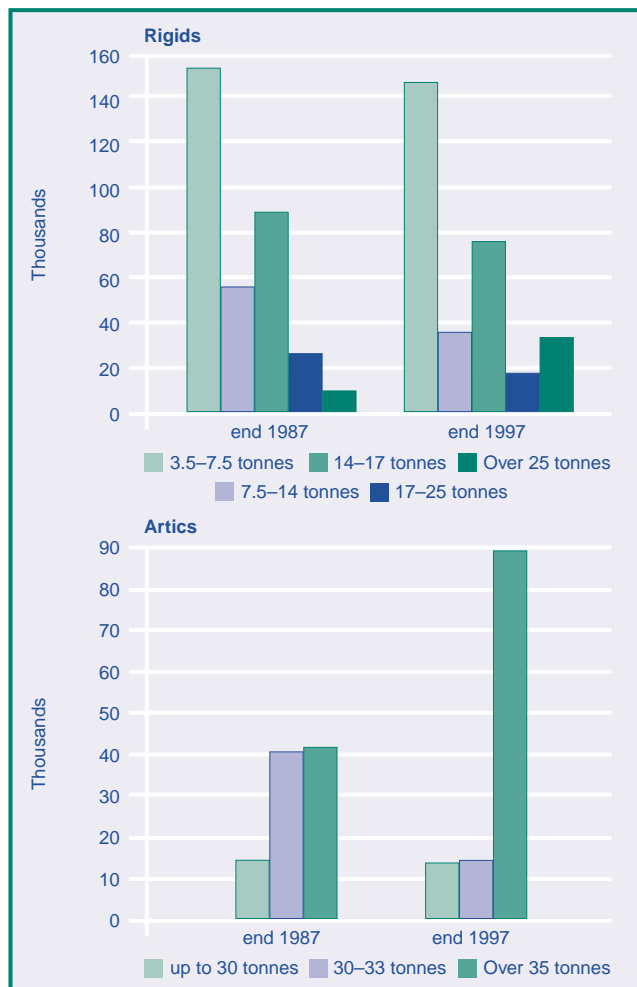


Chart 13 HGV registrations by size



- Within the rigid HGV group, registrations of all gross vehicle weights have declined between 1987 and 1997 except the very largest category, 'Over 25 tonnes'.
- Registrations within this latter category rose from around ten thousand at the end of 1987 to over 30 thousand at the end of 1997.
- For articulated HGVs, registrations in the very largest category, 'Over 33 tonnes', increased from around 40 thousand at the end of 1987 to around 90 thousand at the end of 1997.
- In the intermediate range, '30-33 tonnes', there was a decline over the ten years from around 40 thousand to some 15 thousand.
- The smallest group, 'Up to 30 tonnes', was little changed at around 12-13 thousand.

Chart 14 shows the age of the fleet registered at the end of 1997.

- The average age of articulated vehicles is five years.
- The average age of rigid vehicles is six years and seven months.
- For articulated HGVs, the distribution by age is relatively uniform, with most registrations in the five to ten years age group.
- Twenty thousand articulated vehicles are over ten years old.
- For rigid HGVs, around 90 thousand vehicles were first registered more than ten years ago and another 90 thousand fall in the five to ten years age group.

Chart 14 HGV: age of fleet

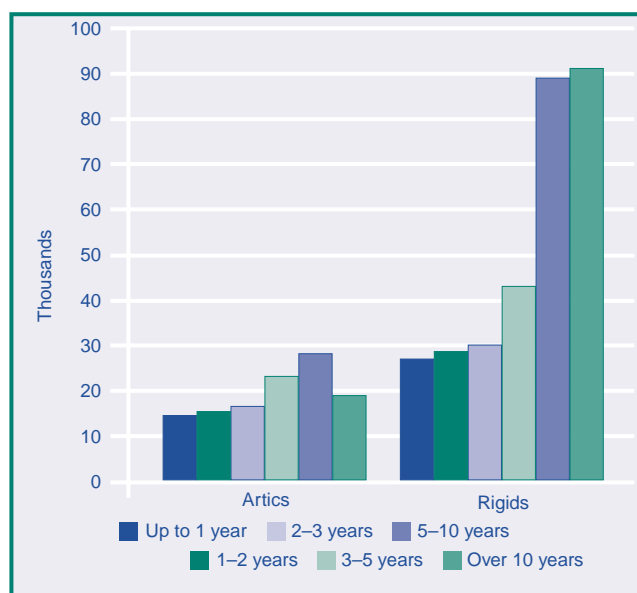


Table 4 Age distribution of HGV fleet 1: January 1998

	Articulated vehicles		Rigid vehicles	
	'000s	%	'000s	%
1945-1988	19	16	91	30
1989	9	8	31	10
1990	7	6	24	8
1991	5	5	17	5
1992	7	6	17	5
1993 ²	10	8	20	6
1994	13	11	25	8
1995	17	14	29	9
1996 ³	16	14	28	9
1997	15	13	27	9
Total	117	100	309	100

¹ Excludes trailers

² Euro I from 1 October 1993

³ Euro 2 from 1 October 1996.

1.6 Road safety: goods vehicle speeds

- Deaths in accidents involving HGVs over the period since 1986 reached a peak of around a thousand in 1989.

Chart 15 Deaths in accidents involving HGVs

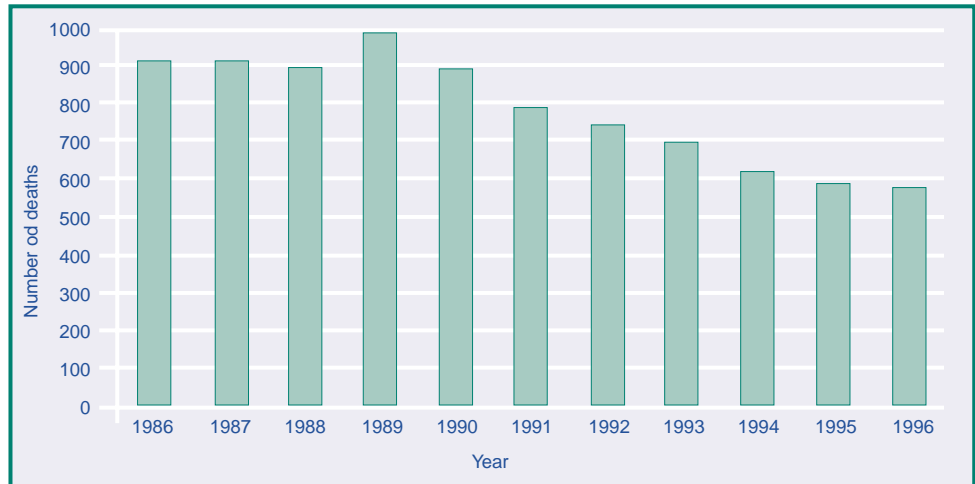
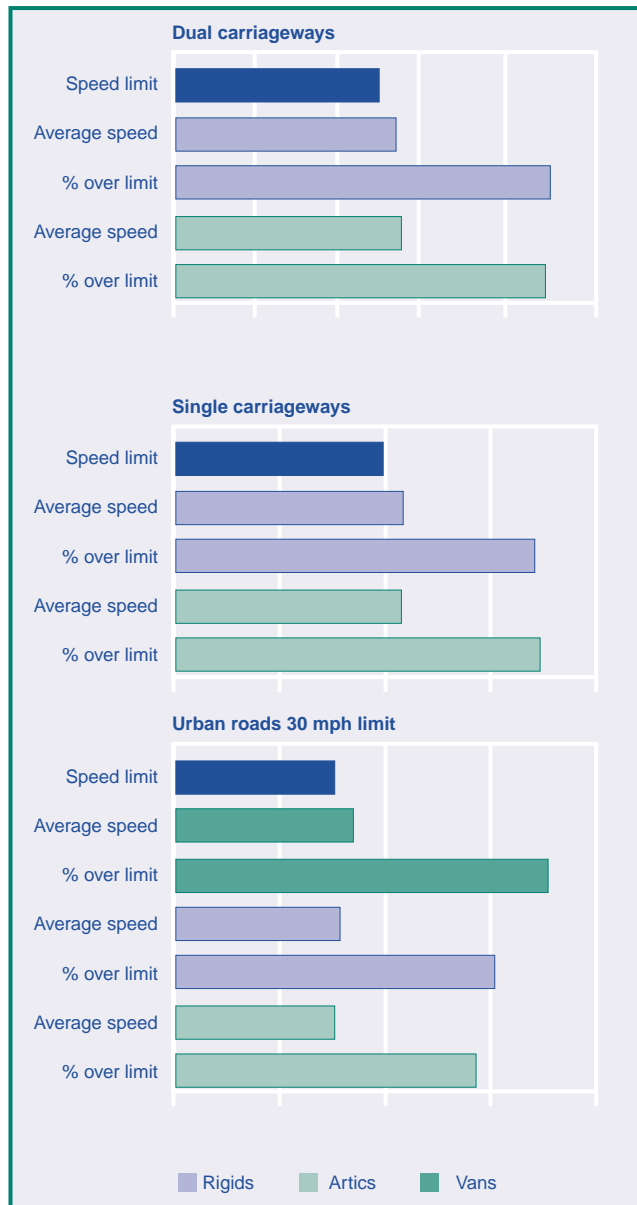


Chart 16 HGVs and speed limits 1996



- Since then, the number has declined steadily to below 600 in both 1995 and 1996, despite the increase in HGV vehicle miles.

*Note: the figures do **not** represent deaths in accidents **caused** by HGVs (such accidents are included in the total) ; statistics on causation are not available.*

- Although most lorries are fitted with speed governors which limit their maximum speed to 56 mph, 11 per cent were observed to exceed 60 mph on motorways in 1996. Thirty-nine per cent of vans exceeded their 70 mph speed limit.
- Nearly 90 per cent of lorries on dual carriageways exceed the 50 mph speed limit. Indeed their average speed is above the speed limit. Thirty-two per cent of vans exceeded their 70 mph speed limit.
- About 70 per cent of lorries exceed the 40 mph speed limit on non-urban single carriageway roads. Eight per cent of vans exceeded their 60 mph speed limit on such roads.
- On urban roads where a 30 mph speed limit is in force, nearly 60 per cent of lorries and 70 per cent of vans exceed the limit.
- On urban roads where the limit is set at 40 mph, a smaller proportion of vehicles exceed this limit – 15 per cent of rigid vehicles, 11 per cent of articulated vehicles and 22 per cent of vans.

Table 5 Percentage of goods vehicles exceeding the speed limit: 1996

	Speed limit (mph) ²	Rigid vehicles ¹		Rigid/articulated vehicles		Vans	
		Average speed (mph)	% over limit	Average speed (mph)	%over limit	Average speed (mph)	% over limit
a) Non-urban roads							
Motorways	60	55	11	55	11	66	39
Dual carriageways	50	55	88	54	89	65	32
Single carriageways	40	44	69	44	70	46	8
b) Urban roads							
30 mph limit roads	30	31	60	30	55	33	70
40 mph roads	40	34	15	32	11	35	22

¹ Excluded are two axle rigids on non-urban roads

² Except for van, on non-urban roads

1.7 Road freight: efficiency

Three possible measures of the efficiency of the road freight industry are shown here:

- *Lading factor*: this is the ratio between the maximum tonne kilometres available (vehicle mileage by maximum capacity) to actual tonne kilometres. Since 1986, lading has varied between 60 to 65 per cent, rising and falling with the state of the economy.
- *Empty running*: throughout the period from 1986 to 1996, empty running has remained very close to 30 per cent and well within the margin of accuracy of the sample survey figures.
- *Average payload*: this measure represents the average load of a random selection of loaded HGVs. For all vehicles, the average payload increased from less than 8.5 tonnes in 1986 to over nine tonnes in 1996. Within each of the two groups

Chart 17 Road freight efficiency

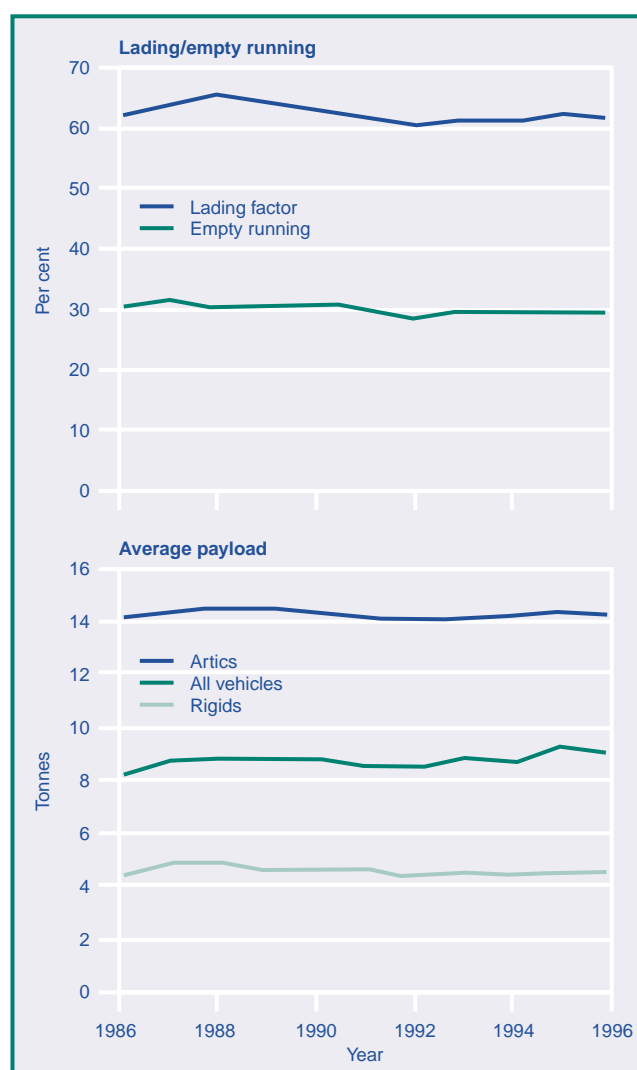


Table 6 Road freight 'efficiency' indicators

	Empty running %			Lading factor ¹ %			Average payload ² tonnes		
	Rigids	Artics	All vehicles	Rigids	Artics	All vehicles	Rigids	Artics	All vehicles
1986	31	29	30	57	67	63	4.6	14.3	8.4
1987	32	29	31	58	68	64	4.9	14.6	8.8
1988	31	29	30	59	68	65	4.9	14.7	8.9
1989	31	29	30	57	67	64	4.7	14.7	8.8
1990	31	28	30	58	66	63	4.7	14.5	8.8
1991	30	28	29	56	65	62	4.6	14.2	8.6
1992	29	27	28	55	64	61	4.4	14.0	8.5
1993	30	28	29	55	65	62	4.5	14.2	8.8
1994	29	28	29	55	65	62	4.4	14.2	8.7
1995	30	28	29	56	66	63	4.5	14.4	9.2
1996	30	28	29	56	65	63	4.5	14.3	9.1

¹ The ratio of the actual goods moved to the maximum tonne kilometres achievable if the vehicles, whenever loaded, were loaded to their maximum carrying capacity.

² Derived by dividing total tonne kilometres by total loaded vehicle kilometres.

(artics and rigids), there was little change in average payload over the ten years. The overall increase therefore reflected more use of heavier, articulated vehicles.

- The overall average length of haul by road has risen each year between 1980 and 1996, from 68 kilometres in 1980 to 90 kilometres in 1996.
- The average lengths of haul for the three lightest categories of rigid goods vehicle have increased but, for other types of goods vehicles, the average lengths of haul

have remained very steady over the period shown in the table below. However, the overall average length of haul has risen because the proportion of freight carried by 38 tonne articulated vehicles (introduced in 1983) has increased.

Table 7 Average length of haul: 1980,1988-1996

	Kilometres								
	Rigid vehicles				Articulated vehicles				
	Over 3.5t to 7.5t	Over 7.5t to 17t	Over 17t to 25t	Over 25t	All rigids	Over 3.5T to 33t	Over 33t	All artics	All vehicles
1980	42	49	33	45	43	117	*	117	68
1988	52	52	30	36	41	109	137	125	76
1989	54	55	30	36	42	112	140	130	78
1990	57	58	29	38	43	112	135	129	79
1991	60	61	30	39	45	113	140	133	83
1992	56	62	30	38	44	118	135	132	83
1993	55	59	31	37	44	115	140	135	84
1994	58	64	30	37	45	119	137	133	86
1995	57	65	34	36	45	115	142	137	89
1996	59	65	40	36	47	115	136	133	90

1.8 Road freight traffic forecasts

- Despite some slow down in recent years, the Department’s forecast is for further strong growth in goods vehicle traffic, especially vans and articulated HGVs.
- Rigid HGV traffic, while still projected to grow, is much less buoyant than for the other two categories.
- The outcome is a projection that articulated HGV traffic will overtake rigid traffic before 2030.
- Forecasts cannot be made with certainty and are therefore expressed as a range in Table 9.
- The traffic forecasts are based on an expectation of continued economic growth leading to increased demand for freight transport.

Chart 18 Goods vehicle traffic forecasts

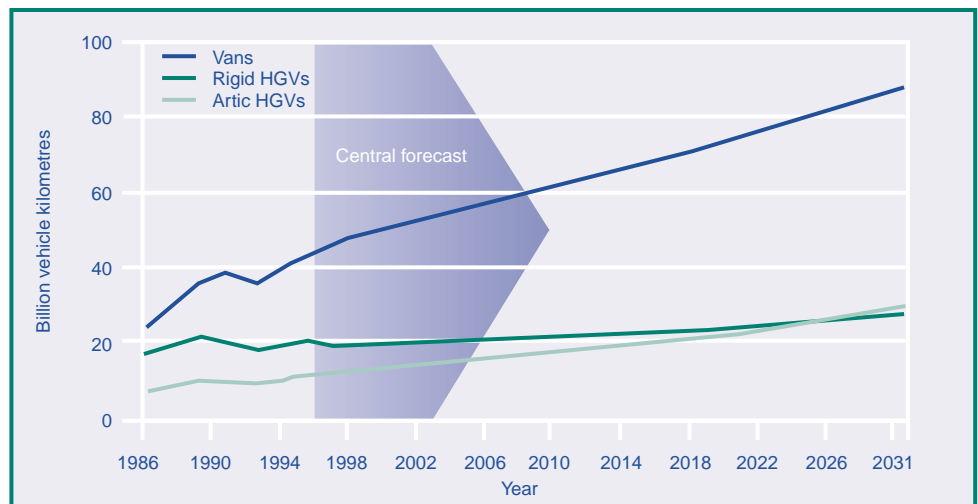


Table 8 Goods vehicle traffic

	Billion vehicle kilometres		
	Vans ¹	HGVs	
		Rigid	Artic
1986	26.5	16.3	7.3
1987	29.0	17.7	8.4
1988	32.0	18.7	9.3
1989	35.4	19.6	10.2
1990	35.7	19.1	10.0
1991	37.2	19.0	10.0
1992	36.7	18.6	9.6
1993	36.5	18.7	9.7
1994	38.3	19.1	10.4
1995	39.1	19.1	10.7
1996	40.4	19.0	11.7

¹ Commercial vehicles less than 3.5 tonnes gross vehicle weight.

Table 9 Goods vehicle traffic forecasts

	Vans			Rigid HGVs			Artic HGVs		
	Low	Cen ¹	High	Low	Cen ¹	High	Low	Cen ¹	High
1996 (bn kms)	40.4			19.0			11.7		
1996 = 100	100			100			100		
2001	109	115	121	98	104	109	108	14	120
2006	120	129	138	100	108	115	120	129	138
2011	131	144	156	103	112	122	133	146	158
2016	145	161	177	106	117	129	148	165	181
2021	158	179	200	109	123	137	164	186	207
2026	172	198	225	112	129	146	180	208	235
2031	185	218	251	115	136	156	196	231	265

¹ Central most likely forecast.

1.9 Energy consumption

- For rail and air transport, it is not possible to distinguish between energy consumed by freight transport and energy consumed by passenger transport. However for road transport it is possible to show separately energy consumption by lorries and by other vehicles.
- In 1996, all modes of transport, including passenger transport, consumed 53 million tonnes of oil equivalent; heavy goods vehicles accounting for about eight million tonnes.
- In 1986, the corresponding consumption figure was 41 million tonnes of oil equivalent. Of this, some six million tonnes was used by heavy goods vehicles.
- Total energy consumption by HGVs was 37 per cent greater in 1996 than in 1986.
- HGVs averaged a little over 3000 kilometres per tonne of oil equivalent over the period from 1986 to 1996, with evidence of a declining trend, possibly reflecting the shift to larger articulated vehicles.
- Freight moved per tonne of oil has increased from a little under 18.5 thousand tonne kilometres in 1986 to around 19.5 with a slowly rising trend largely masked by substantial variation over the economic cycle.

Chart 19 HGV oil consumption

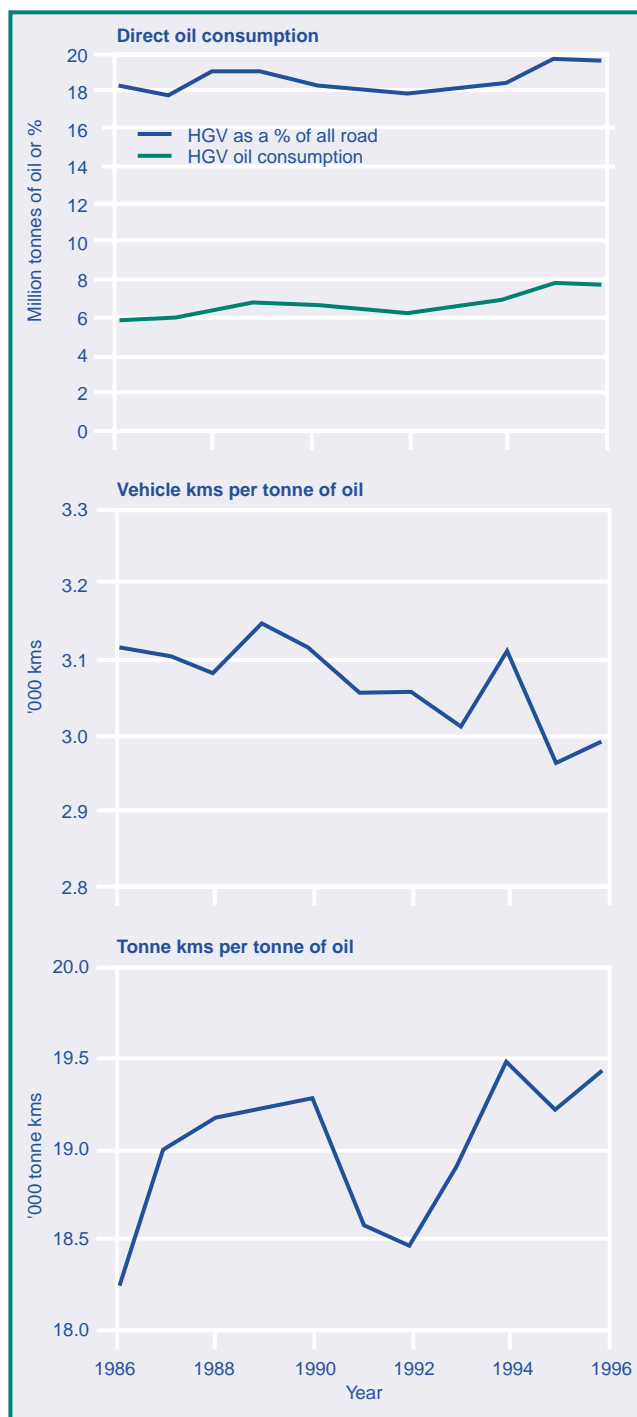


Table 10 Energy consumption by HGVs

	Million tonnes of oil equivalent				'000		
	All modes ¹	HGVs	Other road	Total road	HGVs as % of road	Vehicles kms/ tonne of oil	Tonne kms/ tonne of oil
1986	41	6	25	31	18	3.1	18.2
1987	43	6	26	32	18	3.1	19.0
1988	45	7	28	34	19	3.1	19.2
1989	47	7	29	36	19	3.1	19.2
1990	49	7	30	37	18	3.1	19.3
1991	48	7	30	37	18	3.1	18.6
1992	49	7	31	37	18	3.0	18.4
1993	50	7	30	37	18	3.0	18.9
1994	51	7	31	38	19	3.1	19.5
1995	51	8	31	38	20	3.0	19.2
1996	53	8	31	39	20	3.2	19.4

¹ United Kingdom.

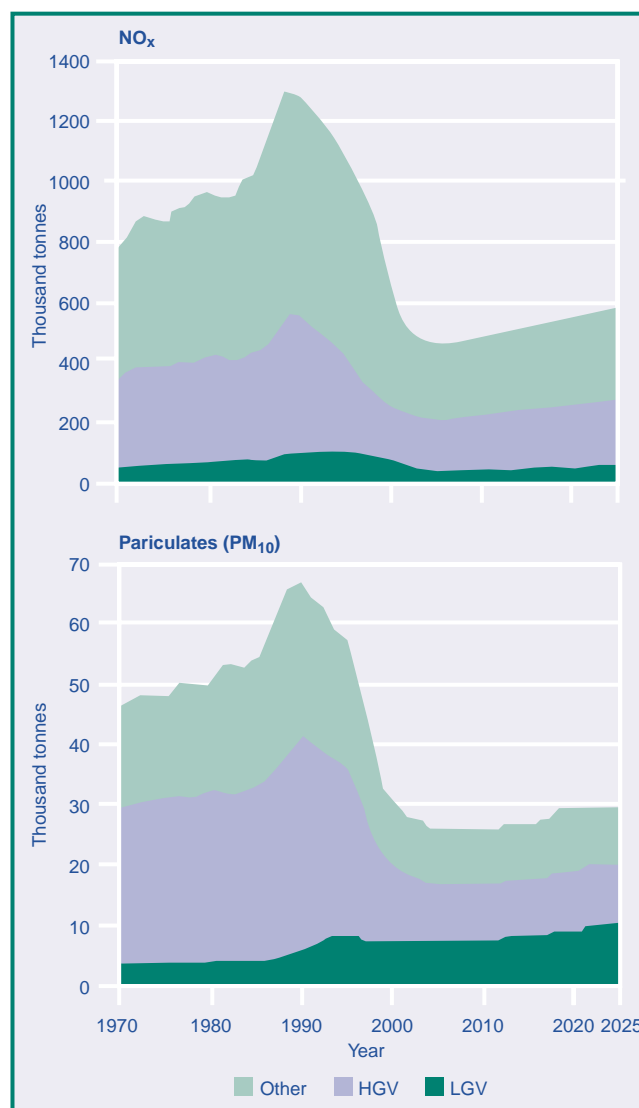
1.10 Pollutant emissions: United Kingdom

Chart 20 and Table 11 show emissions of pollutants for vans and Heavy Goods Vehicles (HGV) for the period 1970-1995, with forecasts up to 2025. The data was obtained from AEA Technology plc (National Environmental Technology Centre). For the other modes of transport, no data specifically related to freight transport is available.

- Nitrogen oxides: From 1975 to 1990 emissions of this pollutant rose both for goods vehicles and in total. Since then, emissions have fallen steadily and are predicted to continue falling to around 2010 for goods vehicles. By 2025, the prediction shows that goods vehicles will account for over half all remaining emissions of nitrogen oxides.
- Particulates (PM₁₀): the figures show a rise to a peak in about 1990. Thereafter, there is a steep fall to about 2010 for goods vehicles, slightly more prolonged to 2015 for non goods vehicles. Goods vehicles account for more than half these emissions throughout the period.

The predictions take account of current EURO regulations on emission standards which are shown below.

Chart 20 Vehicle emissions



- All new HGVs registered after 1 October 1993 must meet emission standards set by EC Directive 91/542 (the 'EURO1' standard).
- All HGVs registered after 1 October 1996 must meet more stringent emission standards (the 'EURO 2' standard).
- Further tightening of standards for future vehicles is being planned under the EU 'Auto-Oils' programme. The charts and tables in this section do not include any provision for this.

Table 11 Vehicle Emissions of Pollutants

	Thousand tonnes											
	1970	1975	1980	1985	1990	1995	200	2005	2010	2015	2020	2025
NO_x												
Vans	38	43	47	52	72	63	43	26	23	25	28	31
HGV	301	325	361	376	441	345	217	182	190	208	227	247
Other	426	494	552	601	770	624	398	252	219	229	241	251
Total	765	862	959	1029	1284	1031	658	460	432	461	495	529
PM₁₀												
Vans	3	3	4	4	7	8	7	7	7	8	9	10
HGV	26	28	29	29	32	24	12	8	8	8	9	9
Other	16	17	20	22	24	19	12	10	10	10	11	11
Total	44	48	53	55	63	52	31	26	25	26	25	31

2 Maintaining standards

Maintaining safe standards in transport operations requires inspection and enforcement to detect operators who put the safety of their staff and the general public at risk by failing to maintain their vehicles to an adequate standard. Three major areas where government agencies act are examined here:

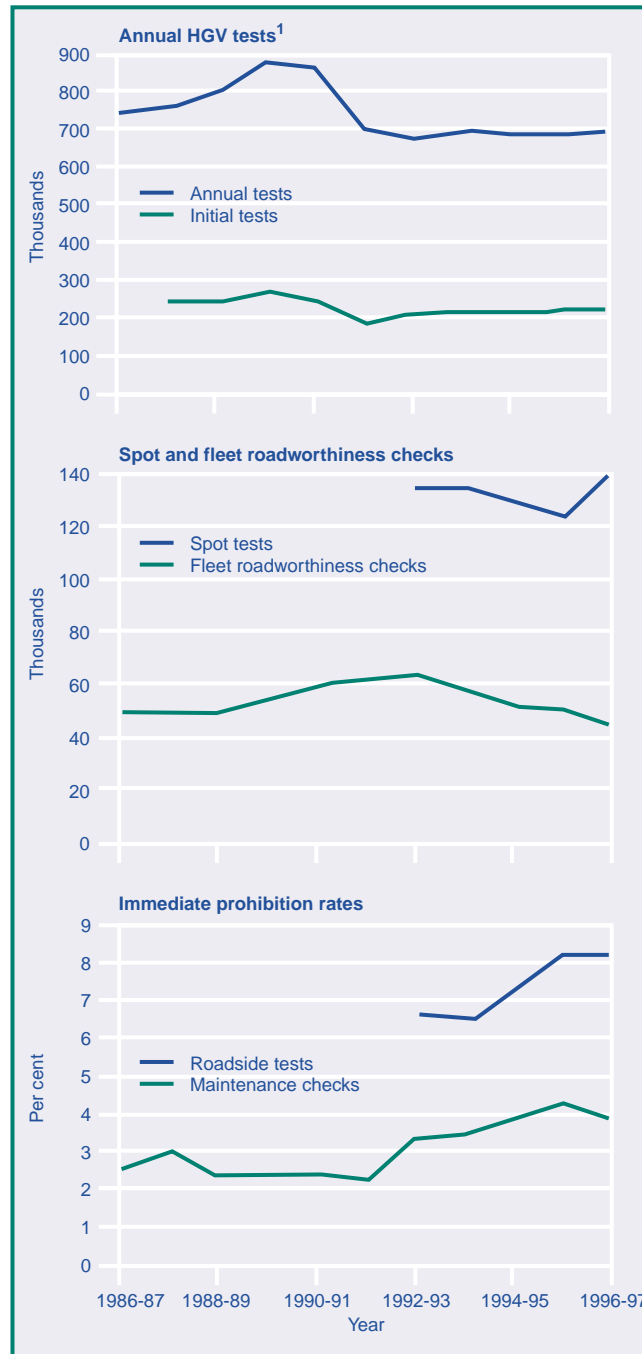
- Heavy goods vehicles.
- Shipping entering UK harbours.
- Aircraft using UK airports.

•2.1 Heavy goods vehicles

For the HGV fleet, the Vehicle Inspectorate (VI) undertakes the enforcement and checking role. In recent years, VI has targeted its enforcement activities with the result that the number of offences detected has increased. Table 12 and Chart 21 show the impact of some aspects of the work of VI in this field.

- The number of annual tests on HGV s has stabilised in recent years at around 700,000. Around 200,000 vehicles record an initial failure in these tests, rather more than a quarter of the total as for most of the past ten years.
- VI roadworthiness spot checks have varied between 120 and 140,000 per annum in recent years. Since 1992/93, the number of fleet checks (usually in conjunction

Chart 21 HGV enforcement



¹ From March 1991, vehicles in the three to 3.5 tonne class transferred to MOT testing.

with operator maintenance assessments) has fallen from 62,000 to 45,000 in 1996/97, partly as a result of conducting more assessments using data held on computer, rather than by operator visits.

- Vehicles served with an immediate prohibition rose to a little over eight per cent of spot inspections in 1996/97. On fleet roadworthiness checks, where operators often have advance notice, the number of vehicles suffering an immediate prohibition has risen from under three per cent in 1986/87 to around four per cent in the most recent years, with better targeting of VI resources accounting for some of the recent rise.

Table 13 provides some information for recent years on VI's examinations of HGVs for traffic offences. In 1996/97, VI undertook over 200,000 examinations, 13,000 of

which were foreign vehicles. Nearly 80,000 vehicles were weighed and 5.6 per cent resulted in convictions for being overweight, compared with three to 3.5 per cent in the previous two years. 1.5 per cent of examinations resulted in convictions in relation to drivers hours offences, again a rise on earlier years. Four per cent of foreign vehicles examined were prohibited in relation to drivers' hours, somewhat less than in previous years. Four per cent of vehicle examinations resulted in convictions for other offences, somewhat higher than in the earlier years.

Table 12 VI Enforcement Activity

Year	Annual HGV tests (thousands)	Initial failures (thousands)	Failure rates (%)	Spot checks (thousands)	Immediate prohibitions (%)	Delayed prohibitions (%)	Fleet roadworthiness checks (thousands)	Immediate prohibitions (%)	Delayed prohibitions (%)
1986/87	750	n/a	n/a				50	2.5	3.2
1987/88	767	240	31.3				50	2.8	3.3
1988/89	803	243	30.2				51	2.4	2.7
1989/90	868	260	30.0				54	2.4	2.5
1990/91	862	238	27.6				59	2.4	2.4
1991/92	698	195	27.9				61	2.3	2.6
1992/93	666	206	31.0	134	6.8	7.1	62	3.2	2.4
1993/94	673	204	30.3	134	6.6	7.3	57	3.4	2.5
1994/95	676	200	29.6	130	7.4	7.7	51	3.8	3.0
1995/96	675	204	30.2	125	8.0	8.4	49	4.2	3.3
1996/97	686	215	31.4	140	8.1	9.7	45	3.7	3.7

Table 13 HGV examinations, weighings and traffic offence convictions and prohibitions

Year	Examinations ('000s)	of which foreign ('000s)	Numbers weighed ('000s)	Convicted		Prohibited	Convicted
				Overweight %vehicles weighed	Drivers hours %vehicles examined	Drivers hours %foreign vehicles examined	Other %vehicles examined
1994/5	267	18	121	3.1	0.9	4.6	2.0
1995/96	249	16	107	3.5	1.2	4.7	2.3
1996/97	215	13	79	5.6	1.5	4.1	3.8

2.2 Foreign ships: United Kingdom

Foreign ships arriving at UK ports can be subject to Port State Control. Such inspections are undertaken by the Maritime and Coastguard Agency (MCA). The very large majority of such inspections relate to cargo vessels.

- Around 2,000 inspections are undertaken every year.
- The number of foreign ships detained has reached 200 in some recent years.
- Better targeting by MCA has meant that the number of ships detained after inspection has risen from less than one per cent in 1986 to ten per cent in 1997/98.

Chart 22 Port State Control inspections

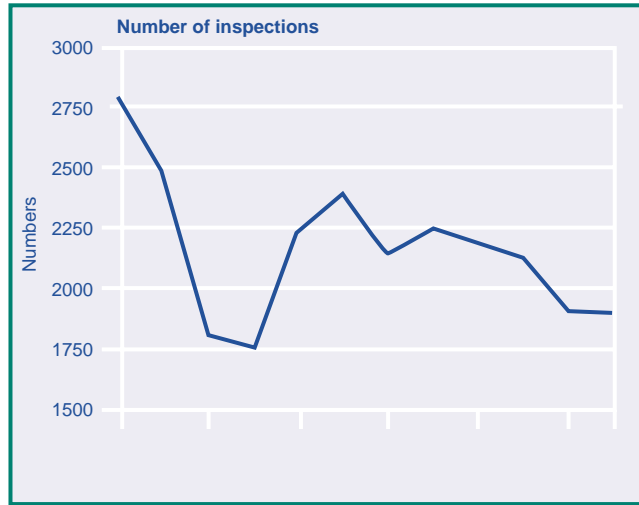


Chart 23 Foreign ships detained

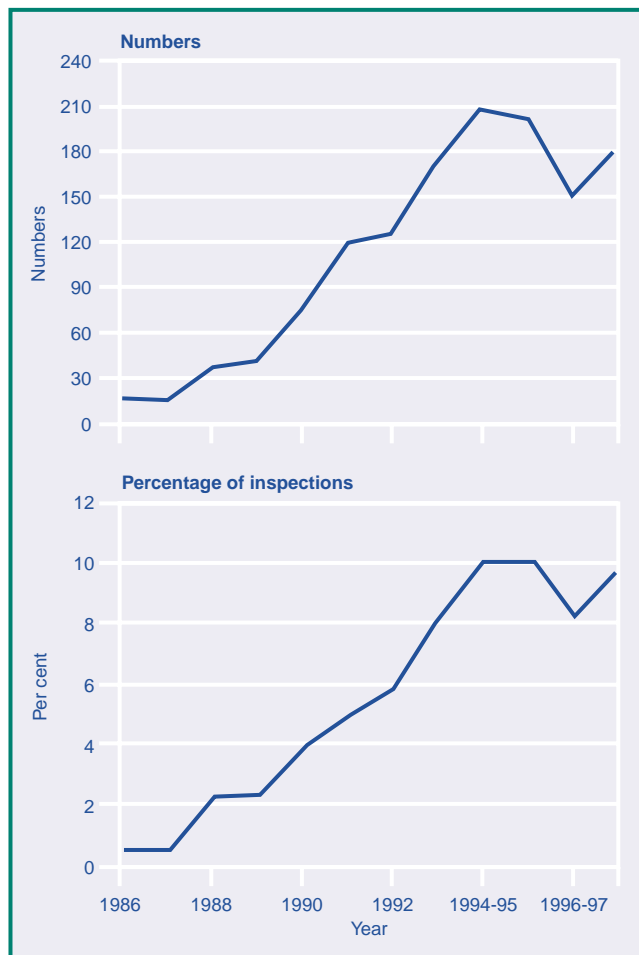


Table 14 Port State Control

	PSC inspections ¹	Foreign ships detained	Percentage of ships detained
1986	2,788	18	1
1987	2,404	17	1
1988	1,830	37	2
1989	1,783	44	3
1990	2,197	79	4
1991	2,397	116	5
1992	2,132	124	6
1993	2,218	174	8
1994/5	2,153	212	10
1995/6	2,098	206	10
1996/7	1,880	157	8
1997/8	1,890	179	10

¹ Port State Control

2.3 Aircraft: United Kingdom

The information in this section relates to all aircraft, whether carrying passengers or freight, Some 70 per cent of air freight is carried in the holds of passenger aircraft.

UK registered aircraft and airlines are subject to regular inspections by the Civil Aviation Authority (CAA) to ensure that they meet the UK's high safety standards. Similar regimes exist for aircraft from EC and EEA countries which have free access to the UK.

Aircraft from outside the EC/EEA require a permit from DETR to conduct commercial flights to or from the UK and must comply with the minimum international standards set by the International Civil Aviation Organisation in accordance with the Chicago Convention. Before issuing a permit, DETR checks that the airline and its aircraft have all the relevant certificates and licences from the appropriate authorities. While random checks on aircraft are not permitted under the terms of the Convention, DETR will arrange for the CAA to inspect ("ramp check") foreign aircraft where it has information that suggests that international standards are not being complied with. Details of these checks are given in Table 15.

- In the last two years some 90 ramp checks have been carried out on foreign aircraft.
- Any problems identified by ramp checks are taken up with the aviation authority of the state concerned.
- Seven aircraft have been grounded while serious breaches of ICAO standards were addressed.

Table 15 Results of ramp checks carried out by the CAA on foreign aircraft

	1996-97	1997-98
Number of checks	31	59
Major actions taken:		
Aircraft grounded	4	3
Permits for aircraft from a particular country suspended	1	1

3 International freight haulage

3.1 Modal share: United Kingdom

- Sea continues to be the dominant mode for the carriage of UK international trade, rising fairly steadily from 301 million tonnes in 1986 to 369 million in 1994. The amount of freight carried has levelled off since the opening of the Channel Tunnel in 1994.
- Taking account both of through rail traffic and lorries on the Shuttle, freight traffic through the Channel Tunnel has expanded rapidly since its opening in May 1994. Total traffic amounted to a little under 10 million tonnes in 1996.
- While the volume of freight handled at UK airports is small (1.6 million tonnes in 1996), it has a high value. The volume of air freight has doubled in the last ten years from 0.8 million in 1986.
- Around 70 per cent of air freight is carried in the bellyhold of passenger aircraft. The share carried in dedicated 'freighter' aircraft has changed little in recent years.

Chart 24 International freight traffic by mode

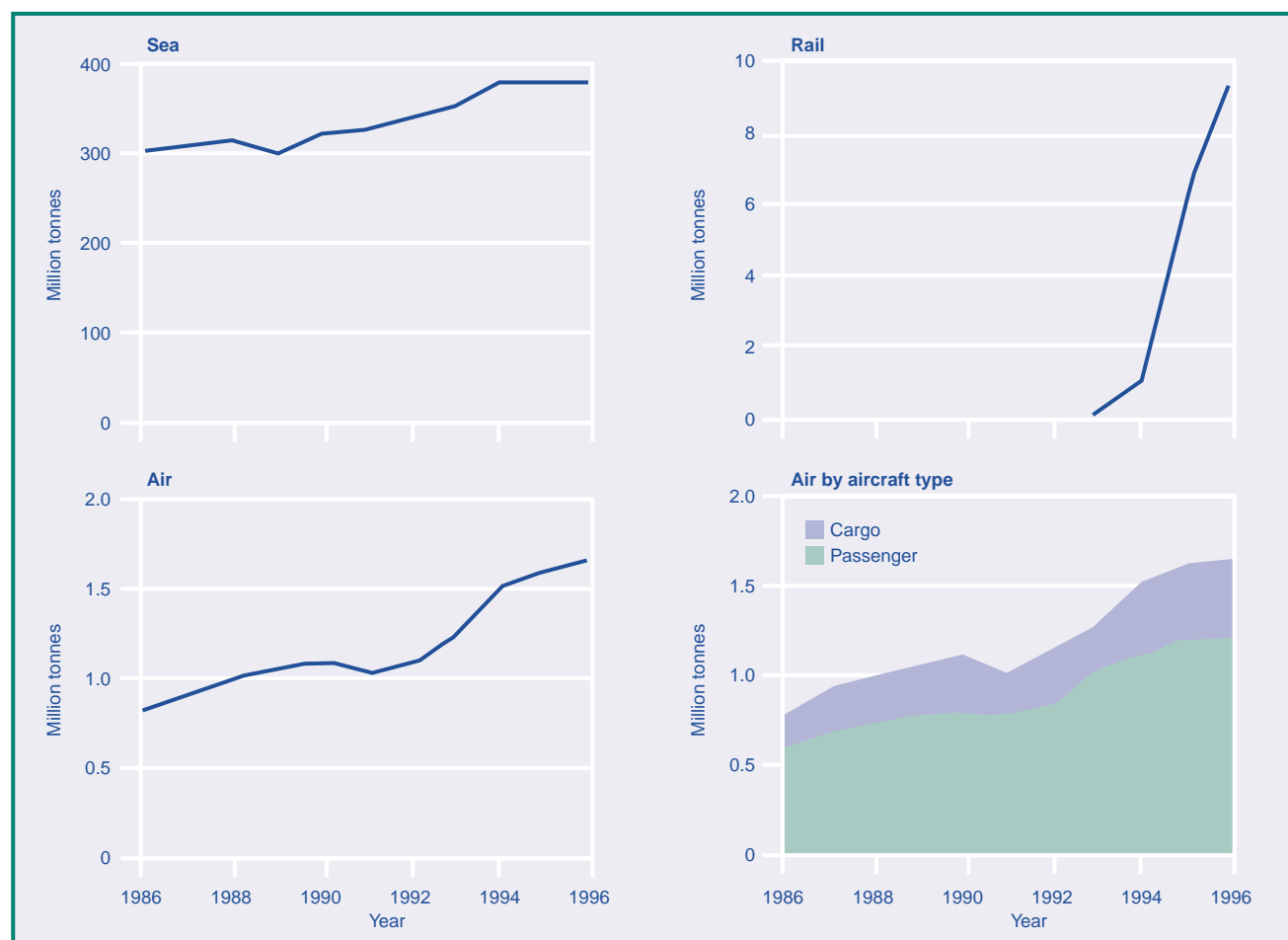


Table 16 International freight lifted

	Million tonnes						
	Sea	Rail			Air		
		Shuttle	Through train	Total	Passenger	Cargo	Total
1986	301				0.6	0.2	0.8
1987	306				0.7	0.2	0.9
1988	312				0.7	0.2	1.0
1989	302				0.8	0.2	1.1
1990	320				0.8	0.3	1.1
1991	325				0.8	0.2	1.0
1992	333				0.9	0.3	1.1
1993	347				1.0	0.3	1.3
1994	369	0.8	0.4	1.2	1.1	0.4	1.5
1995	369	4.8	1.7	6.5	1.2	0.4	1.6
1996	368	6.9	2.3	9.2	1.2	0.4	1.7

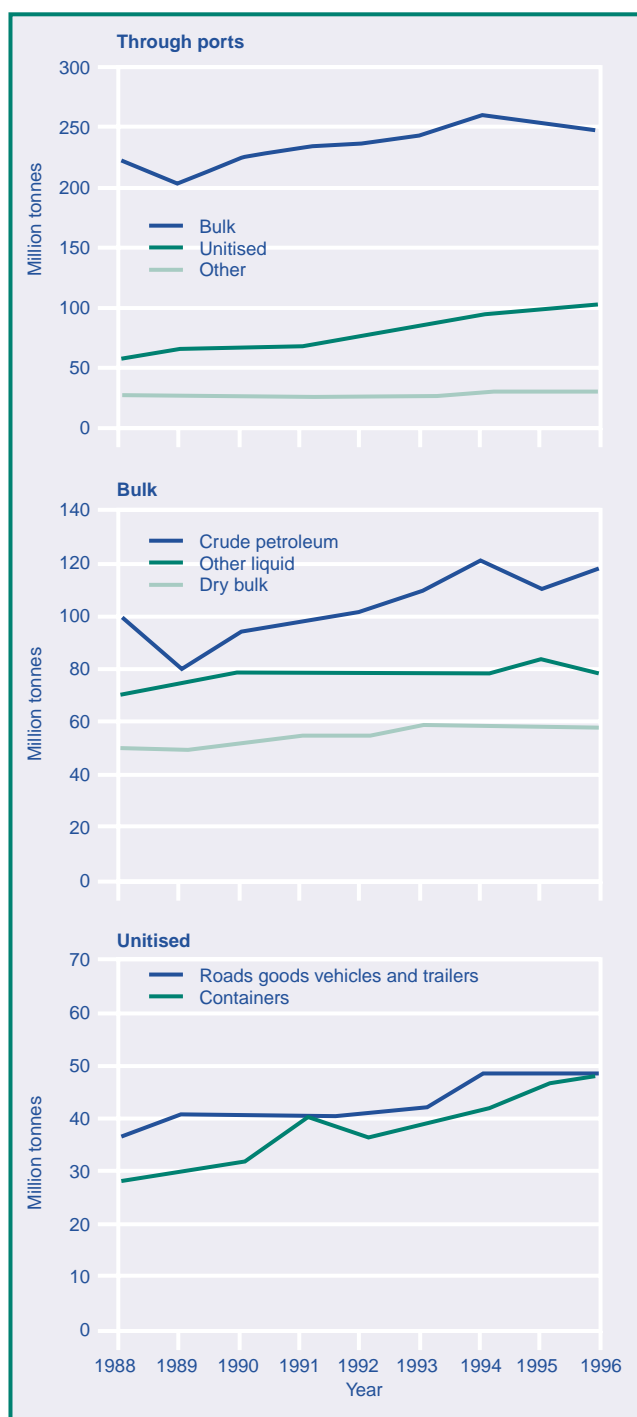
3.2 Ports: international freight: United Kingdom

- Movements through ports in weight terms consist largely of bulk traffics. Between 1988 and 1996, the volume of bulk shipments increased from 221 million tonnes to 247 million tonnes per year.
- Unitised traffic, containers and lorry and trailer movements, grew strongly between the two years, rising from 65 million tonnes in 1988 to 96 million tonnes in 1996.
- Within the bulks total, crude oil shipments fell between 1988 and 1989 but rose thereafter to reach 116 million tonnes in 1996. Other liquid bulks increased from 1988, before falling slightly in recent years; dry bulk shipments have fluctuated since 1988.
- Within unitised shipments, there was strong growth after 1988 in road goods vehicles and trailers, but the trend has flattened after 1994 with the opening of the Channel Tunnel.
- Growth in container shipments, initially relatively subdued, increased substantially after 1991.
- Other traffic, semi bulks like paper products and ‘conventional’ traffic, has been relatively stable.

Table 17 Type of port traffic

	Million tonnes							
	Bulk				Unitised			
	Crude Petroleum	Other liquid	Dry bulk	Total bulk	Ro-Ro	Containers	Total unitised	Other
1988	99	50	71	221	35	29	65	27
1989	81	50	75	206	40	30	71	25
1990	93	52	78	223	40	32	72	25
1991	95	55	79	229	39	34	73	23
1992	101	55	77	233	42	36	77	23
1993	108	57	77	242	43	39	82	23
1994	119	58	78	255	47	42	89	25
1995	109	56	82	251	48	46	93	24
1996	116	54	76	247	48	48	96	24

Chart 25 International port traffic



- In terms of *total tonnage*, domestic and international combined, London was the UK's largest port in both 1988 and 1996.
- The changes in the patterns of oil shipments was a major factor in the rise of Forth ports and the decline of Sullom Voe.
- Liverpool and Felixstowe both recorded substantial increases in traffic.
- Among the ports specialising in roll on roll off traffic, Dover was the leading port in both years. Among the others, Belfast replaced Harwich in the top five.
- Felixstowe was the largest container port by far in both years. Southampton displaced London in second place while Liverpool and Medway joined the top five container ports in place of Belfast and Ipswich.

Table 18 Leading ports in 1988 and 1996: all traffic

		Million tonnes			
		1988		1996	
1	London	54	1	London	53
2	Sullom Voe	51	2	Grimsby & Immingham	47
3	Tees & Hartlepool	37	3	Forth	46
4	Grimsby & Immingham	35	4	Tees & Hartlepool	45
5	Milford Haven	33	5	Sullom Voe	38
6	Southampton	31	6	Milford Haven	37
7	Forth	29	7	Southampton	34
8	Liverpool	20	8	Liverpool	31
9	Felixstowe	16	9	Felixstowe	26
10	Medway	13	10	Medway	14

Table 19 Port traffic: road goods vehicles (foreign and coastwise)

		Thousand units			
		1988		1996	
1	Dover	771	1	Dover	1,056
2	Larne	307	2	Felixstowe	360
3	Felixstowe	200	3	Portsmouth	296
4	Portsmouth	167	4	Belfast	283
5	Harwich	161	5	Larne	280

Table 20 Port traffic containers (foreign and coastwise¹)

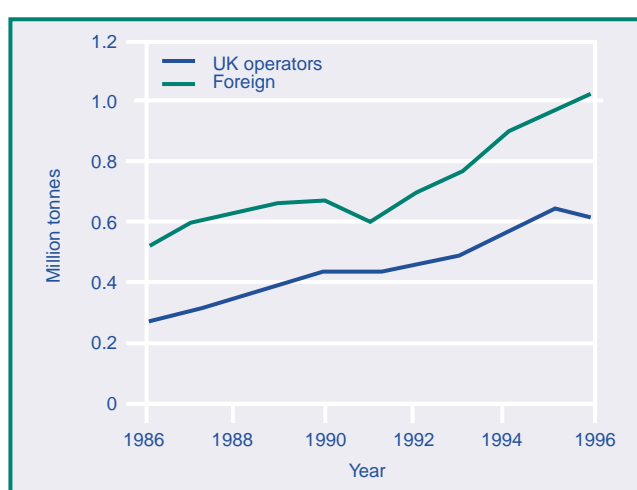
		Thousand units			
		1988		1996	
1	Felixstowe	943	1	Felixstowe	1,441
2	London	341	2	Southampton	546
3	Southampton	249	3	London	343
4	Belfast	128	4	Liverpool	280
5	Ipswich	128	5	Medway	225

¹ Coastwise – movements between two ports.

3.3 International air freight: United Kingdom

- The total amount of international freight passing through UK airports doubled in weight between 1986 and 1996.

Chart 26 Air freight: operator type



- The majority of international freight continues to be carried by foreign operators.
- Heathrow, followed by Gatwick, continues to be the major UK freight airport.
- Around 70 per cent of freight travels in the bellyhold of passenger aircraft, a proportion which has changed little since 1986. The close link between air passengers and air freight explains the dominant position of Heathrow which handled 62 per cent of all international air freight at UK airports in 1996, only slightly lower than its 67 per cent share in 1986.
- East Midlands and Stansted have grown particularly rapidly over the last ten years, as they have developed as centres for major dedicated air freight carriers.

Table 21 Air freight: operator type

	Million tonnes		
	Air operators		
	UK	Foreign	Total
1986	0.3	0.5	0.8
1987	0.3	0.6	0.9
1988	0.4	0.6	1.0
1989	0.4	0.7	1.1
1990	0.4	0.7	1.1
1991	0.4	0.6	1.0
1992	0.5	0.7	1.1
1993	0.5	0.8	1.3
1994	0.6	0.9	1.5
1995	0.6	0.9	1.6
1996	0.6	1.0	1.7

Table 22 Leading freight airports in 1986 and 1996¹

		Million tonnes			
		1986		1996	
1	Heathrow	537	1	Heathrow	1,040
2	Gatwick	164	2	Gatwick	267
3	Manchester	39	3	East Midlands	105
4	Belfast International	35	4	Stansted	105
5	East Midlands	20	5	Manchester	79
6	Glasgow	13	6	Liverpool	28
7	Stansted	13	7	Belfast International	27
8	Prestwick	10	8	Coventry	23
9	Southend	16	9	Prestwick	22
10	Bournemouth	8	10	Birmingham	19

¹ Figures also include a relatively small amount of domestic traffic.

3.4 International comparisons

- Since 1970 road's share of freight in the EU has increased markedly, while the proportion of freight carried by rail has declined.
- Road freight dominates throughout the EU, but the proportion of freight sent by road in the UK is higher than the EU average.
- In part this reflects different geographical conditions - for example the longer journeys possible in continental Europe are more suitable for rail freight.
- Chart 27 and Chart 28 exclude coastal maritime freight. This is important for the UK. When it is included (*Chart 29*), the proportion of freight carried by road for the UK appears close to the EU average.

Chart 27 Freight: modal shares - 1970

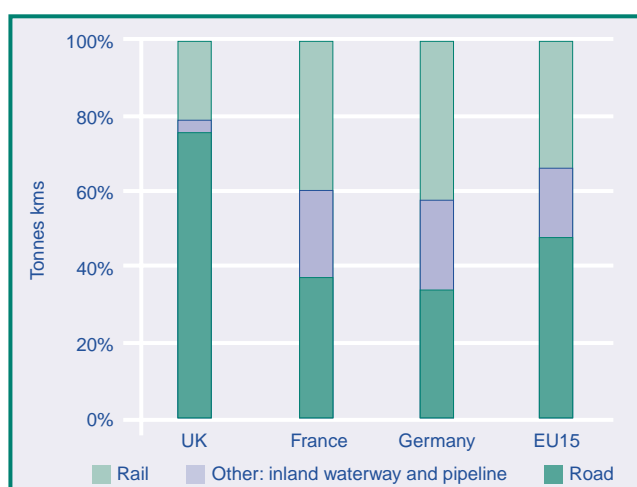


Chart 28 Freight: modal shares - 1995

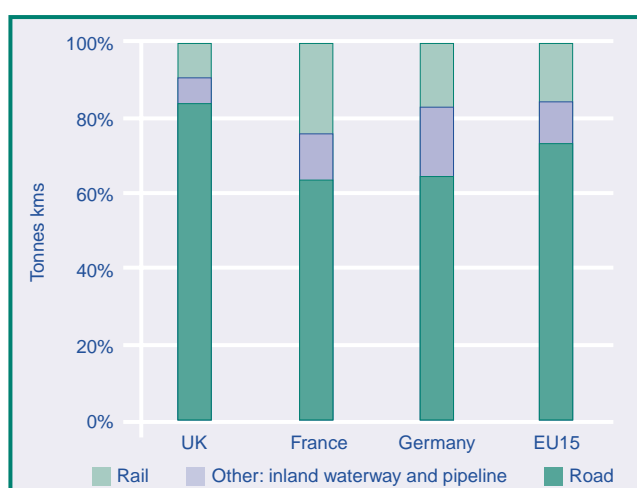


Chart 29 Freight: modal shares - 1995 including coastal maritime

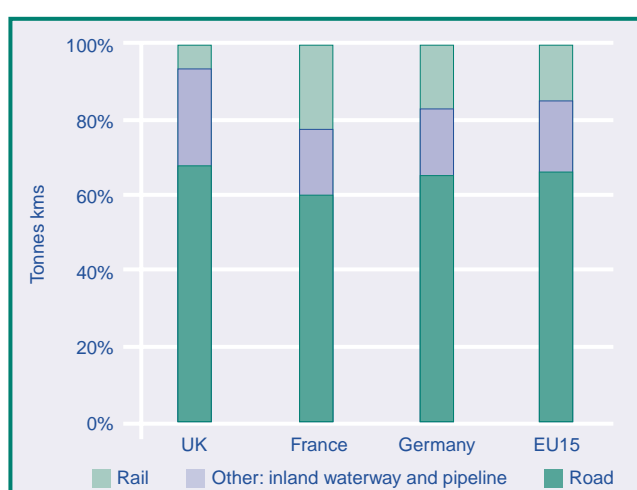


Table 23 Freight modal share by country

	Billion tonne kilometres									
	1970			1995			1995 including coastal marine			
	Road	Rail	Other inland waterway and pipeline	Road	Rail	Other inland waterway and pipeline	Road	Rail	Other including maritime	
UK	85	25	3	144	13	12	144	13	50	
France	64	68	42	132	48	28	132	48	38	
Germany ¹	90	113	69	271	70	80	271	70	82	
EU15	431	283	176	1100	220	202	1100	220	3489	

¹ Figures for 1970 are for former East and West Germany combined Figures for roads in 1995 are not comparable with those for 1970 because of a change in coverage.

Notes and definitions

General

Gross Domestic Product (GDP)

The value of the total economic activity taking place in UK territory.

There are three main measures of freight activity.

Goods lifted (tonnes)

The weight of goods (tonnes) handled, taking no account of the distance they are carried.

Goods moved (tonne kilometres)

The weight of the load multiplied by the distance it is carried. As this takes account of distance it is therefore a better measure of the work done.

Average length of haul

Calculated by dividing tonnes kilometres by tonnes lifted.

Mode (Charts 1 to 10, Tables 1 to 3)

Road

The figures include the activity of goods vehicles over 3.5 tonnes gross weight and small commercial vehicles up to that weight. The estimates for goods vehicles are derived from the *Continuing Survey of Road Goods Transport*, and, for small commercial vehicles, *ad hoc* surveys in 1976, 1987 and 1992/93 and interpolation for the intervening and subsequent years.

Rail

Figures up to 1962 include free-hauled (ie departmental) traffic on revenue-earning trains (the inclusion of this traffic in 1963 would have increased the figure). Figures for rail from 1991 are for financial years 1991/92 etc.

Water

Figures before 1972 are not comparable with later years. Unless otherwise stated, from 1972 water includes all UK coastwise and one-port freight movements by sea, and inland waterway traffic. Earlier years included only GB coastwise traffic and internal traffic on waterways controlled by British Waterways.

Pipeline

Estimates are for oil pipelines only (excluding offshore pipelines) .

Air

Domestic air freight within the United Kingdom, whilst sometimes important in terms of speed of delivery and value, is very small in volume; in 1996 it amounted to just 61,000 tonnes.

Heavy Goods Vehicles (HGVs) (Charts 11 to 14, Table 4)

Figures are for heavy goods vehicles over 3.5 tonnes gross vehicle weight. These vehicles pay the goods vehicle rates of Vehicle Excise Duty, are subject to goods vehicle 'plating' and annual testing, and require a goods operator's licence. They account for 95 per cent of road freight activity, with the rest being carried by small commercial vehicles less than 3.5 tonnes gross weight.

Analyses of HGV registrations and the age distribution of the HGV fleet are produced from records of the Driver and Vehicle Licensing Agency. The vehicle weight groups reflect some of the operating controls on goods vehicles as shown below.

Rigid vehicles

Up to 7.5 tonnes	Car driving licence applies; above this weight an HGV driving licence is required.
7.5 to 17 tonnes	17 tonnes is the weight limit for two axle vehicles.
17 to 25 tonnes	24.39 tonnes was the weight limit for three axle vehicles. Since raised to 26 tonnes from January 1993 if fitted with 'road friendly' suspension, otherwise 25 tonnes.
Over 25 tonnes	32 tonnes is the weight limit for four axle vehicles.

Articulated vehicles

Up to 33 tonnes	32.52 tonnes is the weight limit for four axle vehicles.
Over 33 tonnes	38 tonnes is the weight limit for five axle or more vehicles unless the vehicle has six axles, is fitted with 'road friendly' suspension and is taking goods to or from a railhead, in which case the limit is 44 tonnes.

Emission standards

All new HGVs registered after 1 October 1993 must meet emission standards set by EC Directive 91/542 (the EURO1 standard). Those registered after 1 October 1996 must meet more stringent standards (the EURO2 standard).

Accidents (Chart 1 5)

Statistics of accidents and casualties are compiled from reports submitted by the police to the Department of the Environment, Transport and the Regions. The

underlying definitions of personal injury road accidents involving road using vehicles and pedestrians are:

Killed

Human casualties who sustained injuries which caused death less than 30 days after the accident.

Accident

One involving personal injury occurring on the public highway (including footways) in which a road vehicle is involved and which becomes known to the police within 30 days of its occurrence. The vehicle need not be moving and it need not be in collision with anything. One accident may give rise to several casualties. Damage only accidents are not included.

Vehicles involved in accidents

Vehicles whose drivers or passengers are injured, or which injure a pedestrian, or hit another vehicle whose driver or passengers are injured, or which contribute to the accident. Vehicles which later collide with the initial accident which caused injury, are not included unless they aggravate the degree of injury or lead to further casualties. Includes pedal cycles ridden on the footway.

Speed (Chart 16, Table 5)

Non-urban roads

The speeds indicated are average traffic speeds recorded at a sample of motorway, dual carriageway and single carriageway sites.

Urban roads

Speeds were recorded at samples of sites with speed limits of 30 mph and with speed limits of 40 mph.

Traffic and traffic forecasts (Chart 18, Tables 8 and 9)

Traffic estimates are derived from roadside traffic counts which take two forms: occasional twelve hour counts at a large number of sites to estimate the absolute level of traffic (the 'rotating' census) and frequent counts at a small number of sites (the 'core' census) to estimate changes in the amount of traffic.

The total activity of traffic on the road network in Great Britain is measured in vehicle kilometres. The traffic for each year relates to the public road network in place in that year. Thus growth over time is the product of any change in the network (kilometres) and the change in traffic flow (vehicles) .

Traffic forecasts are made for planning and appraising new roads and are meant to apply to the longer term. They are not necessarily expected to be accurate year on year. Full details of the method and underlying assumptions are given in National Road Traffic Forecasts 1989. The most important assumptions concern GDP and real petrol prices.

Energy consumption (Chart 19, Table 10)

Detailed data for individual fuels have been converted from original units to tonnes of oil equivalent using gross calorific values and conversion factors appropriate to each category of fuel. The resulting unit should be regarded as a measure of energy content rather than a physical quantity.

Pollution (Chart 20, Table 11)

Nitrogen oxides (expressed as nitrogen dioxide equivalent)

A number of nitrogen compounds including nitrogen dioxide and nitric oxide are formed in the combustion of fossil fuel. Nitrogen dioxide is directly harmful to human health. Nitrogen oxides also contribute to the formation of ozone which is a harmful secondary pollutant in the lower atmosphere and also an important greenhouse gas contributing to global warming. Oxides of nitrogen can also have adverse effects on plants, reducing growth and can contribute to acid rain. Emissions of nitrogen oxides from petrol engined vehicles will be reduced from the 1992 level as new vehicles built from 1992 onwards are fitted with a catalytic converter to comply with EC standards.

Particulates

Airborne particles may be measured in a number of ways. The simplest is to suck high volumes of air through a filter and to weigh the mass that accumulates over a particular time period. Although black smoke emissions are still widely used for quantifying the particles produced by transport (especially motor traffic), an alternative indicator, emissions of particulates, is increasingly being used. This alternative method measures that fraction of emissions which is considered most likely to be deposited in the lung. The data for particulates are by source category and not end user. Figures include emissions from tyre and brake wear.

Standards (Charts 21 to 23, Tables 12 to 15)

The information in section 2 summarises the inspection activities of the Vehicle Inspectorate, the Marine and Coastguard Agency, and the Civil Aviation Authority.

International freight haulage (Charts 24 to 29, Tables 16 to 23)

Sea

Traffic to and from destinations outside the United Kingdom. Traffic between the United Kingdom and the Isle of Man or the Channel Islands is excluded. It is treated as coastwise traffic.

Rail

Figures relate to freight carried through the Channel Tunnel.

Air

Services flown between the United Kingdom, Isle of Man or Channel Islands on the one hand, and places outside on the other.

Bulk traffic

Unpackaged goods capable of being handled by pipeline, elevator, grab or similar forms of equipment.

Unitised

Freight includes all roll-on/roll-off and containerised modes of appearance .

International comparisons

Figures are taken from the EU publication *EU Transport in Figures - Statistical Pocketbook* which is based on information provided by EU member states and the ECMT publication *Statistical Trends in Transport*.

This new publication, *Focus on Freight* aims to provide readers with an introduction to the major trends in freight transport and a greater depth of understanding of some of the current areas of interest, debate and development.



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