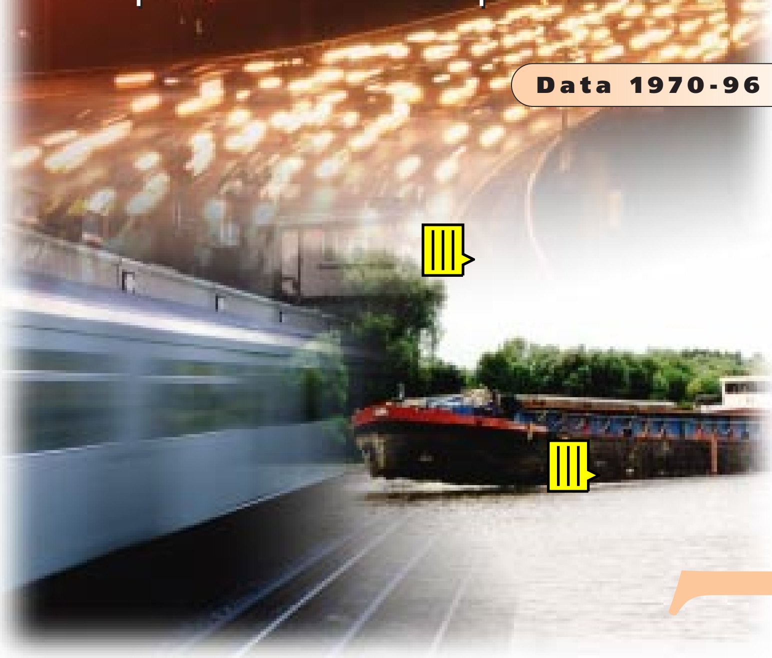
PANORAMA OF THE EUROPEAN UNION

1999 EDITION

Panorama of transport

Statistical overview of road, rail and inland waterway transport in the European Union

Data 1970-96



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Data 1970-1996

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A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server (http://europa.eu.int).

Cataloguing data can be found at the end of this publication.

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Foreword

The Panorama of Transport sets out to describe, via statistics, the most important features of transport in the European Union. It describes transport not only in terms of the quantities of freight and passengers moved and the vehicles and infrastructure used, but also as part of the economy; with more than 6 million people directly employed, some 4% of the total workforce, transport is not only a necessary support to personal life and economic activity, but also a major service industry.

This first edition of the Panorama focuses mainly on road, rail and inland waterways transport, with particular emphasis on freight transport for which Community statistics have been collected for many years. The ever-growing importance of road freight transport - both in absolute terms and relative to other modes of transport - is clearly documented by the statistics published here, which show a nearly three-fold increase since 1970 for road transport, while rail transport has declined by a quarter. At the same time it can be seen that there are well over half a million enterprises in the road transport industry with a total workforce of nearly three million people. Rail transport, which now accounts for less than one-sixth of freight transport and one-tenth of passenger transport, still employs nearly one million people. These statistics also document the progress towards an open road freight transport market, with increasing volumes of cross-trade and cabotage operations even in advance of the complete deregulation achieved in 1999.

In recent years, the European Commission has placed increasing emphasis on the integration of environmental policies into sectoral policies such as transport. The Panorama therefore provides a set of key statistics showing trends in energy consumption, pollutant emissions and safety, which will serve as measures of some of the main external impacts of transport.

This publication represents a further step in Eurostat's policy of disseminating data together with explanatory information to meet the needs of a wide range of users, and where necessary combining statistics which are produced by different departments. Users are invited to treat the Panorama of Transport as an entry point to the wide range of transport-related data available at Eurostat. Future editions of the Panorama will complete the coverage of other modes of transport.

Yves Franchet
Director-General
Eurostat

PANORAMA OF TRANSPORT

Statistical overview of road, rail and inland waterway transport in the European Union

CONTENTS

1. The transport sector in the European Union

Transport is an integral part of the Treaty establishing the European Community (see box), and Community statistics on transport have played an essential role in implementing EU policies related to transport.

Trends in transport mirror economic trends (see Graph 1.1). Transport has shown a steady growth since the 1970s, although the trend has been less regular in goods traffic than in passenger traffic (see Table 1.2 and Graph 1.3). Factors that determine this global development are the changes in the structure and location of the manufacturing industries, changes in production methods due to demands for 'just-in-time' shipments, the growing requirements for staff mobility in the services sector and the general increase of car ownership, leisure time and disposable income.

Table 1.2: EU-15 transport annual growth 1980-96 (%)

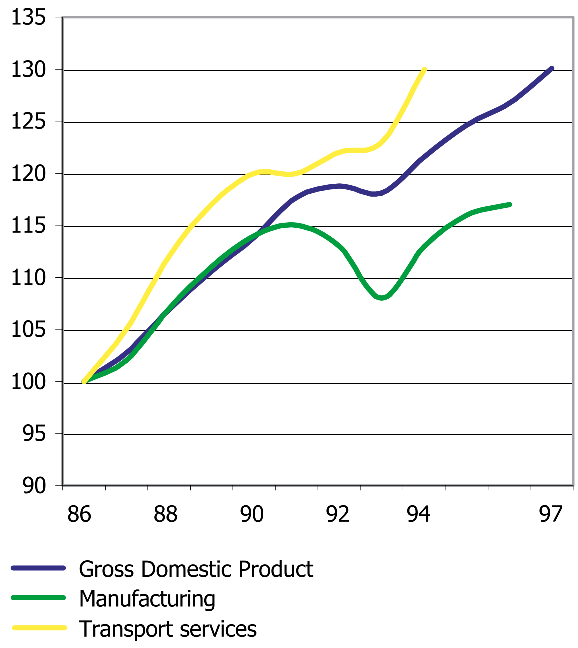
	1986-93*	1993-94	1994-95	1995-96
GDP	+2.6	+2.9	+2.5	+1.7
- of which manufacturing	+1.2	+4.1	+3.3	+0.4
- of which transport	+3.3	+5.3	:	:
Goods transport (tkm)	+1.6	+13.0	+2.3	+1.3
Passenger transport (pkm)	+3.2	+3.0	+2.4	+2.6

EU-15 annual growth by mode 1980-96 (%)

	1980-93*	1994	1995	1996
Road (tkm)	+2.6	+15.0	+3.2	+1.8
Rail (tkm)	-1.0	+5.7	+0.1	-0.6
Inland waterways (tkm)	-0.8	+10.4	-2.7	-1.1

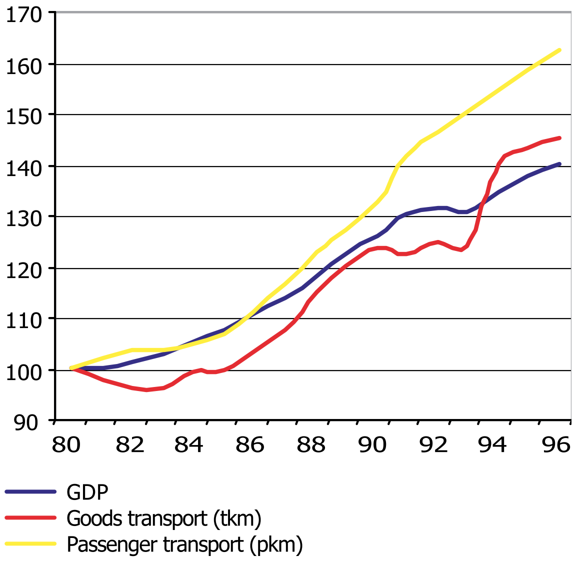
*: Average annual growth - series affected by German reunification.
Sources: Eurostat, national statistics.

Graph 1.1: EU-15 transport growth (1986=100)



NB: Series affected by German reunification.
Manufacturing: without Ireland.
Transport services: without D, IRL, L, EL.

Graph 1.3: EU-15 transport growth (1980=100)



Sources: DG VII, Eurostat.

A sector in its own right

The transport economy in the European Union delivers benefits in its own right: the sector accounts for an estimated 4% of the Union's gross national product and employs more than 6 million people. The latter figure represents more than 4% of all persons employed in the EU (if 'own account' transport is to be included, transport's share in GDP would be about 5% and an additional 1 million persons should be added to the employment number).

Each day, the transport industries and services of the European Union have to get 150 million people to and from work, enable 100 million trips made in the course of the work, carry 50 million tonnes of goods, deal with 15 million courier, express and parcel shipments apart from serving the needs of travel and trade outside the boundaries of the European Union.

Apart from the economic importance of the transport sector, the ever increasing mobility of citizens is today part of everyday life and its significance for every individual should not be underestimated.

In 1996, average intra-EU passenger transport demand was 35 km per person/day (taking into account transport by car, bus/coach, rail and air).

(extracts from the Treaty establishing the European Community, incorporating changes made by the Treaty of Amsterdam)

TITLE V

TRANSPORT

□ *Article 70*

The objectives of this Treaty shall, in matters governed by this Title, be pursued by Member States within the framework of a common transport policy.

□ *Article 71*

1. For the purpose of implementing Article 70, and taking into account the distinctive features of transport, the Council shall, acting in accordance with the procedure referred to in Article 251 and after consulting the Economic and Social Committee and the Committee of the Regions, lay down:

(a) common rules applicable to international transport to or from the territory of a Member State or passing across the territory of one or more Member States;

(b) the conditions under which non-resident carriers may operate transport services within a Member State;

(c) measures to improve transport safety;

(d) any other appropriate provisions.

(...)

□ *Article 80*

1. The provisions of this Title shall apply to transport by rail, road and inland waterway.
2. The Council may, acting by a qualified majority, decide whether, to what extent and by what procedure appropriate provisions may be laid down for sea and air transport.

(...)

TITLE XV

TRANS-EUROPEAN NETWORKS

□ *Article 154*

1. To help achieve the objectives referred to in Articles 14 and 158 and to enable citizens of the Union, economic operators and regional and local communities to derive full benefit from the setting-up of an area without internal frontiers, the Community shall contribute to the establishment and development of trans-European networks in the areas of transport, telecommunications and energy infrastructures.
2. Within the framework of a system of open and competitive markets, action by the Community shall aim at promoting the interconnection and interoperability of national networks as well as access to such networks. It shall take account in particular of the need to link island, landlocked and peripheral regions with the central regions of the Community. (...)

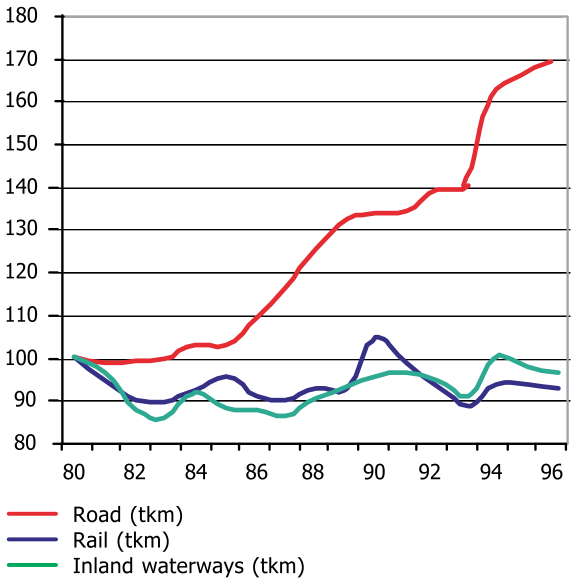
Continuous growth expected

Graph 1.4 shows that road haulage has been constantly growing and takes a largely dominant position in freight transport (70%). Meanwhile rail's share of the freight market has decreased from 32% to 14% in the past 25 years. In the same period, its share of the passenger market has fallen from 10% to 6%.

Physical links vital

The establishment and development of trans-European networks (TEN) in the area of transport, telecommunication and energy infrastructures has been a community policy since the Maastricht Treaty (see box). The transport TEN covers all modes of transport ; the first projects are close to completion. (See Chapter 2.4).

Graph 1.4: EU-15 goods transport growth by mode (1980=100)



Source: Eurostat.

2. Transport infrastructure

2.1. General development

On a global scale, the EU offers a dense transport network. Increasing demand for transport services, both for passengers and goods, have had an impact on the development of the infrastructures. This development has however its particularities, both with regard to the individual Member States (see Chapter 2.2) and the mode of transport in question.

50% of all EU rail lines electrified

In 1996 the total length of railways in EU-15 amounted to 156 591 km (see Table 2.1). Although almost half of this network (47%) is now electrified, the overall length in use steadily decreased (see Graph 2.2) and stands 8% lower than in 1970. As far as network density is concerned, EU-15 offers 48.4 km of railways per 1 000 square kilometres. This is more than twice as much as in the USA (20 km in 1993).

The total length of the road network in EU-15 amounted to 3.3 million km of which 46 845 km (1.4%) consisted of motorways. Equivalent figures for the USA show a total network of about 6.3 million km with a share of 89 100 km (1.4%) of motorways. Motorways more than tripled in 25 years (see Graph 2.2).

When relating the length of networks to the total area, EU-15 offers 1.0 km per km^2 while the equivalent value is 0.5 for the USA. (motorways: 0.014 km and 0.008 km respectively).

Table 2.1: Network lengths in EU-15 (km)

	1970	1996	change 1970-96
Rail	171 023	156 591	8%
Roads	2 736 675	3 354 534	+23%
(of which motorways)	15 677	46 845	+199%
Pipelines	12 539	20 547	+64%
Inland waterways	32 468	30 191	-7%
TOTAL NETWORK	2 952 705	3 561 863	+21%

Source: Eurostat/ECMT/UN-ECE.

Inland waterways for only certain countries

Only 9 of the 15 Member States are able to offer significant transport using inland waterways. In 1995, the total length of inland waterways (comprising rivers, canals and navigable lakes) amounted to 30 191 km of length which represents a density of 9.3 km per 1 000 km^2. This is three times as much compared to the USA (28 404 km of length, 3.0 km of density).

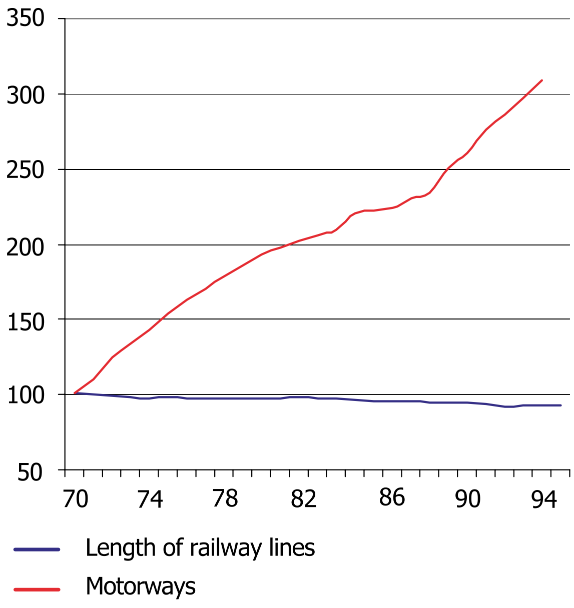
This network of lakes, rivers and artificially built canals offers a unique transport system in the nine Member States, still offering considerable potential, especially since the opening of the Rhine - Main - Danube canal.

Pipelines not to be forgotten

In addition to the three main inland transport modes, pipelines should be mentioned, a network the length of which constitutes 13% of the rail, 0.6% of the road and 68% of the inland waterway network. For statistical purposes, only oil pipelines are considered here. With a total length of 20 547 km, oil pipelines contribute only 0.6% of the total network length (rail, road, inland waterways and oil pipelines).

In the present publication, the pipeline network will not be considered as a main inland transport mode since oil pipelines are only dedicated to the transport of a very restricted group of goods (liquid oil products). However, when considering the volumes forwarded, it becomes obvious that this mode is far from being negligible.

Graph 2.2: Development of rail and motorways network in EU-15 (1970=100)



Source: Eurostat/ECMT/UN-ECE.

23.5% increase over 25 years

The total length of the three 'classic' networks experienced a considerable growth: from 2.94 million km in 1970 to 3.54 million km in 1996. This represents an increase of 20%. The most important share of this growth can be attributed to the road network with a growth of nearly 23%, while the rail and inland waterways network decreased by 8% and 7% respectively.

As would be expected, the road network, comprising motorways, regional highways and roads as well as local roads is the densest transport network. Given that the existing definition of the term 'local roads' allows various interpretations by Member States (leading to results altering comparability) data officially reported by Member States will be used. Local roads make up almost two thirds of the entire road network.

In terms of modal share, the railway network makes up only 4.4% (1970: 6.0%) of the total length of the transport network while the road network amounts to 94.8% (1970: 93.0%) and inland waterways to 0.8% (1970: 1.1%).

2.2. Length of transport networks by country

The situation in most of the Member States is similar to the general trends and developments at EU level, outlined in the previous chapter. However, an analysis by mode shows to what extent the individual Member States follow the general EU trend.

Rail network decrease highest in Portugal and Belgium

At EU-15 level, the total length of the railway network decreased by 8% between 1970 and 1996 (see Table 2.5). The railway network decreased most in Portugal and Belgium (21% and 20% respectively), while only in Denmark, Italy Luxembourg and Finland did it remain stable.

Table 2.3 outlines that in 1996, the railway network of Germany was the longest in EU-15: with 40 826 km this network constitutes 26% of the total EU-15 network. The French railway network comes second with 31 852 km or 20.3%. The UK and Italian network follow with 11% and 10.2% respectively. These four Member States alone stand for two thirds (67.5%) of the entire EU network.

Same rail density in Spain and Sweden

In terms of network density things look different: as one of the bigger EU-15 Member States in terms of area, Germany features the highest railway network density (114.4 km/1 000 km^2) followed by Belgium (110.8 km/1 000 km^2) and Luxembourg (105.4 km/1 000 km^2). Lowest density in EU-15 can be found in Greece (18.7 km/1 000 km^2) and Finland (17.6 km/1 000 km^2).

The case of Finland illustrates the typical situation of a country offering a large territory/low population ratio. One would expect to find a similar situation in neighbouring Sweden. However, figures show that network density in Sweden is the same as in Spain 24.3 km/1 000 km^2). Sweden and Finland have one thing in common though: per 100 000 inhabitants these countries have far more than 100 km of tracks. Austria, in third position, follows far behind with 70 km/100 000 inhabitants. It should be noted that the two Scandinavian countries feature a very uneven population distribution, an element that is not considered in these ratios.

Table 2.3: Length of transport networks 1996 - key indicators

	Railways*				Motorways		
	km	% electrified	km/100 000 inhab.	km/1 000 km^2	km	km/100 000 inhab.	km/1 000 km^2
Belgique/België	3 380	73	33,3	110,8	1 674	16,5	54,9
Danmark	2 349	17	44,6	54,5	825	15,7	19,1
Deutschland	40 826	45	49,8	114,4	11 246	13,7	31,5
Ellada	2 474	0	23,6	18,7	470	4,5	3,6
España	12 284	56	31,3	24,3	7 747	19,7	15,3
France	31 852	45	54,6	58,6	*8 596*	14,7	15,8
Ireland	1 945	2	53,6	27,7	80	2,2	1,1
Italia	16 014	64	27,9	53,1	6 440	11,2	21,4
Luxembourg	274	95	66,0	105,4	118	28,4	45,4
Nederland	2 739	73	17,6	66,0	2 207	14,2	53,2
Österreich	5 672	60	70,4	67,6	1 607	19,9	19,2
Portugal	2 850	22	28,7	31,0	710	7,2	7,7
Suomi/Finland	5 881	35	114,8	17,4	431	8,4	1,3
Sverige	10 923	68	123,5	24,3	1 350	15,3	3,0
United Kingdom	17 128	30	29,1	70,2	*3 344*	5,7	13,7
EU-15	156 591	47	42,0	48,4	46 845	12,6	14,5

* *Railways:* Data for UIC member railways.
Sources: Eurostat/ECMT/UN-ECE, UIC, IRF, national statistics.

Estimates in italic.

New high-speed lines unable to compensate disused stretches

In six Member States, high-speed railway lines have been increasingly built over the last decade. The largest part of these lines in terms of length was installed in France. With their TGV lines France offers 1 272 km or 51.8% of this track type, followed by Spain (19.2%) and Germany (17.4%) where the system (ICE) is different from that used in France and Spain. The figures mentioned in Table 2.4 concern only new lines especially built for high-speed purposes and do not consider existing tracks that might have been adapted for high-speed operation.

The adding of these high-speed lines to the global rail network has obviously not been able to compensate the putting out of service of other parts of the network.

Table 2.4: EU-15 high-speed rail lines*

1981	451 km
1983	567 km
1988	731 km
1990	1 013 km
1991	1 350 km
1992	1 883 km
1993	2 203 km
1994	2 356 km
1995	2 356 km
1996	2 457 km
1997	2 548 km

** Lines especially built for high-speed train traffic.*
Source: UIC.

Most spectacular increase of motorway construction in Greece and Spain

Completely different tendencies as described above can be observed for the development of road networks. Between 1970 and 1996 the total road network increased by almost 26%. Most of this growth has been achieved in the construction of motorways. During the observation period the network of motorways has more than tripled (from 15 677 km in 1970 to nearly 50 000 km in 1996). Extraordinary growth can be noticed for Greece and Spain: the Greek motorway network increased from 11 km in 1970 to 470 km in 1996. A similar development is recorded in Spain where the network increased from 185 km to 7 747 km over the same period, although definitional problems might overstate this increase.

Densest motorway network in Belgium

As far as the length of the total road network is concerned (including motorways), the highest growth during the period 1970-96 has been achieved in Portugal (+67%), Belgium (+54%) and the Netherlands (+36.5%).

In 1996, the most extensive motorway network within EU-15 can be found in Germany with 11 246 km, followed by France (8 596 km) and Spain (7 747 km). Belgium offers the densest motorway network in the world (55 km/1 000km^2) immediately followed by the Netherlands (53 km/1 000 km^2) and Luxembourg (45 km/1 000 km^2). The EU-15 average is 14.5 km per 1 000 km^2, a value close to those registered in France and Spain.

Little passenger traffic over inland waterways

Inland waterways in the EU are nearly exclusively used for the transport of goods. It can be stated that practically no passenger transport takes place using the inland waterway network, except for a very small volume and this mainly for leisure purposes. In the present context, navigable inland waterways are defined as 'rivers, lakes and canals, over which vessels of a carrying capacity of not less than 50 tonnes can navigate when normally loaded'.

Length up 8% in Germany

Between 1970 and 1996, the total length of navigable inland waterways in the nine EU Member States able to perform transport activities using this mode decreased by 2 307 km which represents 7% (see Table 2.5). Germany, with 7 343 km is the main contributor to today's network (24%) and is one of the two Member States (the other country being Finland) which show an increase in network length: +8% in 25 years. Part of the network has gained interest with the opening of the Rhine-Main-Danube canal in the early 1990s, facilitating traffic to Austria.

Italy abandons 871 km in 10 years

France's waterways offer a slightly scattered network structure and experienced a 20% decrease over the last 25 years. Italy ceased to use 871 km of navigable waterways, representing a loss of 37%. The Netherlands, despite a loss of 10% in usable length, continues to be an important user of this mode, both in national and international transport (see Chapter 5.1 - Transport of goods).

Table 2.5: Length of transport networks by country (km)

Railways* (length in use)
Motorways
Other roads
Pipelines* (oil)
Inland waterways* (navigable canals, rivers and lakes)

	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK	EU-15	EU-15 index 1970=100
1970	4232	2352	43777	2571	13668	36117	2189	16089	271	3148	5907	3591	5870	11550	19691	171023	100
	411	162	5874	11	185	1542	0	3913	10	1209	488	75	108	556	1133	15677	100
	93539	62592	541370	34692	139221	710384	86695	281405	4949	*81890*	*102053*	41763	73444	110846	356155	*2720998*	100
	52	-	3358	-	1099	3609	-	1860	-	323	604	-	-	-	1634	12539	100
	1553	-	6808	-	-	7433	-	2337	37	5599	350	-	6000	-	2351	32468	100
1980	3971	2015	42725	2461	13542	34382	1987	16133	270	2760	5847	3588	6096	11382	18490	165649	97
	1252	504	*8979*	91	1933	4801	0	5900	44	1750	927	129	194	809	2556	*29869*	191
	124710	68405	591929	37367	147644	796514	89796	290370	5050	91628	*103553*	*50410*	74490	96504	337077	*2905447*	107
	458	77	3387	-	1753	5254	-	3069	-	391	777	-	-	-	3166	18332	146
	1510	-	6697	-	-	6568	-	2337	37	4843	350	-	6057	-	2351	30750	95
1990	3479	2344	40981	2484	12560	34260	1944	16086	271	2798	5624	3592	5867	10801	17406	160497	94
	1666	653	*10809*	190	5126	6824	26	6185	78	2092	1445	316	225	939	3181	*39755*	254
	138575	70269	617390	38312	156243	801274	92263	297419	5013	102498	*104807*	61222	76855	132619	378934	*3073693*	113
	301	444	3545	-	2678	4948	-	4086	-	391	777	-	-	-	2422	19592	156
	1513	-	6669	-	-	6197	-	*1366*	37	5046	351	-	6160	-	2351	*29690*	91
1993	3410	2349	40369	2484	12601	32579	1944	15942	275	2757	5600	3062	5885	9476	16996	155729	91
	1665	737	11080	330	7404	7614	53	6311	121	2150	1554	579	337	1061	3252	44248	282
	140765	70374	634543	38265	152460	908212	91451	299776	5013	103650	104720	67390	77162	133859	385199	3212839	118
	294	409	3318	-	3536	4830	-	4235	-	391	777	-	-	-	2601	20391	163
	1513	-	7681	-	-	5825	-	1466	37	5046	351	-	6120	-	2353	30392	94
1994	3398	2306	41355	2464	12646	32275	1944	16002	275	2757	5636	2699	5880	9661	16998	156296	91
	1666	786	11143	380	7736	8102	72	6375	123	2167	1589	587	388	1145	3286	45545	291
	141509	70469	*639240*	38265	155828	956657	91432	304100	5013	106800	104679	71619	77256	133869	385789	*3282525*	121
	294	409	3318	-	3536	4830	-	4235	-	391	777	-	-	-	2602	20392	163
	1513	-	7681	-	-	5703	-	1466	37	5046	351	-	6120	-	2353	30270	93
1995	3368	2349	41719	2474	12280	31939	1947	15998	275	2739	5672	2850	5880	9782	17026	156298	91
	1674	786	11190	420	7747	8275	70	6435	115	2207	1596	687	394	1262	3307	46165	294
	142126	70535	*643970*	38265	156760	951097	92360	305500	5046	111144	104715	68045	77328	136233	387799	*3290923*	121
	294	409	3318	-	3691	4830	-	4235	-	391	777	-	-	-	2602	20547	164
	1513	-	7343	-	-	5962	-	1466	37	5046	351	-	6120	-	2353	30191	93
1996	3380	2349	40826	2474	12284	31852	1945	16014	274	2739	5672	2850	5881	10923	17128	156591	92
	1674	825	11246	470	7747	8596	80	6440	118	2207	1607	710	431	1350	3344	46845	299
	142800	70511	*648730*	*38300*	*157700*	955981	92570	306900	5053	111212	104741	69340	77351	136915	389585	*3307689*	122
	:	:	:	-	:	:	-	:	-	:	:	-	-	-	:	:	:
	1513	-	7343	-	-	5962	-	1466	37	5046	351	-	6120	-	2353	30191	93

Sources: Eurostat, UIC, UN-ECE, national statistics. Estimates in italic - underlined: break in time series.
**Railways:* data refer to main railway companies (UIC-members) - Pipelines: only pipelines longer than 40 km are considered.

2.3. Expenditure

In 1993 the EU-15 Member States spent almost ECU 68 billion (in 1994 prices) for transport infrastructures. This is a 46% increase compared with 1985. Investments in 1994 were slightly lower: ECU 67 billion. Average annual growth in the period 1985-94 was 4.35% (see Table 2.6).

Expenditure in this domain represents the total public investment of Member States in road, rail, inland waterway and aviation infrastructures, like roads, rail tracks, airports, transport terminals and the like. Figures do not include investments in rolling stock or other vehicles.

Big efforts from Spain and Portugal

Table 2.6 also offers an insight into how much the Member States have been spending over the years. In 1994, the average spending in EU-15 counted for 1.1% of the total GDP generated at EU-15 level. The two Member States of the Iberian peninsula performed particularly well with a 1.4% share for Spain and 1.7% share for Portugal.

Graph 2.7 outlines the absolute sums invested in transport infrastructures and compares the 1994 situation to the one in 1985.

Expected high share for the road network

As data availability in this sector is relatively poor, a selection of 10 Member States proved necessary (representing approximatively 90% of total investments made) in order to establish a base for a modal split.

Graph 2.8 outlines that about three quarters of the total investments are dedicated to road infrastructure. However, considerable investments are being made in the railway infrastructure; thus, the slight upward trend of the roads' share in the early 1990s is not expected to continue.

Spending on rail infrastructures has been decreasing by 4% between 1985 and 1992 and accounted for one fifth of total expenditure.

Inland waterways' share was at a low level throughout the period observed and reached 1.9% in 1992. However, this image is influenced by the fact that not all countries feature this transport mode. If only countries with significant inland waterways are taken into account, the equivalent figure rises to 2.7%. Countries with intensive inland shipping invest relatively more in this mode: for instance, in 1991, nearly 8% of infrastructure expenditure in the Netherlands was on inland waterways.

Overall, the figures reflect the trends and developments of the various transport modes fairly well, both at EU and national level.

Table 2.6: Transport infrastructure investments - in million ECU (1994 prices)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1994 - % of nat. GDP
Belgique/België	2 195	2 085	1 718	1 807	1 427	1 369	1 559	1 826	2 063	1 970	1,0
Danmark	571	534	538	657	790	768	823	1 088	923	*800*	0,7
Deutschland (-W.)*	13 772	14 293	14 079	13 755	13 819	14 014	20 397	21 186	20 489	20 958	1,2
Ellada*											
España	2 141	2 091	2 532	3 709	4 517	5 938	6 271	5 631	5 651	5 552	1,4
France	9 519	9 835	9 956	10 903	10 972	12 321	13 490	13 591	13 428	12 812	1,1
Ireland	246	240	200	201	249	308	343	368	465	*500*	1,1
Italia	7 210	7 475	9 115	9 873	9 752	10 087	9 931	10 232	8 938	*8 500*	1,0
Luxembourg	88	87	108	114	122	113	161	182	177	158	1,3
Nederland	1 876	1 693	1 849	1 796	1 932	2 150	2 179	2 194	2 309	*2 400*	0,9
Österreich	1 941	1 926	1 588	1 638	1 673	1 977	1 795	1 675	1 766	1 591	1,0
Portugal	304	373	437	538	629	871	1 005	854	975	1 203	1,7
Suomi/Finland	806	851	923	879	951	1 030	1 044	1 007	880	887	1,1
Sverige	941	889	961	1 068	1 257	1 389	1 160	1 416	1 787	2 125	1,3
United Kingdom	4 727	4 704	5 308	6 175	7 339	8 544	8 186	8 372	8 027	7 511	0,9
EU-15	46 337	47 076	49 312	53 113	55 429	60 879	68 344	69 622	67 878	*66 967*	1,1
Index (1985=100)	100	102	106	115	120	131	147	150	146	*145*	

Sources: European Centre for Infrastructure Studies - 1996 report; DG VII (estimates).

Estimates in italic.

** No data available for Greece and former GDR and new Länder respectively.*

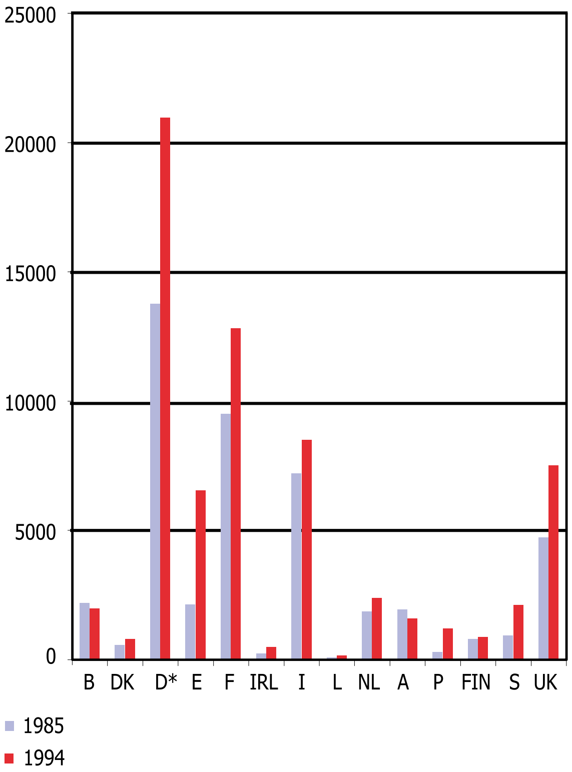
EIB as an important financier

The concept of the trans-European transport network (TENs, see next chapter), outlines the supra-national dimension of transport networks.

Public sector funds for the financing of major projects are increasingly combined with private capital.

In 1997, the European Investment Bank (EIB) as an important financier of infrastructure projects borrowed ECU 6 879 million for projects in the transport sector alone. 43% of this amount was attributed to investments for roads and motorways, 28% on railway investments and 29% on air transport and shipping. Since 1993, the EIB has provided ECU 46 billion for TEN projects alone, of which 38 billion was for projects within the European Union.

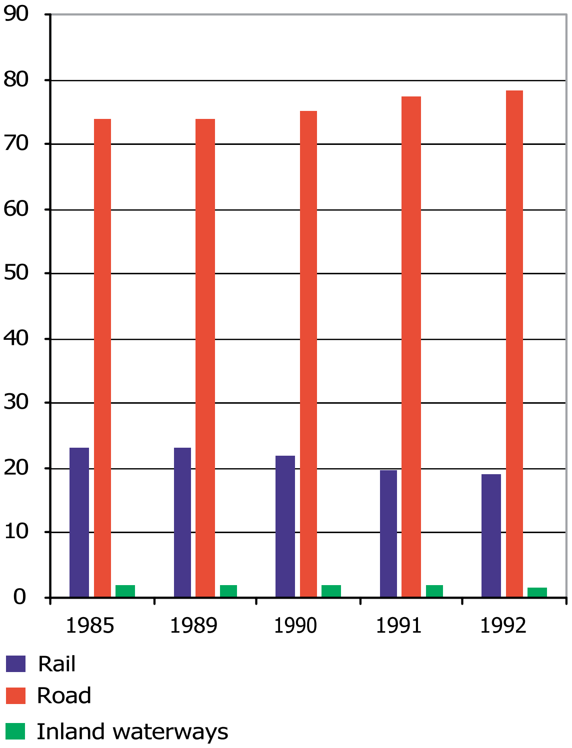
Graph 2.7: Transport infrastructure investments - in million ECU (1994 prices)



* Excluding new Länder respectively former GDR.

Source: European Centre for Infrastructure Studies.

Graph 2.8: Modal split in infrastructure expenditure * (Share in %)



** all EU Member States except EL, IRL, L and A.*

Source: ECMT.

2.4. Trans-European transport networks (TENs)

The Maastricht Treaty provided the background for the development of trans-European networks (TENs) for telecommunications, energy and transport. This chapter outlines the main ideas and projects linked to the development of the transport-TEN.

Further coordination and integration of national networks

A comprehensive, environmentally responsible European transport network is of prime importance for employment, competitiveness and growth.

The trans-European transport network should lead to a gradual integration of national networks. A single network of a European dimension should ensure mobility of persons and goods, offer high quality infrastructures combining all modes of transport and allow optimal use of existing capacities.

Guidelines adapted every five years

The community guidelines for the development of the transport-TEN (Council Decision No 1692/96/EC) mention the characteristics of the different networks. Every five years, the Commission evaluates progress made in setting up the network and state whether the guidelines need to be adapted.

Community measures for the rail network include :

- the gradual establishment of the network consisting in the infrastructure and fixed installations. This includes the creation of a high-speed network and the maintenance or upgrading of conventional lines;
- the achievement of technical interoperability of the European high-speed train network;
- the taking into account of requirements concerning safety, reliability, human health, environmental protection, technical compatibility and operation.

For the road network, measures focus:

- on the forging of missing links and in particular those on cross-frontier intra-Community axes and those that are attractive to peripheral or enclosed areas;
- on improvements on existing links, especially on cross-border axes and peripheral areas;
- on connections between certain non-member countries;
- on inter-modal connections aimed at combined-transport axes;
- on bypasses for the principal urban nodes located on the road-TEN;
- on the development and implementation of computerised traffic-management systems.

Measures for the inland waterway network comprise:

- the building of missing links in the existing network or the removing of bottlenecks through efficient traffic management systems;
- the notion of a multi-modal approach: complementarity with other modes through improved port infrastructures.

A complete TEN by 2010

The European Commission has prepared a complete TENs design which it estimates will cost around ECU 400 billion to make a reality by 2010. All of the projects have been approved by the Member States concerned and several are already underway.

Fourteen priority projects

Fourteen transport projects of common interest (with an estimated cost of ECU 110 billion) were endorsed as priorities during the European Council meeting in Essen in December 1994 (see window). These projects also reflect the priority attached to the strengthening of alternatives to road transport. About 80% of the estimated total of ECU 110 billion investment is on rail links; a further 9% on road/rail links. Only 10% of the investment is dedicated to new road building. However, It should be mentioned that the TEN road network already largely exists. Most of the planned work relates to the upgrading of low quality existing roads.

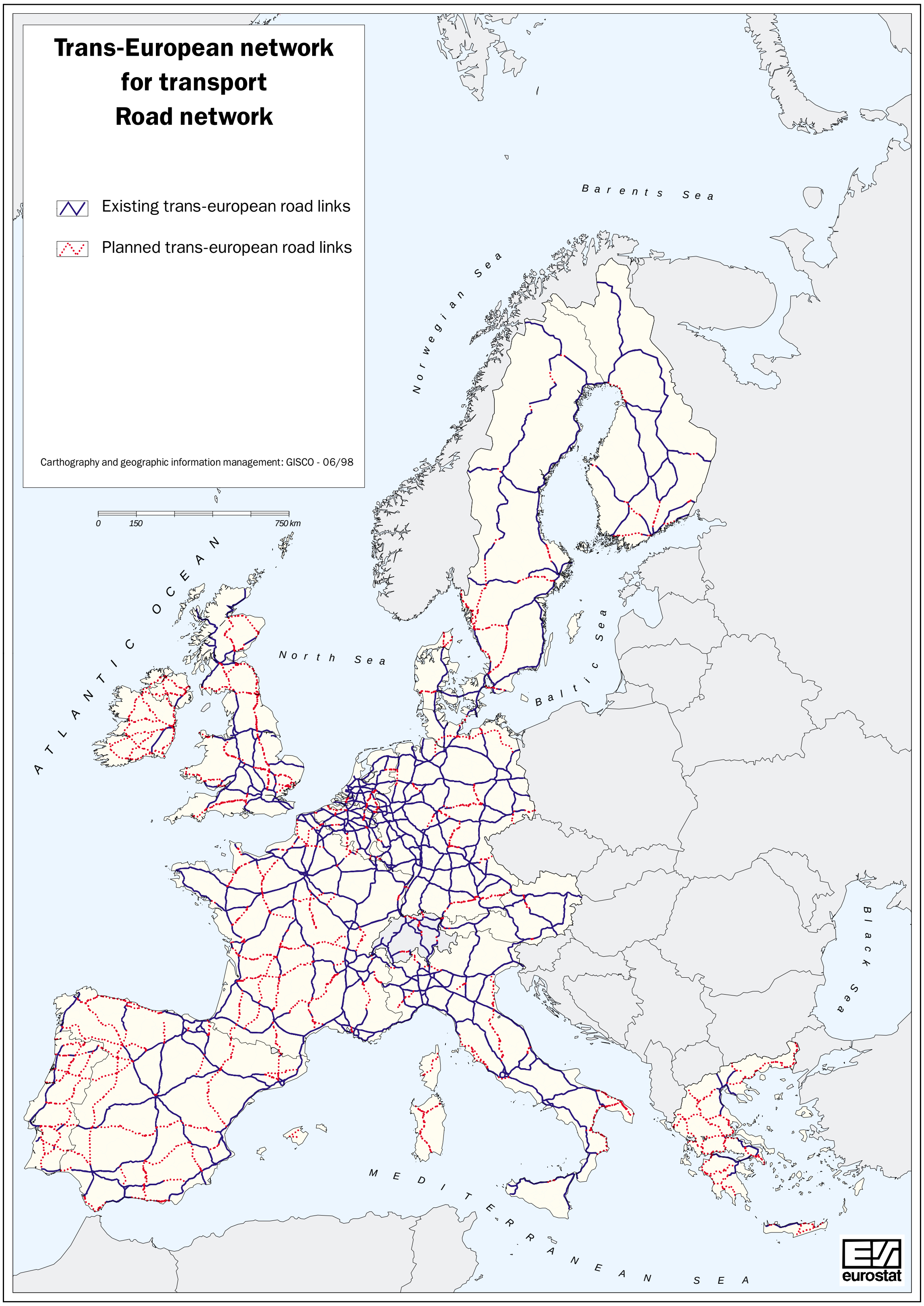
Three of the 14 priority projects are close to completion (Projects 9, 10 and 11,see window); for six other projects (Projects 2, 3, 4, 5, 7 and 14) financing is largely in place and should be completed by around 2005. For the remaining projects, timescales run significantly beyond 2005 apart from uncertainties in the financing of important sections of the projects.

Multiple-source funding

Overall, in the period 1993-98 from the total of ECU 13 000 million spent on the 14 priority projects, around 3 000 million has come from the EU's budgets. Budgets available include the EU's dedicated TEN transport budget (ECU 1 800 million available for the period 1995-99) and, for projects in eligible areas, money from the Structural and Cohesion Funds.

TENs for transport: 14 priority projects

1. High-speed train Paris-Brussels-Cologne-Amsterdam-London (PBCAL)
2. High-speed train / combined transport north-south (Berlin-Brenner-Verona)
3. High-speed train South: from Madrid, two links northwards to join French high-speed network
4. High-speed train Paris-eastern France-southern Germany (including Metz-Luxembourg branch)
5. Conventional rail/combined transport 'Betuwe line' (linking Rotterdam with Rhein/ Main-Rhein/ Neckar centres)
6. High-speed train/combined transport France-Italy (Lyon-Turin-Milan-Venice-Trieste)
7. Greek motorways PATHE (north-south axis) and Via Egnatia (east-west axis)
8. Lisbon-Valladolid motorway
9. Conventional rail link Cork-Dublin-Belfast-Larne-Stranraer (upgrading of existing line)
10. Malpensa airport, northern Italy (doubling of runway capacity, new terminal and cargo facilities)
11. Öresund fixed link (four-lane motorway and double-track rail line between Denmark and Sweden) including access routes
12. Nordic triangle (Copenhagen-Oslo/ Stockholm-Helsinki: various road and rail projects)
13. Ireland-United Kingdom-Benelux road corridor
14. West coast main rail line - United Kingdom (upgrading)


Trans-European network
for transport
Road network
Existing trans-european road links
Planned trans-european road links
Carthography and geographic information management: GISCO - 06/98
0
150
750 km
Barents Sea
Norwegian Sea
ATLANTIC OCEAN
North Sea
Baltic Sea
Black Sea
MEDITERRANEAN SEA
eurostat

Trans-European network
for transport
Rail network
Existing conventional lines
Planned conventional lines
Existing high-speed lines
Planned high-speed lines
Upgraded high-speed lines
Planned upgraded high-speed lines
Carthography and geographic information management: GISCO - 06/98
0
150
750 km
Barents Sea
Norwegian Sea
ATLANTIC OCEAN
North Sea
Baltic Sea
Black Sea
MEDITERRANEAN SEA
eurostat

3. Means of transport

Transport equipment can roughly be defined as all means that enable the transport of goods and/or persons; thus not only cars, buses, lorries and trains (composed of locomotive and wagons) are meant here, but also road trailers and semi-trailers, rail goods vehicles, bicycles and powered two-wheelers.

In the frame of this chapter however, only the main transport equipment related to road, rail and inland waterways transport will be highlighted.

One in 10 jobs related to car industry

The European transport equipment industry is of considerable importance, both for intra- and extra-European trade: the automotive industry alone accounts for about 10% of the total industrial value added. It is estimated that one out of every 10 EU-15 jobs is directly or indirectly linked to the automotive industries, and although the market for passenger cars and goods vehicles is sensitive to economic fluctuations, this industrial branch has kept its importance within the EU-15 economy.

Rail equipment succesful outside the EU

By its excellent reputation with regard to know-how and applied technologies, the rail equipment industry scores very well in extra-EU export too.

With the privatisation process of formerly State-owned railway enterprises and the gradual introduction of European-wide high-speed train connections (see also Chapter 2.4 - Trans-European transport networks), the rail equipment industry faces new challenges.

60% less rail goods wagons than in 1970

When considering the EU data relating to rail transport in table 3.1, the considerable change in rail transport becomes obvious: at EU-15 level, all three categories considered here (locomotives, rail passenger vehicles and rail goods wagons) show a drop in number. Goods wagons are particularly affected.

Table 3.3 shows that all Member States, except Greece with a very modest relative increase, experienced very serious cuts in their stock of rail goods vehicles culminating in -96% for the UK. In the entire EU, 923 000 goods wagons were taken out of service between 1970 and 1996. A cautious interpretation of these figures is however requested: a growing number of vehicles are no longer owned but leased, and do not appear in the statistics anymore.

Along with a higher share of electrified tracks, the stock of locomotives (railway vehicles equipped with a prime mover and motor or with a motor only used for hauling railway vehicles) changed: in 1970, one third of EU-15 locomotives were powered by electricity; in 1996 this figure stood at 50%. However, the total number of locomotives decreased by 12% in roughly the same period (1970-94).

Table 3.3 outlines that the largest reduction in stock was registered for the United Kingdom (-57%) followed by Germany (-42%) and Sweden (-41%).

Table 3.1: Means of transport - key indicators EU-15

		1970	1980	1990	1991	1992	1993	1994	1995	1996
ROAD	Cars (million)	60.77	102.61	145.61	149.76	153.05	155.74	159.35	161.72	165.54
	Buses and coaches (1 000)	317	427	467	461	464	467	473	473	483
	Goods vehicles (1) (1 000)	7 899	11 342	16 656	17 465	17 934	17 931	18 330	18 800	19 483
	Trailers and semi-trailers (1 000)	1 693	3 250	6 409	6 468	6 466	6 381	6 344	*6 350*	*6 360*
RAIL	Locomotives (units)	46 958	48 038	43 989	44 062	41 442	40 943	*41 383*	:	:
	Passenger vehicles (2) (units)	96 797	95 858	86 326	85 658	84 805	83 940	80 183	77 408	75 505
	Goods transport wagons (3) (1 000)	1 508	1 221	839	804	784	720	650	608	585
IWW	Self-propelled goods vessels (4) (units)	30 483	21 714	17 124	16 213	16 032	15 878	15 679	:	:

(1) lorries and tractors
(2) coaches, railcars and trailers
(3) data relate to main railway companies (UIC members)
(4) including tugs and pushers
Sources: Eurostat, IRF, UIC, national statistics.

Estimates in italic.

Table 3.3: Rail transport equipment in EU-15

Stock of locomotives (units)

	1970	1980	1990	1991	1992	1993	1994
Belgique / België	1 536	1 794	1 727	1 738	1 717	1 696	1 607
Danmark	753	802	874	976	946	964	953
Deutschland	15 275	15 405	14 308	14 502	14 619	14 008	12 733
Ellada	247	313	401	411	417	421	422
España	*1 700*	1 860	1 985	2 057	2 073	2 152	2 143
France	7 303	7 611	7 422	7 475	5 664	5 390	7 183
Ireland	307	192	166	166	166	152	253
Italia	4 179	5 506	*5 000*	*4 500*	4 082	4 845	*5 000*
Luxembourg	109	96	99	112	116	116	*116*
Nederland	1 262	1 298	1 244	*1 241*	1 238	1 210	*1 200*
Österreich	1 400	1 450	1 553	1 597	1 628	1 603	1 605
Portugal	450	523	548	600	591	608	577
Suomi / Finland	*1 100*	1 020	*800*	790	771	770	765
Sverige	1 800	1 758	1 304	1 228	1 165	1 038	1 056
United Kingdom	9 537	8 410	6 558	6 669	6 249	5 970	5 770
EU-15	*46 958*	48 038	*43 989*	*44 062*	41 442	40 943	*41 383*
index 1970=100	100	102	94	94	88	87	88

Goods transport rail wagons (1 000)

	1970	1980	1990	1991	1992	1993	1994	1995	1996
Belgique / België	48.9	43.4	30.3	29.6	28.6	20.8	20.0	20.3	19.6
Danmark	10.3	8.3	4.6	4.5	4.7	4.6	4.2	4.1	4.1
Deutschland	459.0	476.4	366.8	363.9	360.7	312.2	271.5	245.9	240.5
Ellada	9.0	10.9	11.0	11.0	11.0	11.1	11.1	11.1	11.1
España	41.0	41.0	37.2	36.1	35.0	31.5	33.0	29.7	28.7
France	302.4	253.1	162.0	141.0	138.2	134.3	124.6	116.1	112.2
Ireland	9.5	4.7	1.8	1.8	1.8	1.8	1.8	1.8	1.6
Italia	125.9	113.4	99.7	97.4	95.0	91.6	90.0	89.1	80.6
Luxembourg	4.2	3.7	2.7	2.5	2.6	2.5	2.6	2.4	2.3
Nederland	19.2	12.3	6.7	6.4	6.3	6.4	6.0	6.0	5.8
Österreich	34.9	38.7	34.3	34.8	36.6	34.7	31.9	28.9	27.1
Portugal	9.0	6.7	4.6	4.4	4.4	4.2	4.2	3.9	4.2
Suomi / Finland	21.9	21.5	15.2	14.7	14.1	14.0	14.0	14.0	13.7
Sverige	48.2	45.9	27.5	25.0	23.5	22.4	21.0	20.4	19.9
United Kingdom	364.9	141.2	34.4	30.9	21.2	27.7	14.2	14.0	14.0
EU-15	1508	1221	839	804	784	720	650	608	585
index 1970=100	100	81	56	53	52	48	43	40	39

Passenger rail transport wagons (units)

	1970	1980	1990	1991	1992	1993	1994	1995	1996
Belgique / België	3 415	3 641	3 286	3 252	3 231	3 173	3 109	3 110	3 271
Danmark	1 481	1 613	1 594	1 586	1 666	1 665	1 623	1 688	1 534
Deutschland	31 506	29 118	24 139	23 949	23 210	23 109	19 616	19 083	18 163
Ellada	574	660	810	820	830	854	861	869	869
España	3 353	3 506	3 839	3 948	3 972	4 119	4 193	4 230	4 448
France	15 053	15 922	15 748	15 764	15 682	15 507	15 589	15 799	15 764
Ireland	481	343	314	317	322	315	318	318	334
Italia	11 357	13 611	14 025	13 959	14 148	13 893	13 744	13 527	13 068
Luxembourg	114	102	114	142	150	148	146	146	146
Nederland	1 932	1 986	2 268	2 332	2 563	2 519	2 631	2 611	2 691
Österreich	4 125	4 055	3 689	3 833	3 834	3 832	3 779	3 740	3 287
Portugal	980	1143	1 232	1 252	1 270	1 244	1 346	1 341	1 394
Suomi / Finland	1 043	1 095	957	971	979	979	968	977	947
Sverige	2 705	2 021	1 747	1 708	1 657	1 584	1 623	1 655	1 589
United Kingdom	18 678	17 042	12 564	11 825	11 291	10 999	10 637	8 314	8 000
EU-15	96 797	95 858	86 326	85 658	84 805	83 940	80 183	77 408	75 505
index 1970=100	100	99	89	88	88	87	83	80	78

NB: Figures relate to UIC member companies only.

Sources: Eurostat, UIC, UN-ECE, national statistics.

Estimates in italic.

Table 3.4: Road transport equipment

Passenger cars (million)	1970	1980	1990	1991	1992	1993	1994	1995	1996	Cars per 1 000 inhab. 1996
Belgique / België	2.06	3.16	3.86	3.97	4.02	4.11	4.21	4.27	4.31	424
Danmark	1.08	1.39	1.59	1.59	1.61	1.62	1.63	1.67	1.73	329
Deutschland	15.11	25.87	35.50	36.95	37.95	38.89	39.77	40.40	41.05	501
Ellada	0.23	0.86	1.74	1.78	1.83	1.96	2.08	2.20	2.34	223
España	2.38	7.56	12.00	12.54	13.10	13.44	13.73	14.21	14.75	376
France	11.90	18.40	26.44	27.07	27.31	27.60	27.68	27.76	27.87	477
Ireland	0.39	0.74	0.80	0.82	0.86	0.89	0.94	0.96	0.99	272
Italia	10.18	17.69	27.42	28.44	29.43	29.65	30.87	31.70	32.79	571
Luxembourg	0.07	0.13	0.18	0.19	0.20	0.21	0.22	0.23	0.23	559
Nederland	2.56	4.55	5.51	5.55	5.66	5.76	5.88	5.63	5.74	370
Österreich	1.20	2.25	2.99	3.10	3.25	3.37	3.48	3.59	3.69	458
Portugal	0.42	0.92	1.85	2.01	2.02	2.21	2.40	2.56	2.75	277
Suomi / Finland	0.71	1.23	1.94	1.92	1.94	1.87	1.87	1.90	1.94	379
Sverige	2.29	2.88	3.60	3.62	3.59	3.57	3.59	3.63	3.66	413
United Kingdom	10.20	14.99	20.20	*20.20*	20.30	20.60	21.00	21.00	21.70	369
EU-15	60.78	102.61	145.61	149.76	153.05	155.74	159.35	161.72	165.54	444
index 1970=100	100	169	239	246	252	256	262	266	272	246

Buses and coaches (1000)	1970	1980	1990	1991	1992	1993	1994	1995	1996
Belgique / België	16.2	19.6	15.6	15.4	15.0	15.0	14.9	14.6	14.7
Danmark	5.0	7.4	8.1	10.0	11.3	13.0	13.6	13.5	14.0
Deutschland	64.0	95.8	100.4	89.6	90.9	88.4	88.5	86.3	90.0
Ellada	10.5	18.0	21.4	22.1	22.7	23.2	23.5	24.6	25.1
España	30.7	42.6	45.8	46.6	47.2	47.0	47.0	47.4	48.4
France	41.0	65.0	75.0	77.0	76.0	77.7	79.3	80.0	82.0
Ireland	2.0	2.7	4.0	4.4	4.6	6.0	6.2	6.4	6.6
Italia	32.9	58.1	77.7	78.6	78.2	77.0	78.0	77.2	78.0
Luxembourg	0.6	0.6	0.8	0.8	0.8	0.8	0.9	0.8	0.9
Nederland	9.5	11.2	12.1	12.4	12.3	12.2	11.0	12.0	*12.0*
Österreich	6.8	9.0	9.4	9.3	9.4	9.5	9.6	9.8	9.7
Portugal	5.9	8.5	12.1	12.3	12.8	13.6	14.3	15.0	*15.6*
Suomi / Finland	8.1	9.0	9.3	8.9	8.7	8.3	8.1	8.1	8.2
Sverige	14.3	12.8	14.6	14.5	14.2	14.1	14.3	14.6	14.9
United Kingdom	79.2	78.3	73.0	72.0	72.0	73.0	75.0	75.0	*75.0*
EU-15	327	439	479	474	476	479	484	485	495
index 1970=100	100	134	147	145	146	146	148	148	151

Table 3.4: Road transport equipment (continued)

Goods vehicles* (1 000)

	1970	1980	1990	1993	1994	1995	1996
Belgique / België	198	234	311	446	457	473	486
Danmark	247	253	294	314	330	342	349
Deutschland	*1 223*	*1 572*	*1 731*	2 140	2 235	2 345	2 408
Ellada	106	401	743	827	850	885	916
España	716	1 362	2 401	2 812	2 912	3 024	3 152
France	1 558	2 643	3 735	3 787	3 774	3 773	*3 781*
Ireland	104	132	214	209	205	196	190
Italia	890	1 371	2 417	2 389	2 402	2 578	*2 930*
Luxembourg	10	12	18	24	25	25	26
Nederland	294	336	543	641	692	621	604
Österreich	122	190	262	287	295	303	307
Portugal	104	237	575	772	856	894	946
Suomi / Finland	112	149	264	253	249	276	263
Sverige	149	186	314	306	308	313	317
United Kingdom	2 066	2 264	2 835	2 723	2 739	2 752	2 807
EU-15	7 899	11 342	16 656	17 931	18 330	18 800	19 483
Index 1970=100	100	144	211	227	232	238	247

Number of trailers and semi-trailers (1 000)

	1970	1980	1990	1993	1994	1995	1996
Belgique / België	25	51	95	103	113	119	126
Danmark	35	128	318	332	347	362	384
Deutschland	1070	1905	3565	3385	3215	3050	2900
Ellada	2	5	9	10	10	11	11
España	18	48	106	117	128	136	145
France	81	156	165	172	174	173	174
Ireland	9	12	19	18	18	17	17
Italia	104	264	600	650	713	770	840
Luxembourg	6	12	9	8	7	6	6
Nederland	33	68	140	150	160	175	190
Österreich	24	50	296	312	330	346	283
Portugal	31	72	160	170	184	190	210
Suomi / Finland	10	23	345	362	377	389	404
Sverige	85	252	348	441	449	393	408
United Kingdom	160	204	234	238	241	244	246
EU-15	1 693	3 250	6 409	6 468	6 466	6 381	6 344
index 1970=100	100	192	379	382	382	377	375

Estimates in italic; underlined: break in time series.

* *Difference in definition between countries:* some countries include vans - therefore limited comparability. Road tractors included for all countries.

Sources: DG VII, Eurostat/ECMT/UN-ECE, IRF, national statistics.

In 1996, 75 505 rail passenger vehicles were available in the EU-15: a 22% drop compared to 1970, the sharpest decline being registered from 1980 onwards. The total number of rail passenger transport vehicles taken off the tracks between 1970 and 1996 corresponds to the 1996 stock of these vehicles in Belgium, Denmark, Italy and Austria together.

An increase in the number of rail passenger transport vehicles can be registered in eight Member States: highest growth in relative terms can be found for Greece (+51%) followed by Portugal (+42%) and the Netherlands (+39%).

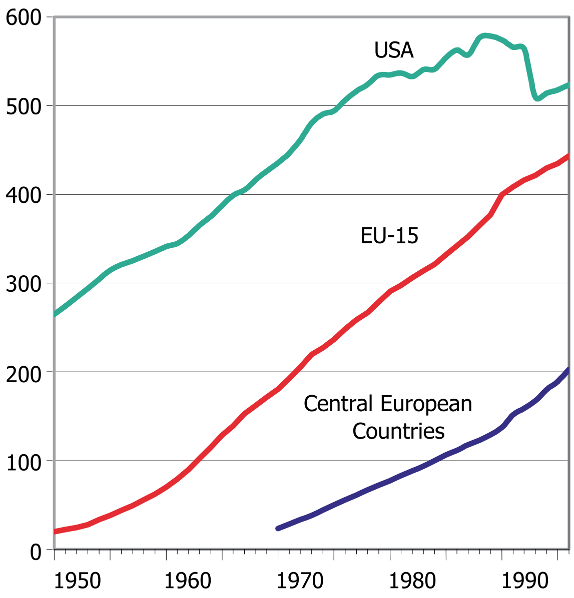
More than 165 million cars on EU-15 roads

The constantly growing demand for personal mobility has mostly been met by an important increase in the number of cars; increased demand for goods transport mainly by an important growth in the number of lorries, road tractors, trailers and semi-trailers.

More than 165 million cars were on the EU-15 roads in 1996: an impressive 172% growth in just a quarter of a century (annual growth rate: just under 4%).

Graph 3.2 gives an overview of the development of the level of motorisation in the EU, the USA and the central European countries. Car density in the EU nearly doubled in 20 years and reached 444 units per 1 000 inhabitants in 1996.

Graph 3.2: Motorisation
- cars per 1000 inhabitants



** USA:* change in time series from 1993.
Source: DG VII.

Unsurprisingly, average annual growth rates were highest in Greece (+9.8%), Portugal (+7.8%) and Spain (+7.2%). The lowest rates were registered for Denmark (+1.69%) and Sweden (+1.85%). In 1996, two Member States had a car-density higher than the US average : Italy and Luxembourg (with 571 and 559 cars per 1 000 inhabitants respectively). However, the US figures only take into account the category ‘passenger cars’; the impressive number of pick-up trucks and vans used as passenger cars (but a statistical sub-category of ‘commercial vehicles’) are not considered. Motorisation level in the USA is thus higher than the curve of Graph 3.2 suggests.

The stock of buses and coaches expectedly progressed less than private cars, however, a 52% increase at EU-15 level is registered for the period 1970-96.

Mainly the first decade of the observation period saw impressive developments. Between 1970 and 1996, only two Member States registered a negative development: Belgium (-9%) and the United Kingdom (-5%). Quite to the contrary, spectacular increases can be noticed in Ireland (+230%), Denmark (+180%) and Portugal (+164%). It should be noted that these figures include buses used in urban common transport.

Lorries ‘compensate’ rail goods wagons

Goods road vehicles have obviously been compensating the considerable reduction of rail goods wagons: their number rose by 150% between 1970 and 1996. Goods road vehicles as mentioned in Table 3.4 include lorries, road tractors (only capable of goods haulage when a semi-trailer is attached) and sometimes vans. The fact that certain countries include vans makes comparison somewhat problematic.

This aspect plays when looking at Graph 3.5: it appears to be remarkable that the number of road tractors is that low. Only 4.3 % of all goods road vehicles in EU-15 consist of road tractors: a figure that does not match the picture one has in mind while on the road. The reason can be found in the fact that approximatively 70% of the goods vehicles have a carrying capacity of ‘less than 1.5 tonnes’: this class corresponds to relatively small ‘light duty’ vehicles, leaving a much less ‘obstructive’ impression on the road.

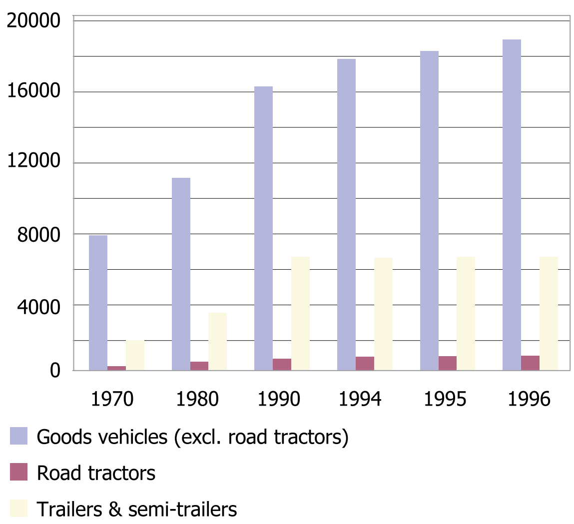
The interest of semi-trailers

Road tractors alone will not carry goods: semi-trailers will be attached to them. The number and size of semi-trailers gets more attention when considering their potential in combined (road - rail) transport.

Table 3.1 also offers an overview of the number of trailers (coupled to lorries) and semi-trailers together. In 1996, their number exceeded 6.3 million in total, a 276% increase compared to 1970.

If one would consider trailers and semi-trailers as ‘goods vehicles’, a total of 25.9 million vehicles were used for goods transport in EU-15 in 1996.

Graph 3.5: Goods road vehicles in EU-15



Source: Eurostat.

50% of the inland vessels disappeared

In 1994, EU-15 only offered half the amount of vessels than it did in 1970. Various scrappage schemes in individual Member States have contributed to this decrease. Nevertheless, the 1994 fleet offered roughly the same transport performance than in 1970 (1970: 106 million tkm, 1994: 112 million tkm - see Chapter 5.1.1). The improvement of transport efficiency in this domain is thus quite remarkable.

While the number of vessels increased in Luxembourg, Finland and the UK, the fleet decreased sharply in the other Member States.

About 14 800 vessels have been taken off the transport market. Vessels concerned were often of the smaller category, unable to operate economically.

Highest reductions in the number of vessels can be observed for France, Belgium and Germany (50% or more).

The number of dumb and pushed barges has experienced a similar drop between 1970 and 1994: their number was cut by 50%; only Italy managed to keep its fleet.

Table 3.6: Inland waterway transport equipment

Self-propelled goods vessels, tugs and pushers (units)	1970	1980	1990	1991	1992	1993	1994
Belgique / België	5 092	3 107	1 871	1 732	1 684	1 665	1 650
Danmark	-	-	-	-	-	-	-
Deutschland*	6 038	4 464	3 230	3 016	3 129	3 135	3 018
Ellada	-	-	-	-	-	-	-
España	-	-	-	-	-	-	-
France	5 790	4 254	2 514	2 261	2 057	1 829	1 803
Ireland	-	-	-	-	-	-	-
Italia	3 124	2 347	2 755	2 740	2 802	2 847	2 853
Luxembourg	17	18	25	26	31	36	44
Nederland	9 885	6 966	6 136	5 836	5 716	5 755	5 678
Österreich	57	64	61	56	56	51	40
Portugal	-	-	-	-	-	-	-
Suomi / Finland	90	113	136	143	154	157	160
Sverige	-	-	-	-	-	-	-
United Kingdom	390	381	396	403	403	403	403
EU-15	30 483	21 714	17 124	16 213	16 032	15 878	15 649
index 1970=100	100	71	56	53	53	52	51

Dumb and pushed barges (units)	1970	1980	1990	1991	1992	1993	1994
Belgique / België	455	190	164	161	165	169	171
Danmark	-	-	-	-	-	-	-
Deutschland*	2 200	1 732	1 566	1 300	1 188	1 291	1 313
Ellada	-	-	-	-	-	-	-
España	-	-	-	-	-	-	-
France	1 591	1 211	768	824	836	740	775
Ireland	-	-	-	-	-	-	-
Italia	393	217	372	322	369	381	390
Luxembourg	0	0	0	0	0	0	0
Nederland	1 523	925	937	915	890	890	900
Österreich	225	150	171	166	175	147	130
Portugal	-	-	-	-	-	-	-
Suomi / Finland	70	57	23	23	23	23	23
Sverige	-	-	-	-	-	-	-
United Kingdom	1 610	1 228	411	427	427	427	427
EU-15	8 067	5 710	4 412	4 138	4 073	4 068	4 129
index 1970=100	100	71	55	51	50	50	51

** including former GDR for 1970-90 data.*
Sources: Eurostat/ECMT/UN-ECE, national statistics.

4. Enterprises and employment

4.1. General development

The following two chapters outline the degree of importance of employment in the transport sector. In that context, the transport sector represents employment in enterprises and companies whose main activity consists in the transport of goods and passengers and related activities. Enterprises producing or retailing transport equipment are not considered; neither is transport as a secondary activity within other sectors.

Transport closely related to other sectors

The evolution of the transport sector is highly influenced by general economic activity. Indeed, there is very close inter-relation between the transport sector and the various other sectors of the economy. On one hand, the other sectors need an efficient transport sector to develop; on the other hand, the transport sector depends on the other sectors' activity.

Several external factors have had a major impact on the transport industry: the increased globalisation of economies, the completion of the European single market, the changes in production methods of the manufacturing industries (just-in-time production, leading to more frequent deliveries of smaller quantities) and the continuing deregulation of transport activities (for example cabotage rights, cross-trade, liberalisation of rail transport).

More than 6 million persons in 768 000 enterprises

In the European Union, the transport sector generates approximately 4% of the total GDP and in 1994 offered a job to more than 6 million persons (see Table 4.1). This represented 4.2% of the total EU-15 employment.

In addition, the transport equipment industry, comprising car and motorcycle manufacturers (including spares and accessories), naval construction, locomotive and rail wagon manufacturing as well as the aviation equipment industry is one of the main branches of activity in the European Union.

In the frame of this publication, only enterprises and employment related to transport activities will be highlighted.

Both employment and enterprises figures presented in the current and the next chapter are based on the NACE Rev. 1 classification. It should be noted that the category 'water transport' includes maritime transport and that 'auxiliary transport activities' refers to enterprises and employment that go beyond the three inland transport modes (road, rail and inland waterways).

Rail and air transport still dominated by a few large companies

The total number of enterprises operating in the transport services in the European Union now exceeds 768 000. The sector is a mixture of public, semi-public and private companies.

In the case of rail and air transport, a few large companies dominate the market. This contrasts with the highly competitive 'other land transport' and 'auxiliary transport activities' categories where small and medium-sized enterprises (SMEs) take the lion's share.

Table 4.1: Enterprises and employment in the EU - 1994/95

	Railway transport	Road and other land transport (incl. pipelines)	Water transport (maritime and inland)	Air transport	Auxiliary transport activities	TOTAL
Number of enterprises	383	631 494	15 767	3 252	117 237	768 133
Employment (1 000)	1 062.1	2 860.2	234.9	346.5	1 658.9	6 162.6
Average number per enterprise	2 773.1	4.5	14.9	106.5	14.1	8.0

Sources: Eurostat, national statistics.

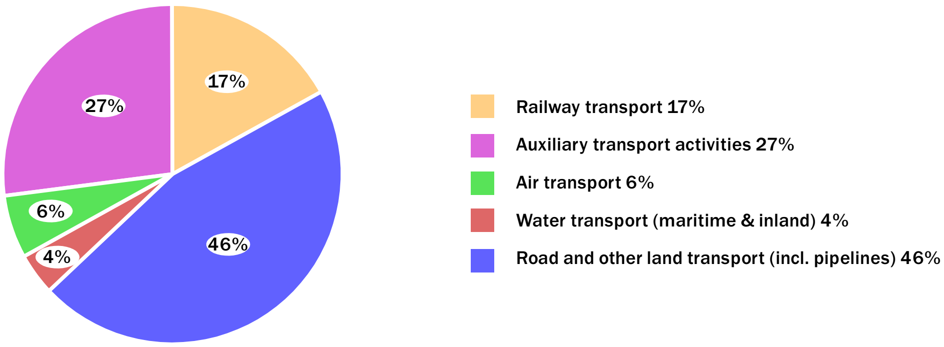
Nearly half of the jobs linked to road transport

Graph 4.2 shows that of the 6.16 million jobs in the transport sector, nearly half (46%) can be found in the category 'other land transport (including pipelines)'. Most of these jobs are linked to road transport activities.

The number of enterprises in this category is high : 631 494; this results in an average of 4.5 employed persons per enterprise, an indicator for a high proportion of SMEs.

Auxiliary transport activities (exploitation of roads, bridges, tunnels, car parks and river locks; loading, unloading and servicing of maritime ships and inland waterway vessels, activities related to airports; air traffic control, etc.) offer an average enterprise size of 14.1 persons per company - similar to the statistical average of the 'water transport' category with 14.9 persons. However, the latter figure only has limited value since maritime shipping companies (with relatively high numbers of employed persons per company) are balanced by operators of inland waterway vessels (often operated as a 'family business' or by individual persons).

Graph 4.2: Employment in the transport sector: distribution by branch - 1995



Source: Eurostat.

4.2. Number of enterprises and employment by country

Total employment as well as the number and structure of enterprises in the transport sector can vary substantially from country to country. Economic structures and topographic particularities influence this heterogeneous sector.

Relatively low transport share in Ireland and UK

The transport sector has been growing in all the Member States. In 1994, employment in this branch was particularly important in Greece, Austria and Finland where it exceeded 5% of total employment (see Table 4.3). Ireland and the United Kingdom come last with a share of 3.3% and 3.6% respectively. Their geographical position in Europe is certainly responsible for this relatively low figure.

Although the transport branch of Germany shows exactly the same share of total employment as the EU-15 average (4.2%), it is at least remarkable that this country alone features nearly a quarter (24.8%) of all transport sector jobs at EU-15 level.

Auxiliary transport activities important in Germany

In 7 out of 15 Member States, more than half of the persons employed in the transport branch can be found in the category 'road and other land transport'. Spain scores highest with 69%, followed by the Netherlands and Italy (both at 57%). It is Germany that offers the lowest share with 29%. Germany excels however in the category 'auxiliary transport activities', offering 43% of all German transport sector jobs (EU-15: 27%). With an extensive road and inland waterway network, important inland ports and several big air and seaports this share becomes understandable.

At EU-15 level, air transport's share of the entire transport sector is only 5.6%. Due to a single relatively important cargo centre, this share can amount to nearly 19% in a small country like Luxembourg. Ireland and Portugal follow with 12.7% and 11.4% respectively.

Average staff of eight in a transport enterprise

When considering all sub-branches of the transport sector, Table 4.4 outlines that an average eight persons are employed per enterprise. Statistically, the Netherlands and Portugal feature the highest staff (15.3 and 14.9 persons respectively); the smallest enterprises are to be found in Greece with an average of 2.6 persons.

Table 4.3: Employment by branch of activity in 1994* (1 000)

	Railway transport	Road and other land transport (incl. pipelines)	Water transport (maritime and inland)	Air transport	Auxiliary transport activities	TOTAL	% of total employment
Belgique/België	42.7	79.5	8.7	12.3	37.8	181.0	4.8
Danmark	25.0	39.5	13.9	8.8	31.7	118.9	4.7
Deutschland	327.1	443.6	35.0	58.1	658.0	1 521.8	4.2
Ellada	12.0	95.8	38.9	5.0	47.5	199.2	5.3
España	41.1	364.5	14.1	29.1	79.4	528.2	4.5
France	185.7	451.4	8.0	58.5	212.2	915.8	4.2
Ireland	11.2	16.3	2.6	5.0	4.3	39.4	3.3
Italia	140.2	448.6	39.6	33.0	124.2	785.6	3.9
Luxembourg	3.3	2.2	0.1	1.4	0.4	7.4	4.5
Nederland	26.6	175.9	13.5	27.9	63.5	307.4	4.6
Österreich	62.3	94.6	1.2	4.3	26.8	189.2	5.1
Portugal	14.3	72.5	8.3	17.3	39.4	151.8	3.4
Suomi/Finland	17.4	58.0	10.7	5.2	19.3	110.6	5.4
Sverige	21.9	95.1	13.0	10.0	33.9	173.9	4.4
United Kingdom	131.3	422.7	27.3	70.6	280.5	932.4	3.6
EU-15	1 062.1	2 860.2	234.9	346.5	1 658.9	6 162.6	4.2

** UK, A, S:* results of 1995.
Sources: DG VII, Eurostat.

Table 4.4: Number of enterprises by branch of activity in 1995 (units)

	Railway transport	Road and other land transport (incl. pipelines)	Water transport (maritime and inland)	Air transport	Auxiliary transport activities	TOTAL	Average number of persons per enterprise
Belgique/België	11	12 322	2 415	197	4 344	19 289	9.4
Danmark	*14*	*11 887*	*876*	*169*	*2 894*	*15 840*	*12.1*
Deutschland	99	89 317	2 413	408	33 511	125 748	7.5
Ellada*	*1*	*20 000*	*175*	*57*	*5 157*	*25 390*	*2.6*
España	49	185 332	379	194	16 833	202 787	9.6
France	27	81 662	2 010	575	11 620	95 894	7.8
Ireland	2	2 252	43	38	752	3 087	6.4
Italia	*29*	*102 165*	*565*	*164*	*19 201*	*122 124*	*12.8*
Luxembourg*	*1*	*505*	*39*	*6*	*136*	*687*	*10.8*
Nederland	1	10 949	4 870	65	4 740	20 625	14.9
Österreich	21	11 255	110	112	2 419	13 917	10.0
Portugal	*1*	*13 566*	*70*	*15*	*1 552*	*15 204*	*15.3*
Suomi/Finland	2	19 286	290	78	1 287	20 943	13.6
Sverige	11	22 918	318	91	2 210	25 548	5.3
United Kingdom	114	48 078	1 194	1 083	10 581	61 050	6.8
EU-15	383	631 494	15 767	3 252	117 237	768 133	8.0

** Eurostat estimates.*
Sources: DG VII, Eurostat.

Figures in italic: 1994 results.

Table 4.5: Employment in the main railway companies - in 1 000 persons

		1970	1980	1990	1995	1996	Change 1970-96 (%)
Belgique/België	SNCB	56.7	65.7	45.2	41.9	41.1	-28
Danmark	DSB	24.0	22.1	20.4	15.7	15.6	-35
Deutschland (-W)	DB	392.7	329.0	236.0	294.9	256.7	-60 (1)
Deutschland (-E)	DR	252.6	237.9	246.3	(DB)	(DB)	(DB)
Ellada	CH	12.6	12.1	13.3	12.5	11.7	-7
España	RENFE	85.1	71.5	49.7	39.0	37.4	-66
France	SNCF	303.0	254.4	202.1	181.1	177.9	-41
Ireland	CIE	22.3	18.1	11.8	11.1	11.0	-51
Italia	FS	197.6	220.7	200.4	129.8	123.4	-38
Luxembourg	CFL	4.4	4.2	3.5	3.2	3.2	-27
Nederland	NS	26.8	26.9	26.2	24.5	24.0	-10
Österreich	ÖBB	73.9	72.5	66.9	61.3	57.0	-33
Portugal	CP	25.6	24.7	22.1	13.1	13.0	-49
Suomi/Finland	VR (+ RHK)	27.7	28.7	20.2	15.3	14.9	-46
Sverige	SJ (+ Banverket)*	45.3	37.5	20.8	21.6	22.0	-51
United Kingdom	BR (+ Railtrack)*	274.3	241.9	135.3	101.7	100.0	-64
	TOTAL	1 824.6	1 667.9	1 320.2	966.7	908.9	-50

(1): DB 1996 compared to DB and DR in 1970
** UK (1995):* BR : 90.2 Railtrack: 11.5; S (1995): SJ: 14.2 Banverket: 7.4.
Source: UIC.

Railways still dominated by traditional structures

When looking at the average number of persons employed by enterprise, the rail sector's average of 2 773 depicts the traditional rail structure. Four countries offer only a single company (see Table 4.4). Other countries offer more rail enterprises, most of them however of minor importance.

Further restructuring of the rail transport industry is likely to change this situation.

Table 4.5 outlines the development of employment of the main European railway companies. In the period 1970-96, not a single main railway company has increased their staff - quite to the contrary: on average, personnel has been reduced by 50% since 1970. Part of this decline may be linked to the elimination of some subsidiary activities which are now carried out by companies in other sectors (catering, maintenance, ferry operation for example).

Caution required for enterprises in 'water transport'

Attention should be given when looking at the number of enterprises linked to 'Water transport' category: both maritime and inland shipping are combined in this category. The relatively high figures registered for Belgium, Germany, France and especially the Netherlands can be explained by the high proportion of inland waterway vessel owners who are either self-employed or operate as a family business.

In countries without significant inland waterways, the numbers can largely be attributed to maritime shipping companies.

5. Traffic and transport quantities and performances

5.1 Transport of goods

5.1.1. General development

The performance of the European transport sector has been in line with the expanding economy, as can be seen in Table 5.1; from 1970 to 1996 total European goods transport in the present 15 Member States grew from 890 000 to 1575 000 million tkm (almost 80%).

Constant increase of road haulage, stagnation of rail transport

The considerable growth of inland transport has been almost entirely realised by road transport. As far as the other modes of transport are concerned, only pipeline transport has substantially grown since 1970, but this mode is accredited with a rather modest share of only 5% of total inland transport (in tkm - see Graph 5.2).

Remarkably enough, Graph 5.3 shows that the two remaining modes of inland transport, namely railway and inland waterways, hardly showed any growth at all, railway transport even decreased (-23% since 1970).

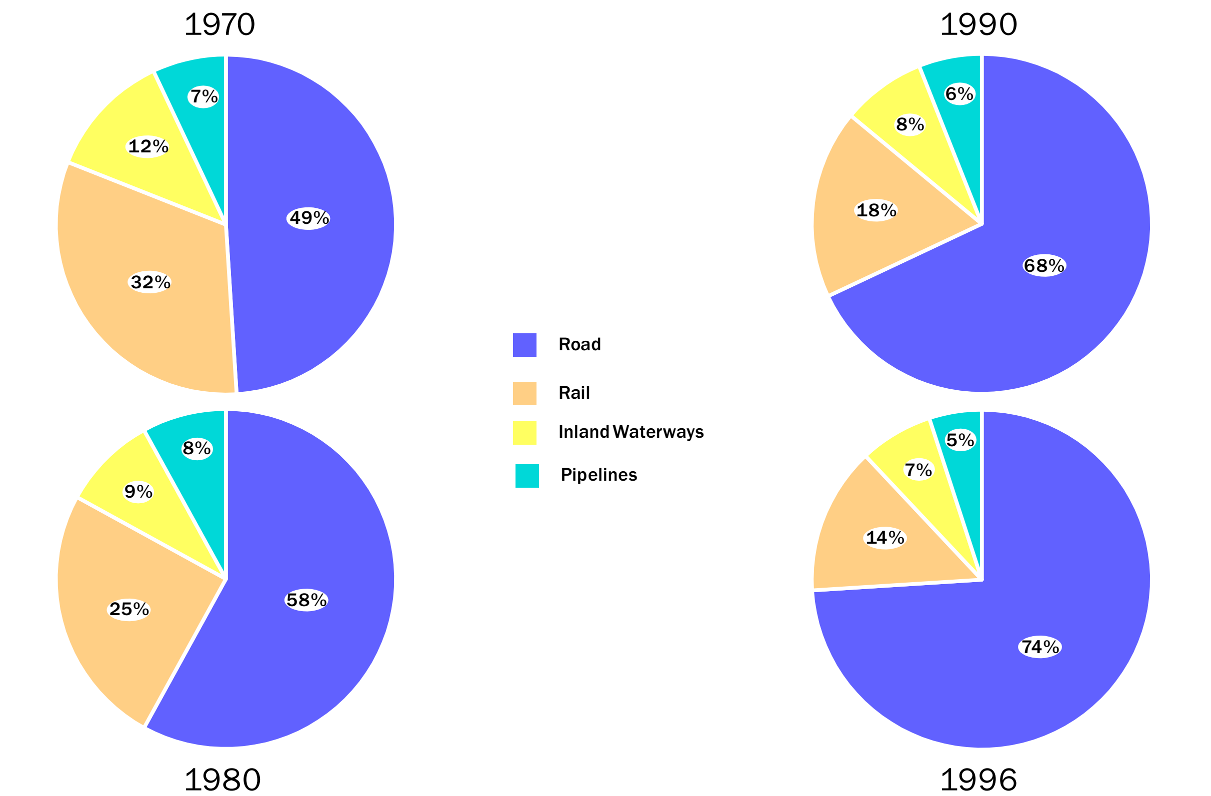
Table 5.1: Goods transport in EU-15 (1 000 million tkm)

	Road	Rail	Inland waterways	Pipelines	Total
1970	434	283	106	66	889
1980	665	287	108	93	1 154
1990	944	256	109	77	1 386
1994	1 094	219	112	86	1 511
1995	1 141	221	114	86	1 562
1996	1 159	219	111	86	1 575
1970-80	+53.2%	+1.4%	+1.8%	+40.9%	+29.8%
1980-90	+41.9%	-10.8%	+0.9%	-17.21%	+20.1%
1990-96	+22.8%	-14.6%	+1.8%	+12.3%	+13.6%
1970-96	+267.0%	-23.0%	+4.7%	+30.3%	+77.1%

Sources: DG VII, Eurostat, ECMT, national statistics.

In 1996, for the European Union as a whole, 74% of all inland transport was performed by road, 14% by rail, 7% by inland shipping and 5% by pipelines.

Graph 5.2: Goods transport: modal split in EU-15 - Basis: tkm



Source: Eurostat.

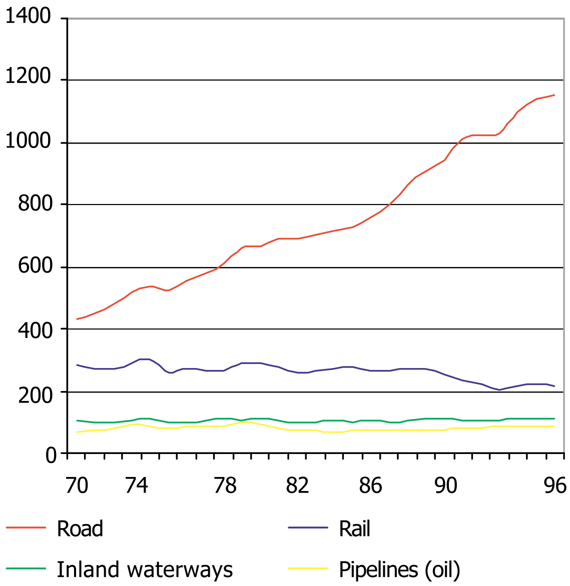
Road haulage dominant, except in two countries

Table 5.4 outlines that for all 15 Member States - with the exception of the Netherlands and Luxembourg- road transport is the main carrier of goods. In Greece, Spain, Ireland, Italy, Portugal and the United Kingdom, it performed even more than 80% of all inland transport.

Rail transport is taking care of more than 20% of total transport in France, Luxembourg, Austria, Finland and Sweden.

The most important Member State in inland waterway transport is the Netherlands; its extended inland waterway network and the geographical position on the Rhine delta are no doubt responsible for a remarkably high share of almost 50% of all performed tkm in 1996. In Belgium, Luxemburg and Germany inland shipping accounts for a considerable part of total transport, i.e. between 14 and 22%.

Graph 5.3: Goods transport evolution in EU-15 1970-96 - 1 000 million tkm



Sources: DG VII, Eurostat.

Table 5.4: Goods transport modal split by country

1996 - in % based on tkm performed

	Road	Rail	Inland waterways	Pipelines
Belgique/ België	75.0	12.7	9.6	2.6
Danmark*	65.9	12.4	-	21.7
Deutschland	66.2	15.9	14.4	3.4
Ellada*	97.4	2.6	-	-
Espaa	91.9	5.0	-	3.0
France	67.2	21.0	2.4	9.3
Ireland	90.6	9.4	-	-
Italia	85.3	9.2	0.1	5.4
Luxembourg*	38.2	39.6	22.2	-
Nederland*	38.3	4.3	49.0	8.3
Österreich	42.4	34.2	5.4	18.1
Portugal*	85.8	14.2	-	-
Suomi/Finland	72.7	26.6	0.7	-
Sverige	63.4	36.6	-	-
United Kingdom	85.0	7.5	0.1	7.3
EU-15	73.6	13.8	7.0	5.5

** Modal split based on national and international road traffic of vehicles registered in country.*

Sources: DG VII, Eurostat.

5.1.2. National goods transport

The amount of national transport is largely dependent on the industrial and commercial development of the countries concerned.

Disregarding pipelines (restricted to liquid oil products), there are significant differences between Member States, as far as the division among the different modes of transport - the so-called 'modal split' is concerned.

Dominant position of road haulage

Table 5.5 indicates that for the European Union as a whole, in 1995 road haulage accounted for more than 10 billion tonnes of national transport; this stands out in contrast to only 520 million tonnes for rail transport and less than 200 million tonnes for inland navigation. However, if performance of road versus rail is measured in tonne kilometres (see Table 5.6), the modal split shows quite different proportions: road transport was responsible for 846 billion tkm and rail for 107 billion tkm of national transport.

In other words, railways are responsible for 5% of the volume, but for 13% of the tkm performance of road haulage.

Rail: important in larger Member States

It is obvious that average distances for road and rail in national transport are very different: 83 km per tonne for road, 205 km for rail. If national rail transport is to be promoted within the framework of 'intermodality', it is clear that this will mainly be appropriate for 'larger' Member States like France, Germany or the United Kingdom. This can be illustrated by the share of national rail transport, expressed in a percentage of road haulage (in tkm) in some Member States (1995): 26% in France and Finland, 23% in Germany and about 8% in Spain, the United Kingdom and Italy.

Dutch waterways 'compete' with rail

In the Netherlands national rail transport is extremely low: less than 3% of road haulage; but this is certainly connected with the strong competition of inland navigation, which has the biggest share of all Member States. A different situation occurs in Belgium; although one of the 'smaller' Member States, rail is responsible for 7% of the volume of national road haulage; traditionally, Belgian railways have a relatively strong position both in national and international goods transport.

Table 5.5: National transport of goods by country and mode - 1985, 1990, 1995 - in 1 000 tonnes

	1985			1990			1995		
	Road (1)	Rail (2)	Inland waterways	Road (3)	Rail (4)	Inland waterways	Road (5)	Rail (6)	Inland waterways (7)
Belgique/België	265 383	34 426	21 437	276 870	30 227	21 134	352 047	24 921	18 641
Danmark	199 930	2 351	-	194 452	2 145	-	175 950	1 932	-
Deutschland	2 213 709	238 935	63 715	2 715 148	224 500	62 601	3 486 368	223 879	71 767
Ellada	158 372	1 205	-	176 596	903	-	178 037	538	-
España	913 335	25 028	-	973 709	22 425	-	588 150	17 363	-
France	1 197 942	114 293	30 455	1 404 051	98 503	32 871	1 324 143	84 603	23 561
Ireland	89 734	3 379	-	78 955	3 278	-	78 531	3 015	-
Italia	327 555	17 221	1 600	889 065	21 085	740	934 626	21 896	607
Luxembourg	11 126	2 539	23	24 032	2 818	40	28 682	2 702	14
Nederland	338 660	5 529	74 995	386 940	4 974	84 032	391 765	4 319	79 374
Österreich	:	:	:	:	:	:	:	16 288	:
Portugal	190 554	4 690	-	237 946	5 390	-	263 198	7 117	-
Suomi/Finland	:	:	-	:	:	-	349 126	20 236	-
Sverige	:	:	-	:	:	-	343 212	:	-
United Kingdom	1 406 200	139 322	-	1 687 000	137 623	-	1 658 409	95 382	-
EU-15	:	:	:	:	:	:	:	:	:

(1): I, E: 1986; P: 1987 - **(2)**: *E, P: 1986* - **(3)**: *L: 1992* - **(4)**: *D:1989* - **(5)**: *D, IRL: 1993; I, L: 1994* - **(6)**: *B, D, EL, F, A, P, FIN: 1996; NL, UK, IRL, :1994; I: 1993; L, DK: 1992* - **(7)**:*D, F :1994; I, NL : 1993; B, L : 1992.*
Source: Eurostat.

Table 5.6: National transport of goods by country and mode - 1985, 1990, 1995 - in million tkm

	1985		1990		1995	
	Road [1]	Rail [2]	Road [3]	Rail [4]	Road [5]	Rail [6]
Belgique/België	10 380	2 537	12 616	2 631	18 801	2 218
Danmark	8 342	608	9 352	570	9 325	479
Deutschland	98 615	37 802	120 169	34 383	153 815	35 241
Ellada	10 352	291	12 486	223	12 356	151
España	74 144	8 795	97 262	8 748	78 744	6 606
France	79 094	37 494	98 021	33 479	112 509	29 647
Ireland	3 727	601	3 877	589	4 161	569
Italia	98 445	7 097	115 785	9 089	119 957	8 731
Luxembourg	206	87	454	112	483	104
Nederland	18 189	1 062	22 581	1 019	26 682	857
Österreich	:	:	:	:	:	2 913
Portugal	8 636	1 137	10 978	1 286	11 119	1 607
Suomi/Finland	:	:	:	:	21 803	5 699
Sverige	:	:	:	:	28 356	:
United Kingdom	100 544	16 812	132 969	16 078	146 714	12 442
EU-15	:	:	:	:	:	:

(1): I, E: 1986; P: 1987 - **(2)**: *E, P: 1986* - **(3)**: *L: 1992* - **(4)**: *D:1989* - **(5)**: *D, IRL: 1993; I, L: 1994* - **(6)**: *B, D, EL, F, A, P, FIN: 1996; NL, UK, IRL, E:1994; I: 1993; L, DK: 1992*
Source: Eurostat.

Inland waterway transport: mainly in the Netherlands and Germany

At national level, only four Member States have a large amount of inland waterway transport: Belgium, Germany, France and the Netherlands. Of course this situation is strongly determined by the geographical position: the Rhine and its delta may be regarded as the most important inland waterway network in the world, connecting important industrial areas and seaports.

The Netherlands, although a relatively small Member State, has the highest volume of national waterway transport of Europe, which is about 20 times as high as the Dutch national rail transport. In Germany and Belgium inland waterways are relatively important for national transport; both countries are in possession of a rather extended and connected inland waterway network. In France, the importance of inland navigation is more limited and restricted to some separated networks.

Although the increase of national waterway transport in the Member States concerned cannot match the development of road haulage, it can be seen that there certainly is a tendency of growth, especially for Germany and the Netherlands.

Graph 5.7: Distance classes* 1992 (national transport)

** Data refer to EUR 12 and 3 transport modes:* road, rail and inland waterways
Source: Eurostat.

5.1.3. Intra-European goods transport

The globalisation of the economy and especially the increasing integration of the European economies has led to a considerable increase of the entire transport sector. Currently being deregulated, especially within transport via railways, the sector is expected to increase efficiency and thus experience further growth.

European transport statistics, as provided by Eurostat, illustrate structure and development of intra-European transport for all modes of inland transport over the years.

In 1985, goods movements between Member States amounted to around 215 million tonnes for road (Table 5.8), 88 million tonnes for rail (Table 5.9) and 185 million tonnes for inland waterway (Table 5.10); in 1996, road was almost redoubled to more than 400 million tonnes, rail only slightly increased to 92 million tonnes, inland shipping to 190 million tonnes.

Table 5.11 gives a complete survey of transport on all possible intra-European transport relations for rail, road and inland waterways in 1996. The geographical structure of European inland transport, as well as the relative importance of the three modes, can be made very clear by a closer look at these statistics.

Table 5.8: Intra-European goods transport by ROAD* 1985-95 (1 000 tonnes) performed by vehicles registered in the individual Member States

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Belgique/België	Loading	20 261	20 765	24 158	28 030	29 768	31 955	33 986	29 846	31 992	36 991	38 945
	Unloading	14 843	15 200	16 869	18 862	19 986	20 046	22 083	20 136	22 408	26 169	28 045
Danmark	Loading	3 849	3 873	3 897	3 900	4 428	5 078	5 428	5 599	7 099	8 034	8 762
	Unloading	3 551	3 892	3 959	3 773	4 061	4 411	4 859	5 198	5 401	6 170	6 595
Deutschland	Loading	22 479	22 837	23 328	25 998	25 616	26 344	27 860	29 085	26 594	:	:
	Unloading	21 093	22 316	22 693	25 774	25 644	26 447	27 790	28 820	31 589	:	:
Ellada	Loading	611	582	580	680	717	637	537	962	581	230	316
	Unloading	519	412	437	557	561	374	375	395	110	44	47
España	Loading	:	6 360	7 481	6 976	7 274	5 930	6 215	6 915	7 445	8 915	10 017
	Unloading	:	4 512	4 646	5 325	6 037	6 121	6 390	7 050	7 402	9 612	9 251
France	Loading	15 808	15 734	16 474	20 868	22 372	23 630	23 989	26 905	24 521	28 264	30 200
	Unloading	15 396	15 047	17 595	20 274	22 093	25 898	23 778	25 973	23 569	27 671	29 416
Ireland	Loading	564	846	897	912	1 080	1 045	881	1 040	979	:	:
	Unloading	814	897	1 047	1 023	1 199	1 057	1 003	964	1 040	:	:
Italia	Loading	:	:	:	:	7 682	10 323	8 115	8 974	8 684	9 113	7 974
	Unloading	:	:	:	:	8 704	8 342	8 891	8 900	8 464	9 037	8 967
Luxembourg	Loading	1 531	1 602	:	:	:	:	:	1 719	3 572	3 364	3 198
	Unloading	1 485	1 288	:	:	:	:	:	2 352	3 578	3 076	4 644
Nederland	Loading	25 884	27 886	29 801	33 271	35 805	37 913	40 112	43 099	44 104	46 414	48 198
	Unloading	23 780	25 562	28 732	32 516	33 357	34 160	36 518	38 607	39 937	42 166	44 352
Österreich	Loading	:	:	:	:	:	:	:	:	:	:	11 854
	Unloading	:	:	:	:	:	:	:	:	:	:	11 463
Portugal	Loading	:	582	772	785	1 299	1 593	2 330	2 020	2 052	2 666	3 176
	Unloading	:	588	762	760	1 268	1 477	1 899	1 747	2 047	2 295	2 520
Suomi/Finland	Loading	:	:	:	:	:	:	:	:	:	:	:
	Unloading	:	:	:	:	:	:	:	:	:	:	:
Sverige	Loading	:	:	:	:	:	:	:	:	:	:	3 384
	Unloading	:	:	:	:	:	:	:	:	:	:	4 218
United Kingdom	Loading	2 033	2 188	3 038	3 292	3 547	4 411	4 628	4 988	5 143	5 794	6 252
	Unloading	2 232	2 562	3 361	3 475	3 944	4 569	4 954	5 289	5 780	6 469	6 713

**Total international traffic - cross-trade however excluded to avoid break in time series.*
Source: Eurostat.

Table 5.9: Intra-European goods transport by RAIL 1985-95 (1 000 tonnes)

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Belgique/België	Loading	16 271	15 508	14 807	17 081	16 612	18 125	18 182	18 150	17 191	17 870	16 675
	Unloading	13 922	11 146	11 395	11 776	11 404	11 826	11 248	11 044	10 692	11 936	10 148
Danmark	Loading	801	783	856	920	1 016	1 092	1 192	1 195	:	:	:
	Unloading	1 844	1 865	1 670	1 577	1 609	1 660	1 806	1 743	:	:	:
Deutschland	Loading	26 203	22 517	22 480	24 164	25 553	26 641	28 526	25 694	21 368	24 520	25 164
	Unloading	18 600	17 662	18 143	19 287	18 718	20 184	22 191	20 518	19 193	22 691	23 090
Ellada	Loading	66	50	33	25	13	31	42	7	11	11	6
	Unloading	187	126	95	110	133	137	134	148	79	60	60
España	Loading	:	1 393	1 273	1 115	1 040	1 143	1 238	1 187	287	:	:
	Unloading	:	1 064	1 226	1 433	1 716	1 726	1 814	1 598	1 871	:	:
France	Loading	19 022	16 060	16 117	16 656	17 120	16 406	16 902	17 183	15 139	16 321	16 051
	Unloading	15 749	13 940	12 770	13 377	13 922	14 247	13 506	14 440	11 532	14 230	14 160
Ireland	Loading	0	0	0	0	0	0	0	0	0	0	0
	Unloading	0	0	0	0	0	0	0	0	0	0	0
Italia	Loading	6 551	7 117	6 998	7 429	8 203	8 346	8 515	8 224	8 284	:	10 612
	Unloading	17 697	15 912	16 756	17 525	18 836	21 438	23 591	22 323	21 011	:	26 121
Luxembourg	Loading	4 015	3 804	3 545	3 863	3 814	3 560	3 458	3 048	:	:	:
	Unloading	6 067	5 801	5 212	5 954	6 717	6 683	6 360	5 985	:	:	:
Nederland	Loading	8 069	7 360	7 621	8 112	8 109	7 165	7 476	7 117	6 945	8 183	9 182
	Unloading	5 001	4 586	4 251	5 029	5 032	5 097	4 506	4 152	4 300	4 434	4 885
Österreich	Loading	:	:	:	:	:	:	:	:	:	:	8 983
	Unloading	:	:	:	:	:	:	:	:	:	:	9 851
Portugal	Loading	:	247	335	333	344	235	213	283	188	280	282
	Unloading	:	288	355	437	336	269	361	389	277	444	473
Suomi/Finland	Loading	:	:	:	:	:	:	:	:	:	:	204
	Unloading	:	:	:	:	:	:	:	:	:	:	481
Sverige	Loading	:	:	:	:	:	:	:	:	:	:	:
	Unloading	:	:	:	:	:	:	:	:	:	:	:
United Kingdom	Loading	324	344	362	355	280	295	336	402	347	798	:
	Unloading	689	646	591	517	527	461	466	524	536	1 106	:

Source: Eurostat.

General structure of intra-European transport quite heterogeneous

The territory of the Member States of the European Union includes several highly industrialised and densely populated areas; both are generating considerable inland transport flows of raw materials, final products and foodstuffs.

Many of these are imported by sea; in connection with their transhipment in European seaports (like Rotterdam, Antwerp, Hamburg or Le Havre), they have to be carried to their destinations within Europe by the different modes of inland transport.

On the other hand, an opposite stream of goods is moving towards the seaports for export to overseas. These flows of transport between the seaports and their hinterland, by road, rail and inland waterways, are providing a substantial contribution to inland transport in Europe.

There are considerable differences in the size of transport between the respective Member States, as well as in the modes to be used, as can be seen in Table 5.12.

Table 5.10: Intra-European goods transport by INLAND WATERWAYS* 1985-95 (1 000 tonnes)

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Belgique/België	Loading	27 108	28 598	26 550	26 624	26 357	26 944	25 818	22 710	:	:	:	:
	Unloading	39 750	39 670	40 215	44 910	46 390	46 459	44 833	43 411	:	:	:	:
Deutschland	Loading	41 057	43 130	44 362	47 893	51 072	48 558	43 667	42 790	41 508	:	41 504	40 709
	Unloading	93 335	95 147	90 202	94 335	94 126	93 124	94 175	92 537	86 018	:	94 721	92 119
France	Loading	17 295	16 344	15 735	18 243	13 148	16 952	14 931	15 794	15 892	15 358	15 465	13 907
	Unloading	10 230	10 899	10 625	11 204	10 250	12 040	11 908	11 681	10 585	10 855	9 940	8 513
Luxembourg	Loading	787	796	794	907	990	949	872	802	866	794	:	:
	Unloading	968	1 201	1 104	1 243	1 033	1 139	980	1 296	906	1 072	:	:
Nederland	Loading	102 155	105 547	102 407	107 600	113 453	113 567	115 441	111 930	96 078	117 797	117 916	:
	Unloading	44 064	46 004	44 957	49 031	54 436	52 627	49 263	47 821	45 229	46 652	44 379	:
Österreich	Loading	:	:	:	:	:	:	:	:	:	573	676	586
	Unloading	:	:	:	:	:	:	:	:	:	943	1 154	1 166

Significant inland waterway transport only in countries listed.
Source: Eurostat.

Table 5.11: Intra-European goods transport by relation and mode 1996 - in 1 000 tonnes

Railway (1)
Road (2)
Inland waterways (3)

Country of loading		Country of unloading															
		B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK	EU-15
Belgique/België	Railway		33	3403	-	117	5223	-	2095	4456	4189	402	0	4	:	28	:
	Road		506	16961	9	1148	24893	23	1869	2522	20830	537	111	13	128	1474	71026
	Inland waterways		-	11426	-	-	3043	-	-	37	16672	57	-	-	-	-	31234
Danmark	Railway	5		638	0	-	52	-	407	0	16	16	-	15	:	-	:
	Road	232		5649	9	171	721	7	332	14	704	118	45	194	1645	129	9970
	Inland waterways	0		70	-		-	-	-	-	5	-	-	-	-	-	75
Deutschland	Railway	2504	612		30	335	3908	-	7818	1220	2633	6726	3	78	:	102	:
	Road	14954	3788		180	1443	16724	41	8835	2238	30945	8758	346	68	813	2095	91228
	Inland waterways	10798	-		-	-	1722	-	-	612	23509	265	-	-	-	-	36906
Ellada	Railway	-	-	0		-	0	-	0	0	-	0	-	-	:	-	:
	Road	2	6	440		0	1	-	184	0	8	32	0	0	11	40	724
	Inland waterways	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
España	Railway	109	4	621	-		0	-	62	0	42	17	410	-	:	-	:
	Road	919	157	3190	7		8520	3	2201	47	850	179	3613	101	81	1344	21213
	Inland waterways	2*	-	71*	-		-	-	-	-	-	-	-	-	-	-	73
France	Railway	3573	132	2550	0	1117		-	5778	288	382	313	16	18	:	440	:
	Road	19003	702	20775	32	10384		67	8952	1606	5858	573	775	76	201	3867	72872
	Inland waterways	2609	-	7365	-	-		-	-	77	4067	17	-	-	-	-	14136
Ireland	Railway	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
	Road	18	12	57	-	19	109		28	-	17	1	-	1	-	832	1095
	Inland waterways	-	-	12*	-	-	-		-	-	-	-	-	-	-	-	14
Italia	Railway	1647	199	3824	2	68	1678	-		7	1620	750	7	18	:	315	:
	Road	1272	361	11835	109	2269	7669	35		104	1535	3245	506	18	76	1509	30543
	Inland waterways	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-
Luxembourg	Railway	617	3	485	0	47	965	-	128		262	18	-	5	:	7	:
	Road	1340	33	2724	-	58	1197	-	104		314	54	6	-	12	100	5942
	Inland waterways	80	-	472	-	-	2	-	-		58	-	-	-	-	-	613
Nederland	Railway	1510	8	4369	0	12	1502	-	649	7		696	0	5	:	53	:
	Road	19425	970	30604	26	1043	7757	66	2064	261		778	123	108	631	1595	65451
	Inland waterways	29920	-	71984	-	-	3746	-	-	344		827	-	-	-	-	106821
Österreich	Railway	335	76	-	-	42	250	-	2980	1	347		7	15	:	115	:
	Road	441	73	6943	31	86	565	4	4558	51	533		4	4	75	186	13555
	Inland waterways	-	-	325	-	-	-	-	-	2	67		-	-	-	-	394
Portugal	Railway	0	-	3	-	119	-	-	0	-	1	-		-	:	39	:
	Road	43	25	358	-	3451	692	1	603	16	117	1		-	2	156	5465
	Inland waterways	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-
Suomi / Finland	Railway	0	10	-	-	-	6	-	6	-	-	7	0		:	-	:
	Road	14	198	143	0	100	48	-	52	0	68	11	1		1217	2	1854
	Inland waterways	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
Sverige	Railway	242	666	-	-	14	410	-	974	0	271	252	0	96		7	:
	Road	137	2012	1119	13	70	253	-	53	5	540	82	2	957		21	5263
	Inland waterways	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-
United Kingdom	Railway	43	0	93	-	-	376	-	114	5	7	1	-	-	:		:
	Road	998	96	2013	63	871	3040	973	1126	46	1083	177	203	3	22		10715
	Inland waterways	1*	-	389*	-	-	-	-	-	-	-	-	-	-	-		226
EU-15	Railway	10588	1743	15987	32	1873	14369	-	21011	5985	9770	9199	444	254	:	1106	:
	Road	58801	8940	102812	478	21113	72189	1220	30961	6910	63403	14546	5737	1542	4912	13350	406916
	Inland waterways	43411	-	92119	-	-	8513	-	-	1072	44379	1166	-	-	-	-	190659

(1): on the basis of receipts - 1995 data for NL; 1994 data P, UK; 1993 data for E, I; 1992 data for DK, L.
(2): figures represent transport performed by vehicles registered in the individual Member States in 1996 (except P (1995) and D, IRL (1993)) as well as cross-trade transport.
(3): on the basis of receipts - 1995 data for NL; 1994 data for L, 1992 data for B.
* *Combined transport:* continuation of journeys after transfer of goods on inland waterways vessels.
Source: Eurostat.

Table 5.12: Intra-European transport - loading and unloading in selected countries by mode in 1996 (in million tonnes)

	LOADING			
	Total	Rail	Road	Inland waterways
Nederland	181.0	8.8	65.4	106.8
Deutschland	153.8	25.7	91.2	36.9
Belgique/ België	122.2	20.0	71.0	31.2
France	101.7	14.6	72.9	14.2
Italia	40.6	10.1	30.5	-
España	22.5	1.3	21.2	0.0
Österreich	18.1	4.2	13.6	0.4
United Kingdom	11.6	0.6	10.7	0.2
Danmark	11.1	1.1	10.0	-
Luxembourg	9.0	2.5	5.9	0.6

	UNLOADING			
	Total	Rail	Road	Inland waterways
Deutschland	210.9	16.0	102.8	92.1
Nederland	117.5	9.8	63.4	44.4
Belgique/ België	112.8	10.6	58.8	43.4
France	95.0	14.4	72.2	8.5
Italia	52.0	21.0	31.0	-
Österreich	24.9	9.2	14.5	1.2
España	23.0	1.9	21.1	-
United Kingdom	14.5	1.1	13.3	-
Luxembourg	14.0	6.0	6.9	1.1
Danmark	10.7	1.7	8.9	-

Source: Eurostat.

Inland navigation: concentrated in Germany, France and the Benelux

The importance of a particular mode is different for individual Member States. For some, like the Netherlands, Germany and Belgium, inland navigation is a very significant mode of intra-European transport, taking care of respectively 51, 35 and 32% of all loadings and unloadings. Even in France inland shipping is carrying out 12% of goods transport to and from other Member States.

Consequently, the most important transport flows for inland shipping are to be found in the north-western European area. Germany, France and the Benelux countries generate almost all inland shipping in the European Union (99%). A considerable part of these goods is transhipped in the big seaports, like Rotterdam and Antwerp.

Rhine axis ever important

In 1996, the most important flows of goods on inland waterways were (in million tonnes) :

- Netherlands-Germany 72.0
- Netherlands-Belgium 29.9
- Germany-Netherlands 23.5
- Belgium-Netherlands 16.7
- Belgium-Germany 11.4
- Germany-Belgium 10.8
- France-Germany 7.4
- Germany-France 1.7

The great significance of inland shipping for this part of Europe is most noticable in the Netherlands: more than two thirds of all intra-European transport to and from this Member State is carried out by inland navigation.

For Germany and Belgium as well, inland shipping is a very important mode, responsible for about one third of intra-European transport for both Member States.

Rail: strong position in some Member States

Although railways are taking care of only 13% of total intra-European transport, the importance of this mode is substantial for some Member States; about one third of intra-European transport of Italy, Austria and Luxembourg is carried out by rail. This is caused by the geographical situation: Italy has no inland waterway connection with any other Member State and the relatively new Rhine-Main-Danube canal did not yet result in much additional inland shipping to and from Austria (in 1996 only 1.6 million tonnes).

Table 5.11 shows that the most important relations of intra-European rail transport in 1996, were (in million tonnes) :

- Germany-Italy 7.81
- Germany-Austria 6.72
- France-Italy 5.78
- Belgium-France 5.22
- Belgium-Luxembourg 4.46
- Netherlands-Germany 4.37
- Belgium-Netherlands 4.18
- Germany-France 3.91
- Italy-Germany 3.82
- France-Belgium 3.57
- Belgium-Germany 3.40
- Austria-Italy 2.98

Germany first in loading rail wagons

In 1996 more than 40 million tonnes of goods were forwarded by train to and from Germany, which is by far the major Member State in rail transport; the main destinations of these goods were Italy, Austria and France, each of them receiving 4 million tonnes or more; the major part of German unloadings came from the Netherlands and Italy.

Belgium and Italy are also important countries for rail transport, each of them accredited with 31 million tonnes in 1996; main destinations for Belgian loadings were France, Luxembourg and the Netherlands (each 4 million tonnes or more); unloadings originated from France, Germany and the Netherlands. In Italy, big volumes were received from Germany, France and Austria; consignments went to Germany, France and Belgium.

Railway transport to and from France was 29 million tonnes in 1996, major destinations were Italy, Belgium and Germany; main origins were Belgium and Germany.

Spain's different rail gauge

Although there is no competition from inland shipping, rail transport from and to Spain appears remarkably low, just over 3 million tonnes in 1996. This may be a statistical anomaly caused by the very specific situation at the border with neighbouring France, where as a consequence of the different rail gauge in Spain, transhipment from one railway wagon to another is inevitable in many cases, so that movements of goods across the border are not included in international transport. Although a growing number of adaptable wagons is available, road haulage is still responsible for 93% of Spanish intra-European transport.

Road: impressive growth over the last decade

In 1996, total intra-European road haulage amounted to 407 million tonnes; since its formidable increase over the last decade, its volume is more than twice as big as inland shipping and more than four times as high as rail transport.

The Member States with the most voluminous international road haulage are Germany (194 million tonnes), France (145), Belgium (130), the Netherlands (129) and Italy (62); for all countries road is by far the most important mode of inland transport, with the remarkable exception of the Netherlands, where inland waterways are carrying a higher volume than road (146 million tonnes).

The most important relations in intra-European road transport are (in million tonnes):

- Germany-Netherlands 30.94
- Netherlands-Germany 30.60
- Belgium-France 24.89
- Belgium-Netherlands 20.83
- France-Germany 20.77
- Netherlands-Belgiun 19.42
- France-Belgium 19.00
- Belgium-Germany 16.96
- Germany-France 16.72
- Germany-Belgium 14.95

As in rail transport, Germany is the major Member State of origin and destination with a volume of 194 million tonnes of goods; more than 60 million tonnes were carried by road to and from the Netherlands. Other important quantities were transported in relation to France, Belgium and Italy.

Remarkably high volumes for Belgium

France, Belgium and the Netherlands are other important Member States, with an intra-European road transport of successively 145, 130 and 129 million tonnes. French road haulage is mainly carried out in relation to Belgium, Germany, Spain and Italy. Belgian road transport is of a remarkably high volume in relation to all its neighbours (44 million tonnes with France, 40 million tonnes with the Netherlands and 31 million tonnes with Germany).

For both Italy and Spain, road is the most important mode. Nevertheless, there is a significant difference between the two countries : in Italy road haulage carries out two thirds of intra-European transport, in Spain its share is 93%, caused by the minor importance of Spanish railways (only 7%). Although there is no competition of any inland navigation, in no other Member State do railways carry so few goods in international transport.

Cross-trade initially under quota system

Before 1993, cross-trade road transport (international road transport, carried out by vehicles neither registered in the Member State of loading, nor in the Member State of unloading) was only allowed under certain bilateral agreements between Member States, or under community quota authorisations, which permitted hauliers to make journeys between any two Member States. Since 1993 these quantitative restrictions for international road transport have been replaced by qualitative restrictions: holders of a 'community licence' can make journeys between any two Member States.

Substantial share on certain relations

For 1996, statistical data about cross-trades are available for intra-European road transport. A summary of the most important 'cross-trade relations' is given below (in million tonnes; in brackets: share of cross-trade compared to total volume forwarded) :

Germany-Belgium	3.36	(22%)
Belgium-Germany	2.67	(16%)
Italy-Germany	2.02	(17%)
Germany-Italy	1.41	(16%)
Netherlands-France	0.97	(12%)
France-Netherlands	0.68	(12%)
Spain-Germany	0.57	(18%)
Belgium-France	0.56	(2%)
Netherlands-Germany	0.52	(2%)

On some relations, mainly those connected with Germany, cross-trades have already obtained a substantial portion of European road haulage; in fact, it already carried out 6% of intra-European road transport (23 out of 407 million tonnes). There can be no doubt about the favourable effects (economical efficiency, reduction of environmental pressure) of this phenomenon, which is an important step for the realisation of a European common transport market.

5.1.4. Cabotage

Road cabotage transport is national road transport performed by a motor vehicle registered in another country. It is a relatively recent phenomenon despite being already specifically mentioned in the Treaty of Rome. The principle of cabotage has been introduced in several modes of transport, however, this chapter only deals with roads goods transport.

An estimated 60 billion km (with an estimated total cost of ECU 45 billion) is travelled by empty lorries every year. The cabotage principle, apart from being a big step towards the liberalisation of road transport, should help to reduce the number of empty journeys.

Cautious introduction

The transport within a country by non-resident hauliers was gradually introduced as from 1 July 1990 by granting authorisations with a validity of one or two months. Quotas were gradually increased and completely abolished as from 1 July 1998. In the three Benelux countries, cabotage quotas were already abolished at the end of 1992.

Initially without Austria

Following the creation of the European Economic Area (EEA), the cabotage regime was extended to the EFTA States (except Switzerland) on 1 July 1994, however excluding Austria, which joined only on 1 January 1997. Liechtenstein joined earlier (1 May 1995) upon adhesion to the EEA.

Overal influence on market remains small

From a low initial level of 176 million tkm in the second half of 1990 (352 million tkm on annual base), cabotage increased almost five-fold to 1677 million tkm in 1995 (see Table 5.13).

In absolute terms, cabotage still remains limited: Table 5.14 shows that the penetration rate of cabotage in national markets (hire and reward) increased from 0.14% in 1994 to 0.23% in 1996.

Dutch hauliers alone hold 35% of market

Hauliers from the Benelux countries have been most active in the cabotage market. Graph 5.15 shows that almost 60% of all cabotage was done by Benelux hauliers. It is expected that these efficient companies will continue to dominate the market. Hauliers from geographically small countries have more incentive to do cabotage because their national market is often small and other national markets are geographically quite close. The opposite applies to 'large' countries.

Table 5.13: Cabotage - in 1 000 tkm, performed by hauliers from:

	II/1990	1991	1992	1993	1994	1995	1996
Deutschland	20 361	73 960	70 322	43 667	55 983	63 633	72 068
France	26 012	109 835	98 457	125 161	172 218	187 596	232 247
Italia	*9 037*	*33 183*	*40 516*	45 280	37 786	*45 754*	47 586
Nederland	37 804	128 279	201 685	226 233	350 103	588 582	720 804
Belgique/België	41 581	139 233	142 233	233 747	236 641	319 838	355 784
Luxembourg	14 843	48 047	65 557	80 131	78 038	114 351	146 614
United Kingdom	3 444	32 819	34 176	40 617	41 097	47 531	62 912
Ireland	5 760	12 757	7 501	5 409	11 130	13 882	17 496
Danmark	14 876	58 409	69 160	58 768	*78 956*	105 808	98 658
Ellada	0	196	0	0	0	0	0
España	2 013	5 497	12 822	19 169	38 211	18 152	*24 855*
Portugal	57	3 319	2 660	2 619	5 799	8 366	9 528
Suomi/Finland	.	.	.	.	5 099	30 000	59 030
Sverige	.	.	.	.	33 099	128 715	158 705
Österreich	.	.	.	.	.	.	.
Liechtenstein	.	.	.	.	.	21	43
Norge	.	.	.	.	1 419	4 484	10 053
EU-15	*175 788*	*645 534*	*745 089*	880 801	*1 144 160*	*1 672 208*	*2 006 287*
Total	*175 788*	*645 534*	*745 089*	880 801	*1 145 579*	*1 676 713*	*2 016 383*

Source: DG VII.

Estimates in italic.

Table 5.14: Penetration rate in national transport ‰

	1994	1995	1996
Deutschland	3,99	6,11	7,11
France	1,22	1,48	2,14
Italia	0,58	0,44	0,49
Nederland	0,22	0,32	0,42
Belgique/België	1,25	1,63	1,67
Luxembourg	0,51	1,25	1,36
United Kingdom	0,27	0,29	0,29
Ireland	0,83	1,21	1,45
Danmark	0,11	0,20	0,50
Ellada	0,37	0,62	0,81
España	0,46	0,60	0,75
Portugal	0,73	0,80	0,25
Suomi/Finland	0,01	0,07	0,03
Sverige	0,20	0,48	0,76
Österreich	.	.	.
Liechtenstein	.	0,00	0,00
Norge	0,21	0,82	1,32
Total	**1,40**	**1,94**	**2,29**

Source: DG VII.

Table 5.16 outlines cabotage by relation for the period July 1994 to December 1995. The most important relations over this period are presented in Table 5.17.

Only a small percentage of the cabotage was carried out by hauliers from 'low labour cost' countries. The fears that they would provide 'unfair competition' for hauliers in 'high labour cost' countries appears to be unfounded. The abolition of quotas in mid-1998 should not change this situation.

Germany most 'cabotaged'

The country undergoing the most cabotage transport is by far Germany: 73% of all cabotage was performed here. France follows behind with 12% (see Graph 5.15).

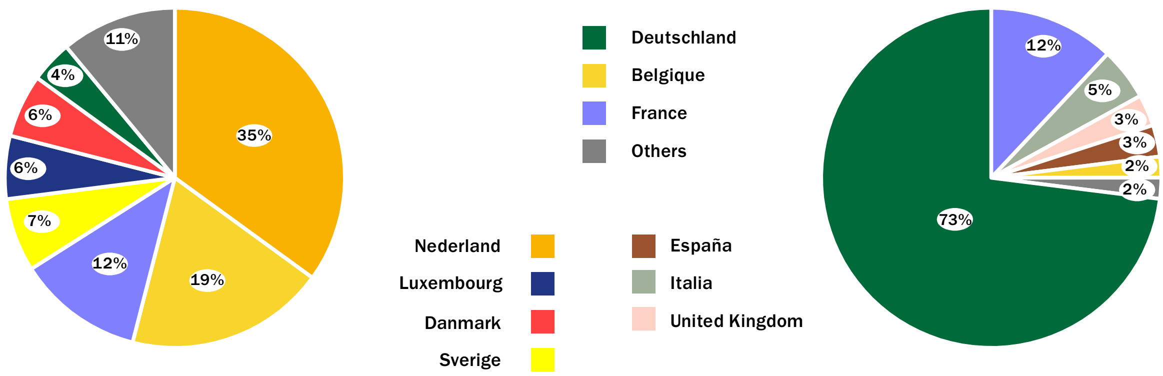
Table 5.17: Leading caboteurs

Period: July 1994 to December 1995

Relation	Position	tkm	%
Dutch hauliers in Germany	1	717 582	31
Belgian hauliers in Germany	2	265 863	11
French hauliers in Germany	3	177 280	8
Swedish hauliers in Germany	4	154 197	7
Belgian hauliers in France	5	150 520	7
Luxembourg hauliers in Germany	6	144 391	6
Danish hauliers in Germany	7	128 136	6
Italian hauliers in Germany	8	55 089	2
German hauliers in Italy	9	47 356	2
Dutch hauliers in France	10	35 291	2

Sources: DG VII, Eurostat.

Graph 5.15: What country 'cabotages'* most... and is most 'cabotaged' *?



* % of market held by hauliers from country.

Sources: DG VII, Eurostat.

Table 5.16: Cabotage - in 1 000 tkm, by relation

Period: July 1994 to December 1995

Cabotage performed in:

Reporting State:	D	F	I	NL	B	L	UK	IRL	DK	EL	E	P	FIN	S	LI	NO	Total	%
D		21908	47356	5400	7489	193	520	0	379	3920	2869	187	0	669	0	0	90890	4
F	177280		25519	392	35171	610	7288	0	0	748	32640	1099	0	93	0	76	280916	12
I	55089	6898		117	77	0	1589	0	0	0	1369	0	0	58	0	0	65197	3
NL	717582	35291	10164		946	8	31189	0	534	0	11166	740	57	715	0	80	908472	35
B	265863	150520	11613	203		5	7800	0	191	906	4927	83	0	0	0	0	442111	19
L	144391	2281	1 927	0	0		0	0	23	0	413	95	0	0	0	0	149130	6
UK	3504	29290	11509	3662	2356	0		7616	140	3488	4667	174	0	36	0	6	66448	3
IRL	4924	318	0	6	2	0	16049		2	0	0	0	0	74	0	0	21375	1
DK	128136	1108	425	1398	34	0	701	0		0	6	1261	0	10771	0	3448	147288	6
EL	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
E	1627	21351	363	0	5	0	0	0	0	0		10017	4	0	0	0	33367	1
P	22	2887	44	0	29	13	6	0	54	0	7540		0	0	0	0	10595	0
FIN	28320	0	56	43	3	0	55	0	623	43	2	0		4650	0	1304	35099	2
S	154197	51	3	45	180	0	552	0	564	0	27	0	1583		0	4612	161814	7
LI	21	0	0	0	0	0	0	0	0	0	0	0	0	0		0	21	0
NO	4574	35	27	13	29	0	0	0	66	8	13	3	0	1135	0		5903	0
Total	1685530	271938	109006	11279	46321	829	65749	7616	2576	9113	65639	13659	1644	18201	0	9526	2318626	100
%	**73**	**12**	**5**	**0**	**2**	**0**	**3**	**0**	**0**	**0**	**3**	**1**	**0**	**1**	**0**	**0**	100	

Source: DG VII.

5.1.5. Transport by groups of goods

A common nomenclature for the classification of goods (NST - Nomenclature des Statistiques de Transport) came into force in 1961. This nomenclature was to be used for the statistics of transport in the European Community. The NST consisted of 176 headings, 52 groups and 10 chapters. In 1967, a revised version (NST/R) was made with a view to harmonisation and improvement.

NST/R well used

The NST/R is widely used in EU-15. Nearly all Member States use it at some level in their national statistics. Some countries use other specific classifications alongside the NST/R.

The information presented in the frame of this publication is limited to the 10 chapters of the NST/R nomenclature and refer to national transport in the 15 Member States. The 10 chapters consist of a grouping of the 24 groups of goods, derived from the NST/R. The window below offers a concise description of this grouping.

NST/R chapters

0	Cereals, potatoes, fresh/frozen vegetables, live animals, sugar beets, wood, textiles
1	Foodstuffs, oil seeds, oleaginous fruits
2	Solid mineral fuels
3	Crude petroleum and petroleum products
4	Iron ore, steel waste, non-ferrous ores
5	Metal products
6	Cement, building materials, minerals
7	Natural and chemical fertilizers
8	Coal, chemicals, tar, paper pulp
9	Machinery, engines, metal products, glass, clothing, miscellaneous articles

NST/R Group 9 expectedly biggest

Table 5.18 outlines the national transport performances (expressed in million tkm) of the three inland modes at EU-15 level. It should however be noted that only six Member States contribute to the account of inland waterway transport, explaining a low share (2.55%) of inland waterway transport at EU-15 level.

Based on tkm performed at national level, Chapter 9 of the NST/R (machinery, engines, glass, clothing, miscellaneous articles) is the biggest group of all types of goods forwarded (26%), followed by cement, building materials and minerals (20%) and foodstuffs (17%).

Heavy and bulky goods by inland waterways where possible

The most complete picture can however be obtained when looking at Graph 5.19: it offers both an insight into the modal split and demonstrates the relative importance of rail and inland waterway transport for heavy and bulky goods like building materials, ores and petroleum products.

Rail clearly dominant for solid fuels

Road transport is clearly dominant in 8 out of 10 goods groups. With a share of 57% in NST/R Chapter 4 (iron ores, steel waste, non-ferrous ores) road transport is less strong. Finally, solid mineral fuels (NST/R Chapter 2) are the only goods where rail is definitely the first choice, taking a share of nearly 50%. With only six countries offering the transport mode, 21.5% of all solid mineral fuels in EU-15 are forwarded by inland waterways. This is the highest modal share reached by inland waterways, even if the NST/R Chapter 6 (cement, building materials, minerals) offers much higher transport performances (8 307 million tkm).

Table 5.18: National transport* in EU-15 by group of goods (NST/R chapter) - in million tkm

NST/R chapters

	0	1	2	3	4	5	6	7	8	9	Total	Modal split
Road transport	100348	160876	6459	38021	12331	48893	176397	10530	55895	223014	832763	86%
Rail transport	8151	6443	10665	10601	8079	15766	13938	3282	8395	28048	113369	12%
IWW transport	1004	1455	4682	4644	1242	707	8307	910	1298	520	24769	3%
Total	109503	168774	21806	53266	21651	65366	198643	14722	65588	251582	970901	100%
Share	11%	17%	2%	5%	2%	7%	20%	2%	7%	26%	100%	

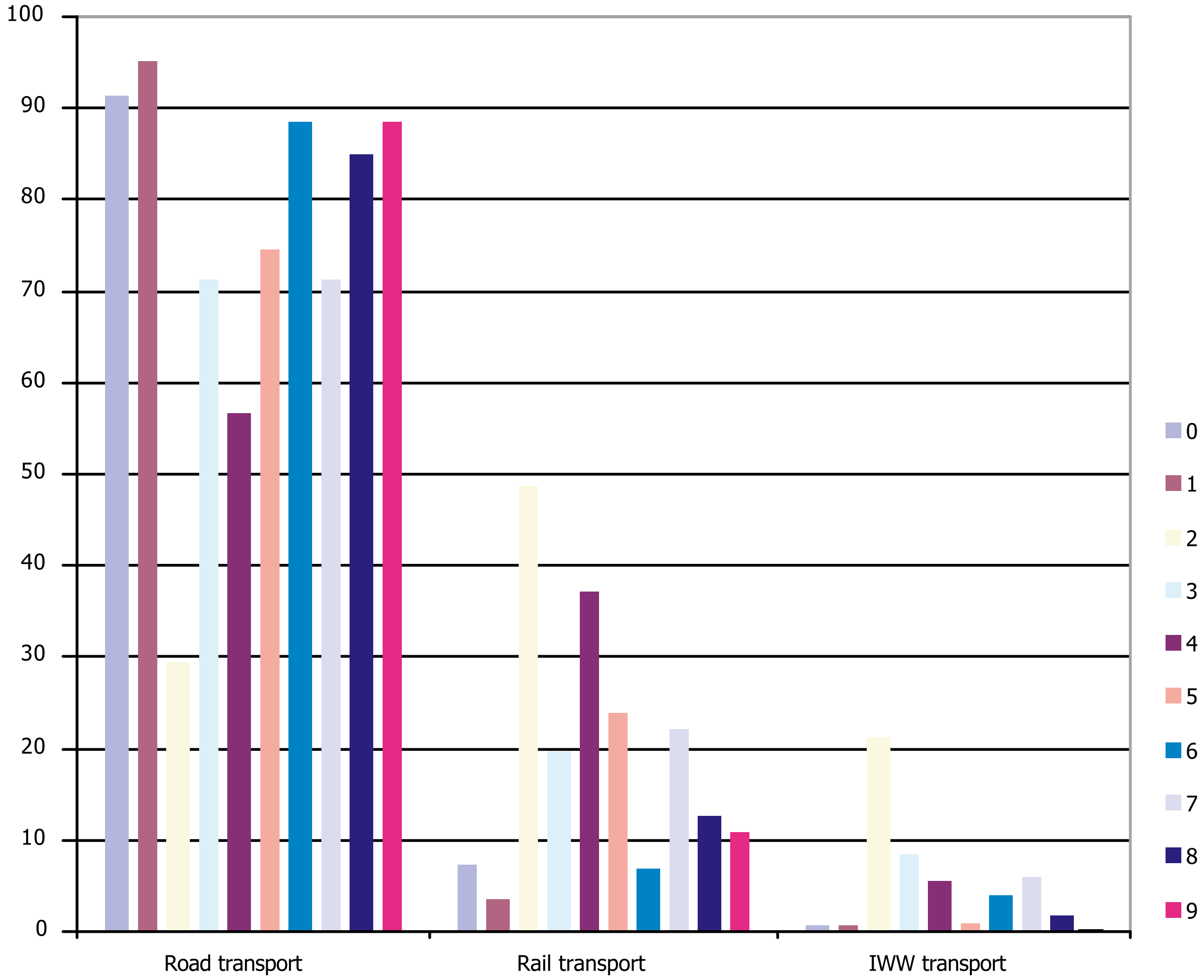
* *Road:* 1995, except IRL: 1993.
Rail: D, F, B, FIN, A: 1997 - IRL, GR, P: 1996 - I, NL: 1995 - E, UK: 1994 - DK, L: 1992.
IWW: D, F: 1996 - NL, A: 1995 - B, L: 1992.
Source: Eurostat.

Petroleum products is another category where rail and inland waterway transport together have a notable share (nearly 30%) compared to road haulage.

Quite to the contrary, flexibility and rapidity are often requested for the transport of foodstuffs (NST/R Chapter 0 and 1) explaining a road haulage share of over 90%.

The increasing share of products forwarded in containers is creating a major problem in reporting procedures. NST/R Chapter 9 includes the position 'miscellaneous articles': goods in containers statistically often end up in this category, making it the biggest category of all NST/R chapters.

Graph 5.19: Modal split of national goods transport in EU-15* by NST/R chapter- in % (based on tkm performed)



* *Road:* 1995, except IRL (1993).
Rail: D, F, B, FIN, A: 1997 - IRL, EL, P:1996 - I, NL: 1995 - E, UK: 1994 - DK, L: 1992.
Inland waterways: D, F: 1996 - NL, A: 1995 - B, L: 1992.
Source: Eurostat.

5.2. Passenger transport

5.2.1. General development

Efficient passenger transport systems are essential for European economies and the quality of life of every individual. They should meet the requirements of citizens and be sufficiently flexible to follow the evolution of transport demand.

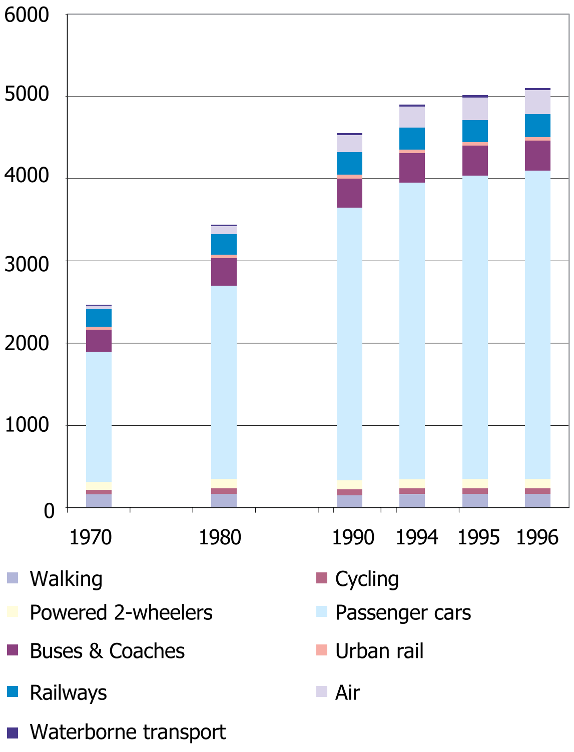
25% of EU-15 households without a car

In the past, this demand for mobility has been largely been satisfied by an increased use of private cars, performing roughly three quarters of all trips. The use of a car offers a high degree of independence and flexibility but it should be kept in mind that about a quarter of European households do not dispose of a private car.

The main factors for an increased mobility have mainly been :

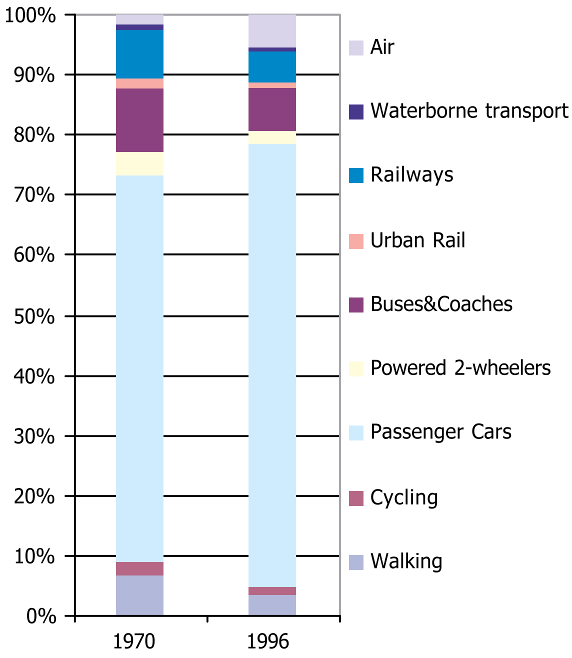
- the geographical spreading of economic acitivities with a clear tendency of abandoning old urban production sites, and consequently:
- a separation of places of work and residential areas with the subsequent necessity of commuting;

Graph 5.20: EU-15 passenger trips by mode (in million pkm)



Source: DG VII.

Graph 5.21: EU-15 passenger trips - modal split (%)



Source: DG VII.

- the rapid growth of the services sector with requirements on professional mobility;
- a higher average disposable income resulting in a higher level of motorisation;
- increased leisure time resulting in more frequent holiday journeys and recreational trips.

Everybody performs 35 km every day

In 1996, transport demand in EU-15 (considering transport in passenger cars, buses and coaches, subways, trams, trolleys, railways and airplanes) could be established at 4 700 billion passenger kilometres (pkm) per year: this corresponds to a daily 35 kilometres performed each day by every single person in the European Union (1970: 16.5 km).

More than double as 'mobile' as in 1970

Graph 5.20 illustrates that the total passenger transport performance more than doubled between 1970 and 1996, passing from 2 468 to 5 181 million pkm (+106%). If transport by car, buses and coaches, rail, urban rail and airplane were to be considered the 'main' modes, their share would be 90.7% in 1970 and 94.9% in 1996.

Graph 5.21 offers an insight into the modal split: the share of 'walking' for instance dropped from 6.3% in 1970 to 3.2% in 1996. This does not mean that we walked less: quite to the contrary, walking increased from 155 to 163 million pkm ; however, performances of other modes increased much more, resulting in a relative drop of this mode.

Air travel progresses most

If one looks only at the 'main modes' (see Table 5.22 and Graph 5.23), overall passenger transport performance in EU-15 rose by 121% between 1970 and 1996. As could be expected, passenger car transport progressed more than the average (+136%) but it is air transport that saw the biggest increase passing from 43 billion pkm in 1970 to 290 billion pkm in 1996 (+574%).

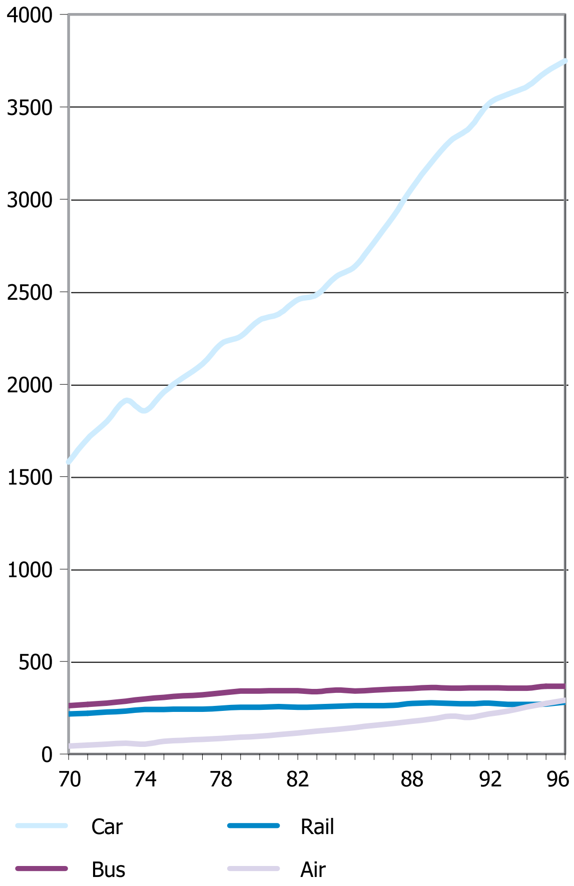
However, this should be seen in the light of a modal split: Graph 5.24 shows that in 1996, air transport accounted for 6% of all pkm performed (1970: 2%) ; passenger car transport stands at 79% (1970: 74%).

Table 5.22: Passenger transport - performance by mode in EU-15
1 000 million pkm

	Passen-ger cars	Buses and coaches	Urban rail	Railway	Air*	Total
1970	1 582	263	38	216	43	2 142
1980	2 349	338	40	253	96	3 075
1990	3 317	355	48	274	204	4 198
1994	3 607	357	41	269	254	4 528
1995	3 687	366	41	271	274	4 638
1996	3 746	366	42	279	290	4 724
1970-80	+48%	+29%	+5%	+17%	+123%	+44%
1980-90	+41%	+5%	+20%	+8%	+112%	+37%
1990-96	+13%	+3%	-13%	+2%	+42%	+13%
1970-96	+136%	+39%	+11%	+29%	+574%	+121%

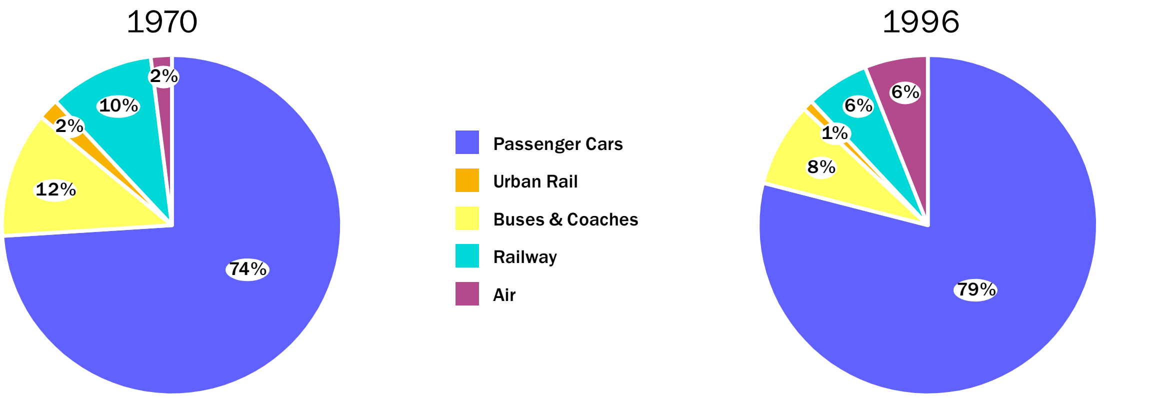
Sources: ECMT, UIC, UITP, DG VII, national statistics, estimates; * AEA, IACA and estimates.

Graph 5.23: Evolution of Passenger transport in EU-15 (1 000 million pkm)



Source: DG VII.

Graph 5.24: Modal split (based on performed pkm) - EU-15



Source: DG VII.

5.2.2. Passenger transport by country

The statistics on passenger transport performances by country basically reflect the general EU trends described in Chapter 5.2.1. However, the situation differs notably when taking a closer look at the modal split and the daily performance in various countries. Since passenger transport by inland waterways does not play a significant role, the following paragraphs offer a first insight on national particularities of the three main motorized transport modes (passenger cars, buses and coaches and railways).

With relatively few cars, the Irish drive a lot

At EU-15 level, transport performance by car increased by 137% between 1970 and 1996 (see Table 5.25). Transport performances developed particularly fast in Greece, Portugal and Spain, where both road network construction and car ownership developed rapidly compared to other Member States.

A more interesting picture is obtained when looking at the average number of kilometres performed by passenger cars: Ireland and Denmark drive most with an average of 12 000 km per person per year whereas Austrians, with an average of 8 150 km, obviously use their cars much less. In addition, it should be noted that Ireland only offers 272 cars per 1 000 inhabitants (EU-average: 444 - see chapter 3. - Means of transport); the vehicle occupancy rate in Ireland should thus be relatively high.

Bus and coach performance highest in Italy, but Danish use this mode more

Between 1970 and 1996, transport by buses and coaches in EU-15 has been increasing by an average 39%, arriving at a total of 366 billion pkm (see Table 5.26). All countries present an increase of this mode with the exception of the United Kingdom, where a 30% drop was registered. Some countries saw a sharp increase like Portugal (+207%), Italy (+170%) and Ireland (+150%).

With 86.6 billion pkm Italy offers the highest figure in the EU - this corresponds to 4.1 km per person per day. Only Denmark's population travels more on bus and coach: 5.7 km per day, which is more than twice the EU average (2.7 km).

Table 5.25: Transport performed by passenger cars - in 1 000 million pkm

	1970	1980	1990	1991	1992	1993	1994	1995	1996	1996 pkm per person per year
Belgique/België	49.3	65.4	80.7	82.9	84.6	86.9	89.5	91.2	92.4	9 099
Danmark	33.3	38.1	53.7	55.3	56.6	57.4	59.1	61.5	63.5	2 065
Deutschland (-W.)	370.1	463.7	592.8	703.6	720.7	729.1	718.6	728.5	732.9	8 946
Deutschland (-E.)	*24.5*	*56.0*	90.3	D	D	D	D	D	D	D
Ellada (1)	*13.5*	*45.0*	*76.2*	*79.5*	*82.5*	*86.0*	*90.8*	*95.0*	*99.0*	*9 451*
España (2)	*64.3*	*188.9*	*282.0*	*293.4*	*305.2*	*311.8*	*318.6*	*328.3*	*339.3*	*8 640*
France	304.7	452.5	586.0	599.0	618.0	634.6	651.2	664.3	674.3	11 551
Ireland (1)	*15.3*	*27.9*	*36.3*	*37.1*	*38.7*	*40.0*	*41.2*	*42.4*	*43.8*	*12 066*
Italia	211.9	324.0	522.6	538.3	602.2	603.1	600.3	614.5	625.6	10 899
Luxembourg (1)	*2.0*	*2.8*	*3.5*	*3.7*	*3.7*	*3.8*	*3.9*	*4.0*	*4.0*	9 639
Nederland	66.3	107.1	136.2	136.7	138.6	140.5	146.9	146.8	145.9	9 396
Österreich (3)	32.9	47.8	62.4	70.4	69.3	67.9	68.2	68.1	65.7	8 150
Portugal	17.5	41.0	65.0	67.5	71.6	82.9	90.0	99.5	105.0	10 574
Suomi/Finland	23.7	33.9	51.2	50.6	50.5	49.7	49.6	50.1	50.4	9 834
Sverige	55.4	66.7	90.0	91.4	91.7	90.7	84.0	87.0	84.5	9 558
United Kingdom	297.0	388.0	588.0	582.0	583.0	584.0	595.0	606.0	620.0	10 547
EU-15	1 582	2 349	3 317	3 391	3 517	3 568	3 607	3 687	3 746	10 038
index 1970=100	100	148	210	214	222	226	228	233	237	
modal share % (4)	75.2	77.4	79.9	80.1	80.4	80.6	80.4	80.2	80.0	

Estimates in italic.

(1) Estimates based on results of DG VII study - (2) 1980-96 estimate based on vehicle stock and vehicle-km data - (3) Source: Austrian Ministry of Environment. - (4) Considered: passenger cars; buses and coaches; railways; air.

Sources: DG VII, ECMT, national statistics

Table 5.26: Transport performed by buses and coaches - in 1 000 million pkm

	1970	1980	1990	1991	1992	1993	1994	1995	1996	1996 pkm per person per year
Belgique/België (1)	9.3	9.1	10.9	11.2	11.6	11.6	12.0	12.5	11.4	1 123
Danmark	4.6	7.3	9.3	9.2	9.3	9.2	9.5	10.6	11.0	2 090
Deutschland (-W.)	48.6	65.6	56.6	70.3	69.9	70.2	68.6	68.5	68.2	832
Deutschland (-E.)	19.1	24.4	16.5	D	D	D	D	D	D	D
Ellada	4.8	5.8	5.1	5.1	5.2	5.2	5.6	5.7	5.7	544
España (2)	20.9	28.1	33.4	35.5	35.5	37.1	38.1	*40.2*	*38.1*	*970*
France	25.2	38.0	41.3	42.9	41.1	42.0	42.6	41.0	41.2	706
Ireland	1.2	3.0	2.6	2.4	2.8	2.9	*3.0*	*3.0*	*3.0*	*826*
Italia	32.0	57.8	84.0	84.7	87.8	81.5	79.3	85.9	86.6	1 509
Luxembourg	0.4	0.4	0.4	0.4	0.5	0.5	*0.5*	*0.5*	*0.5*	*1 205*
Nederland	11.1	13.2	13.0	14.0	14.0	13.7	13.9	14.5	14.5	934
Österreich	9.1	9.8	8.7	8.7	9.4	10.3	10.8	10.5	12.5	1 551
Portugal	4.4	7.6	10.3	10.7	11.4	11.8	12.6	13.1	13.5	1 360
Suomi/Finland	7.0	8.5	8.5	8.1	8.0	8.0	8.0	8.0	8.0	1 561
Sverige	5.5	7.3	9.0	9.3	9.3	9.3	9.2	8.8	9.0	1 018
United Kingdom	60.0	52.0	46.0	45.0	43.0	43.0	43.0	43.0	43.0	732
EU-15	263.2	337.9	355.5	357.5	358.7	356.2	356.6	365.7	366.2	981
index 1970=100	100	128	135	136	136	135	136	139	139	
modal share % (3)	12.5	11.1	8.6	8.4	8.2	8.0	7.9	8.0	7.8	

Estimates in italic.

(1) *Belgium:* change in time series 1993 - (2) Spain: change in time series from 1995: old series was extrapolated to avoid break - (3) Considered: passenger cars, buses and coaches; railways, air.
Sources: DG VII, ECMT, national statistics.

Table 5.27: Transport performed by railways* - in 1 000 million pkm

	1970	1980	1990	1991	1992	1993	1994	1995	1996	1996 pkm per person per year
Belgique/België	7.6	7.0	6.5	6.8	6.8	6.7	6.6	6.8	6.8	668
Danmark	3.6	4.5	5.1	4.9	4.8	4.8	5.1	5.0	4.9	931
Deutschland (-W.)	39.2	41.0	44.6	57.5	57.2	58.7	60.7	63.6	65.3	797
Deutschland (-E.)	17.7	22.0	17.5	D	D	D	D	D	D	D
Ellada	1.5	1.5	2.0	2.0	2.0	1.7	1.4	1.6	1.8	167
España	15.0	14.8	16.7	16.4	17.6	16.5	16.1	16.6	16.6	424
France	41.0	54.7	63.8	62.3	62.6	58.2	58.9	55.6	59.8	1 024
Ireland	0.8	1.0	1.2	1.3	1.2	1.3	1.3	1.3	1.3	357
Italia	34.9	42.9	48.3	49.2	51.1	49.9	51.7	52.4	52.8	920
Luxembourg	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	684
Nederland	8.0	8.9	11.1	15.1	15.4	15.2	14.4	14.0	14.1	908
Österreich	6.4	7.6	8.7	9.4	9.7	9.5	9.4	9.8	9.9	1 224
Portugal	3.5	6.1	5.7	5.7	5.7	5.4	5.1	4.8	4.5	453
Suomi/Finland	2.2	3.2	3.3	3.2	3.1	3.0	3.0	3.2	3.3	635
Sverige	4.6	7.0	6.2	5.8	5.4	5.9	6.1	6.4	6.2	700
United Kingdom	30.4	30.3	33.2	32.0	31.5	30.5	28.8	29.3	32.0	545
EU-15	216.4	252.7	274.0	271.8	274.4	267.5	269.0	270.5	279.4	749
index 1970=100	100	117	127	126	127	124	124	125	129	
modal share % (1)	10.3	8.3	6.6	6.4	6.3	6.0	6.1	6.0	6.1	

** Non UIC railways are included.*
(1) *Considered:* passenger cars; buses and coaches; railways; air.
Sources: DG VII, ECMT, UIC and national statistics.

Lower rail use only in Belgium

Compared to the other modes, transport performances of rail experienced only a modest increase: +29% at EU level between 1970 and 1996 (see Table 5.27). Since the early nineties, a certain stagnation can be registered.

Compared to 1970, the number of passenger kilometres by rail progressed in all the Member States with the exception of Belgium, presenting a 10% decrease. Highest growth was achieved in the Netherlands (+76%), followed by Austria (+55%), Luxembourg and Finland (both +50%).

It is the average Austrian who travels most by rail (3.4 km per person per day), followed by the French (2.8 km). The EU-15 average is established at 2.0 km per person per day.

Danes by far the most 'mobile'

Graph 5.28 (provisional figures) presents the average daily distances travelled in 1996, using the three landborne transport modes.

It should be kept in mind that these figures are of course influenced by the availability (or non-availability) of transport modes. In many cases, there will be no modal choice for trips. However, figures in this table give a first impression on the availability and acceptance of the different modal networks.

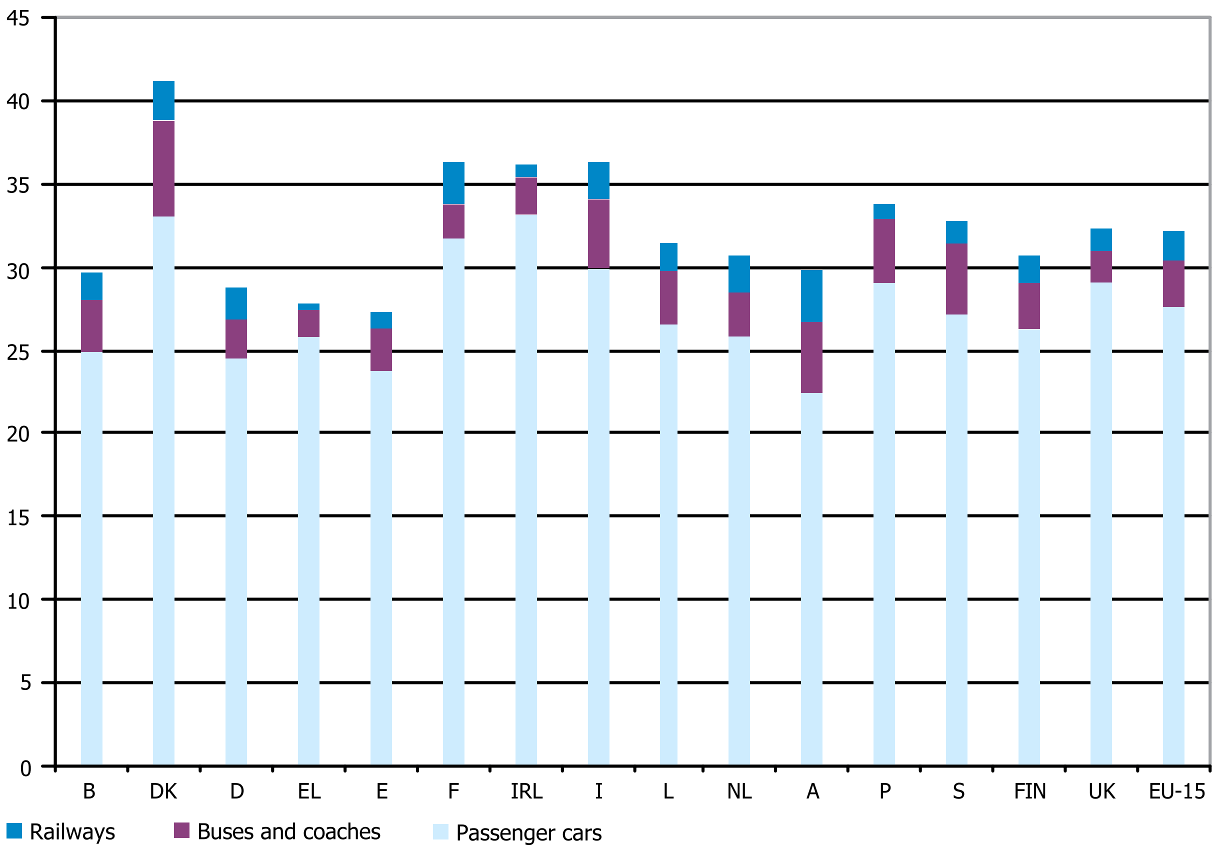
With an average of 41.3 km per person per day, the Danes are by far the most mobile in the EU. Italy comes second with 36.5 km. The population in Spain and Greece travels least with an average of 27.5 and 27.8 km respectively.

The share of rail in Greece and Ireland is low and can partly be explained by a relatively poor rail network density (Greece: 18.7 km/1 000 km^2, Ireland 27.7 km/1 000 km^2, EU-15 average : 48.4 km/1 000 km^2 - see Chapter 2.2 - Length of transport networks by country).

Austria's 'sustainable mobility'

In Austria, cars are used less than in other countries; however, Austrians travel relatively more on buses/coaches and by rail. This relatively high share of public transport modes indicates that Austria offers efficient alternatives to the use of passenger cars.

Graph 5.28: Average daily distance travelled per person in 1996 (km)



NB: provisional, non-harmonised data.
Source: DG VII.

6. Transport safety

Traffic accidents in road and rail transport claimed about 43 000 lives in the EU in 1996; more than 1.7 million persons were injured. Apart from the human tragedy, the annual costs of accidents are evaluated at approximatively ECU 150 billion.

Road traffic accidents account for the vast majority of the fatalities registered and represent the first cause of death for persons under 40. A fatal road accident represents an average loss of 40 years (cancer: 10.5, cardio-vascular illnesses: 9.7).

Careful comparisons needed

Accidents in rail and particularly inland waterway transport do not occur very frequently, especially in small countries. Thus, statistics fluctuate strongly and limit the comparability of modes. Moreover, in some cases the definition of 'accidents' and 'injured persons' differs between countries and comparison of statistics should be done carefully.

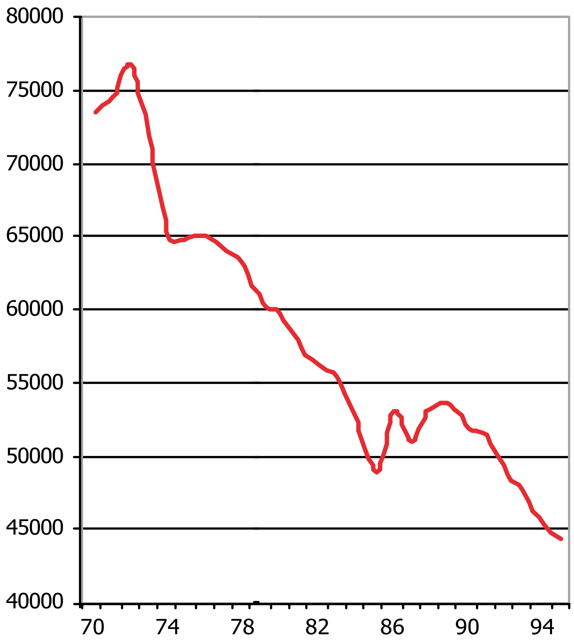
This chapter is limited to the number of deaths related to rail and road transport.

Less victims despite more traffic

A large number of measures for increased road safety have been taken in the past at Community, national and local level. Improved road design, changes in legislation on drink-driving, higher safety standards of vehicles (both crashworthiness of cars and design of vehicle exterior for pedestrians protection), introduction of speed limits, stricter rules on truck and bus driving times, reduced truck load capacities as well as better monitoring of the roadworthiness of vehicles have considerably reduced the number of road transport-related fatalities, despite the constant increase of traffic.

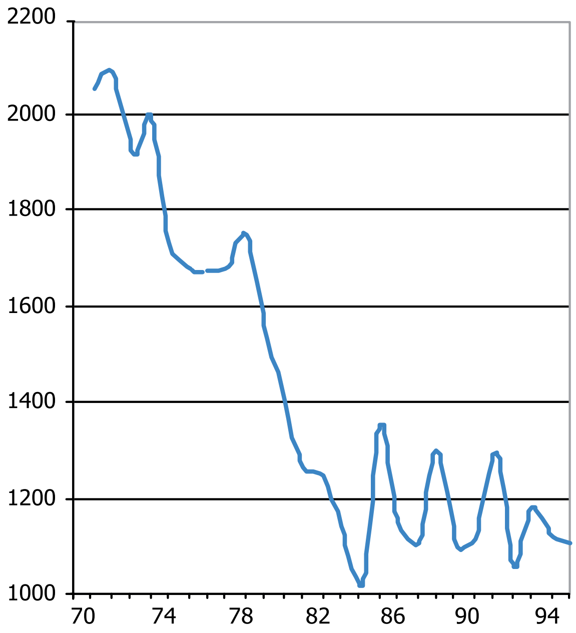
However, differences in safety levels between Member States still exist and leave potential for further improvement.

Graph 6.1: Number of persons killed in road accidents - EU-15



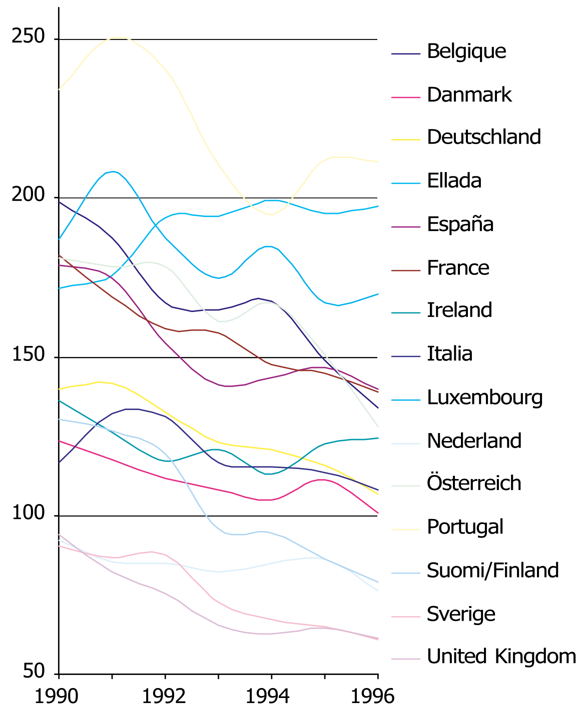
Source: Eurostat/UN-ECE/ECMT.

Graph 6.2: Number of persons killed in rail accidents - EU-15



Source: UIC.

Graph 6.3: Number of deaths in road transport per million inhabitants



Source: Eurostat / UN-ECE / ECMT.

Death rate lowest in Sweden and UK

At European Union level, Graph 6.1 shows that road transport fatalities have been in constant decline and are close to 42 000 in 1996. This is a 43% decrease compared to 1970 despite the fact that road transport more than doubled in the same period. The 1996 figure represents 112 deaths per million inhabitants.

Graph 6.3 and Table 6.4 outline that the United Kingdom and Sweden show the lowest levels (61 fatalities per million inhabitants), followed by the Netherlands (76) and Finland (79), whilst the figures for Greece (198) and Portugal (212) indicate a much higher fatality rate. Germany and Italy show a death rate close to the EU average.

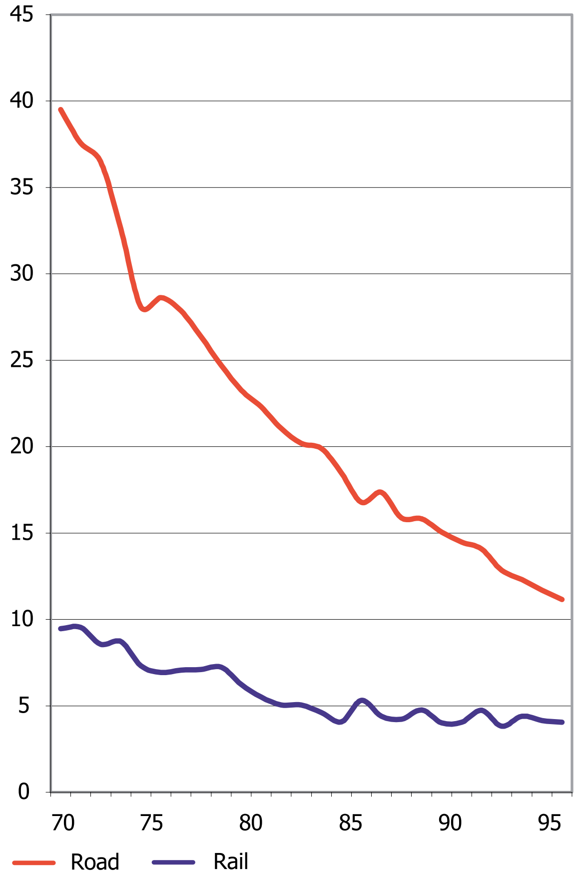
The general downward trend which has been predominant in the EU since the early 1970s is not being followed by Greece and Portugal where road fatalities are still at a high level. A significant decline in Spain was registered only from the early 1990s onwards. Due to the reunification process and the subsequent boost of motorisation, the figures for Germany show a higher level at the beginning of the 1990s.

Table 6.4: Persons killed* in road accidents

	1970		1980		1990		1992		1994		1996	
	persons	per million inhab.	persons	per million inhab.	persons	per million inhab.	persons	per million inhab.	persons	per million inhab.	persons	per million inhab.
Belgique/België	2 950	305	2 396	243	1 976	199	1 672	167	1 692	168	1 356	134
Danmark	1 208	246	690	135	634	123	577	112	546	105	530	101
Deutschland (-W)	19 193	314	13 041	212	7 906	126	10 631	132	9 814	121	8 727	107
Deutschland(-E)	2 139	125	2 009	120	3 140	191	D	D	D	D	D	D
Ellada	931	106	1 225	128	1 737	172	1 995	194	2 076	199	2 068	198
España	4 197	125	5 017	135	6 948	179	6 014	154	5 615	144	5 483	140
France	15 090	299	12 540	233	10 289	182	9 083	159	8 533	148	8 080	139
Ireland	540	183	564	166	478	136	415	117	404	113	450	124
Italia	10 208	190	8 537	151	6 621	117	7 434	131	6 578	115	6 190	108
Luxembourg	132	390	98	270	71	187	73	187	74	185	70	170
Nederland	3 181	245	1 997	142	1 376	92	1 285	85	1 300	85	1 180	76
Österreich	2 238	300	1 742	231	1 391	181	1 403	178	1 338	167	1 030	128
Portugal	1 417	163	2 262	233	2 321	234	2 372	241	1 926	195	2 100	212
Suomi/Finland	1 055	229	551	115	649	130	601	120	480	95	404	79
Sverige	1 307	163	848	102	772	91	759	88	589	67	540	61
United Kingdom	7 770	140	6 240	111	5 402	94	4 379	76	3 650	63	3 598	61
EU-15	73 556	2216	59 757	169	51 711	142	48 693	133	44 615	120	41 806	112
index 1970=100	100	100	81	78	70	66	66	61	61	56	57	52

**Persons dying within 30 days, except France (6 days), Italy (7 days), Portugal (1 day) and Greece (3 days). Spain:* change from 1 to 30 day threshold in 1993. If a harmonised 30-day threshold would be applied, the total number of fatalities would increase by about 1 000 persons.
Source: Eurostat/UN-ECE/ECMT.

Graph 6.5: Number of persons killed per 1000 million pkm - EU-15



Sources: Road: Eurostat/UN-ECE/ECMT; Rail: UIC.

One death per 5 million km driven in France in 1995

Graph 6.5 (EU-15) and Table 6.6 (by Member State) outline the number of deaths per thousand million passenger-km (pkm) travelled. It should be noted that for the road data, only the pkm performed by passenger cars have been considered and that pedestrians and cyclists killed by passenger cars are included. Scandinavian roads prove the safest in the European Union.

Table 6.6: Number of deaths per 1 000 million pkm

	1970		1980		1990		1995	
	Road*	Rail	Road*	Rail	Road*	Rail	Road*	Rail
Belgique/België	316	13	264	7	180	3	141	3
Danmark	265	10	95	5	68	1	55	2
Deutschland (-W)	395	15	199	8	140	5	142	4
Deutschland (-E)	:	:	:	:	D	D	D	D
Ellada	195	32	211	26	342	17	415	24
España	201	5	179	5	208	2	148	2
France	599	7	330	4	249	3	200	2
Ireland	540	9	188	19	159	11	135	6
Italia	315	8	147	6	74	4	80	:
Luxembourg	330	10	245	16	178	10	148	10
Nederland	289	10	188	3	133	4	:	2
Österreich	221	18	140	10	99	6	96	7
Portugal	325	56	298	31	225	23	163	19
Suomi/Finland	170	30	66	7	76	11	60	6
Sverige	238	9	116	7	71	3	52	2
United Kingdom	129	4	121	2	120	2	85	7
EU-15	301	10	191	6	149	4	:	:

** Only passenger-km performed by passenger cars is taken into consideration.*
Sources: Eurostat/UN-ECE/ECMT, UIC.

Table 6.7: Number of deaths in rail transport

Number of deaths in accidents involving railways; in brackets: of which train passengers

	1970	1980	1990	1995	1996
Belgique/België	90 (3)	52 (4)	20 (0)	20 (3)	26 (6)
Danmark	26 (7)	18 (3)	6 (1)	10 (0)	: (0)
Deutschland (-W)	549 (146)	288 (69)	198 (45)	275 (34)	: (35)
Deutschland (-E)	*50 (5)*	*50 (5)*	51 (5)	D	D
Ellada	50 (1)	38 (1)	34 (0)	33 (3)	42 (0)
España	75 (17)	74 (17)	30 (4)	23 (0)	21 (0)
France	273 (54)	203 (33)	188 (30)	129 (22)	136 (14)
Ireland	5 (0)	20 (16)	14 (1)	7 (0)	8 (0)
Italia	296 (41)	228 (48)	204 (9)	12 (4)	: (1)
Luxembourg	2 (0)	4 (1)	2 (0)	3 (0)	: (0)
Nederland	84 (10)	27 (8)	43 (2)	35 (0)	: (1)
Österreich	110 (26)	75 (9)	54 (6)	68 (7)	47 (3)
Portugal	200 (19)	186 (29)	131 (22)	95 (12)	122 (10)
Suomi/Finland	65 (5)	24 (4)	36 (0)	17 (1)	12 (3)
Sverige	40 (6)	49 (25)	18 (3)	9 (2)	16 (0)
United Kingdom	126 (41)	59 (46)	79 (39)	200 (10)	: (8)
EU-15	2044 (381)	1395 (318)	1108 (167)	936 (98)	: (81)
index 1970=100	100 (100)	68 (83)	54 (44)	46 (26)	: (21)
EU-15 per mio inhab.	6.01 (1.1)	3.9 (0.9)	3.0 (0.5)	2.5 (0.3)	: (0.2)

Estimates in italic.

Source: UIC.

Strong fluctuation in rail fatalities

The situation differs for accidents linked to railways. At EU-level, the absolute number of deaths decreased yearly by 5% in average over the period 1970-84 and fluctuated around 1 100 victims per year since 1985. A slight decrease can be observed in recent years, although strong fluctuations exist between individual years. This is particularly visible in Table 6.7, where the number of fatalities per country are presented. The same table indicates that only a minority of victims are passengers travelling in trains. Most fatalities are registered in accidents occuring at railway level crossings (victims travelling in vehicles are rail accident victims), accidents during shunting procedures and track maintenance works, without however claiming victims among the passengers travelling in this transport mode. This should be taken into account when looking at Graph 6.2 and 6.5 where these victims are considered. Thus, relative safety is better than indicated.

7. Environment and energy

7.1. General development

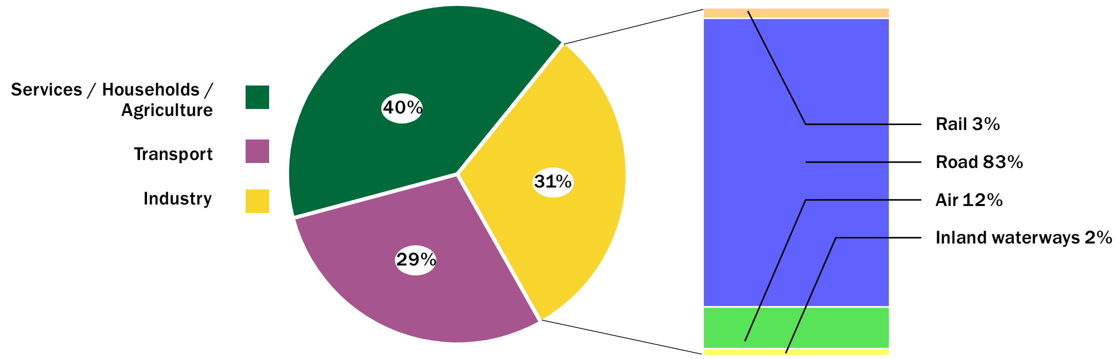
It has been recognised for many years that transport is one of the main sources of pressures on the environment, particularly in relation to air pollution, noise and the loss of wildlife habitats.

The transport sector accounts for more than 30% of the total final energy consumption (more than the entire industry sector, see Graph 7.1) and 26% of CO_2 emissions from fossil fuels, the biggest part being generated by road traffic (see Graph 7.2).

Trends of recent years

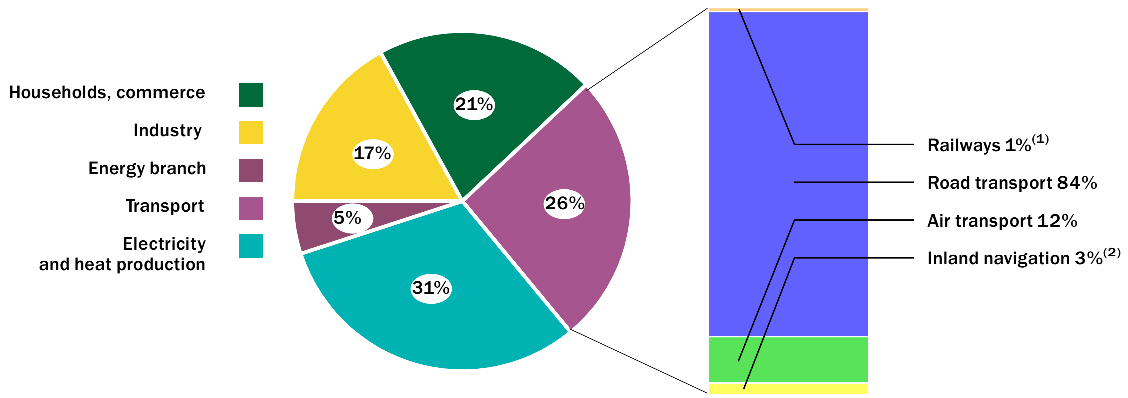
Over the last couple of years, the following trends in transport-influenced environmental pressure indicators can be observed: there has been a very clear downward trend in the emission of lead, mainly due to the increased use of unleaded petrol. Emissions of carbon monoxides, nitrogen oxides and volatile organic compounds have also been reduced, if not as drastically as those of lead, partly due to a more efficient combustion of motor fuels.

Graph 7.1: Share of transport in final energy consumption 1995 (% of mio toe)



Source: Eurostat

Graph 7.2: CO_2 emissions from fossil fuels in the EU-15 - Share of transport - 1995



(1)Without fossil fuel for electricity production - (2) Including passenger transport and leisure boating
Source: Eurostat

Sulphur oxides emissions and their derivates, source of acidification threatening aquatic organisms, eroding buildings and one reason for respiratory complaints, show no recent sign of diminishing in most countries. A substantial improvement (-35% in EU-12) occurred however in the period between 1980 and 1990 with the change in European legislation reducing the sulphur content of fuels. A recently adopted measure gradually reducing the sulphur content of unleaded fuel and diesel oil to 50 ppm (parts per million) in 2005, representing approximatively one tenth of today's values, should have further positive effects (see Chapter 7.3 - Emissions).

The most significant indicator for the emissions of greenhouse gases (responsible for 'global warming') is carbon dioxide (CO_2). The origins of CO_2 emissions of a country are affected by its industrial structure, its energy sector, its transport system, its forestry and agricultural sectors. Electricity and heat production is the sector producing the highest level of CO_2 emissions, followed by transport (see Graph 7.2). Emissions from liquid fuels account for over one third. With a rising number of vehicles and vehicle-kilometres performed, an ever increasing mobility and a growing share of goods hauled by road, the share of transport is tending to increase. It should also be noted that CO_2 emissions corresponding to electricity used in transport appear under electricity production and not under transport.

7.2. Energy consumption

25% of total energy consumption for road transport alone

Since 1960 the entire transport share (including aviation) of total final energy consumption has been constantly increasing, and since the early nineties, it has overtaken that of industry and stands at 30% in 1996 (1960: 17%). Table 7.3 also points out that road transport alone accounts for a quarter of the total final energy consumption in the EU.

Graph 7.1 of Chapter 7.1 shows that the increase of road transport is responsible for the 83% (1995) share of the entire transport sector (1960: 57%). Rail transport stands at 3% (1960: 31%) and transport via inland waterways at 2% (1960: 5%). The remaining 12% are attributed to air transport (1960 : 6%). Consumption of international maritime transport is not included in final energy consumption.

Upward trend despite increasing fuel efficiency

Road transport is by far the largest consumer of petroleum products and although future developments may lead to a greater use of alternative fuels, there is presently little possibility for substitution. Increased car ownership and number of vehicle-kilometres performed as well as a growing share of road haulage of goods offset the general tendency of lower consumption through more fuel-efficient vehicles.

Table 7.4 displays the consumption of main fuels by country for the terrestrial transport modes. It considers the main fuels used for movement or traction and does not include lubricants. Coal used for rail traction has been disregarded because of its very small share. Electricity consumption for rail traction, which includes urban transport systems, has been converted to 'tonne of oil equivalent' (toe) to enable comparison. Attention should be given to the consumption of the inland waterways transport mode. In fact, the indicated figures include consumption used by small vessels (including leisure boats) performing coastal shipping and not using fuel from international maritime bunkers. This explains data from countries who do not have a significant inland waterway network.

Road share of over 90% for all countries

All countries show a high road transport share. Due to the growing share of electrified lines, the consumption of electricity for rail traction is increasing to the detriment of diesel fuel. Spain and Greece have the highest consumption for inland waterways. Its modal share is relatively high and can partly be explained by the importance of the tourism sector.

Table 7.3: Final energy consumption of the transport sector - EU-15

1985-96 (million toe)

	1985	1990	1994	1995	1996	Share 1996
Final energy consumption	768.3	816.8	880.8	898.6	943.4	100%
of which:						
Industry	245.3	252.6	252.6	257.4	266.3	28%
Services, households	326.2	317.5	356.0	365.5	393.8	42%
TRANSPORT	196.8	246.7	272.2	275.7	283.3	30%
of which:						
Rail	6.1	6.3	7.3	7.4	7.5	0.8%
Road	166.1	206.3	226.6	229.0	234.5	24.9%
Air	20.5	27.4	31.3	32.5	34.4	3.6%
Inland navigation	4.0	6.7	7.0	6.7	6.9	0.7%

Source: Eurostat.

Table 7.4: Energy consumption of main fuels by transport mode (1 000 toe)

		1985	1990	1991	1992	1993	1994	1995	1996	change 1985-96 (%)	share in consump. 1996 (%)
Belgique/België	road	5 119	6 442	6 501	6 747	6 905	7 061	7 084	7 211	+41	95
	rail - diesel	113	70	105	81	82	80	77	74	-35	1
	rail - electric	102	107	110	112	117	119	126	110	+8	2
	inl. waterways	214	129	115	149	114	166	134	173	-19	2
Danmark	road	2 791	3 200	3 198	3 267	3 335	3 499	3 540	3 583	+28	93
	rail - diesel	115	98	96	102	106	94	97	96	-17	2
	rail - electric	12	18	17	17	18	20	20	22	+83	1
	inl. waterways	72	397	334	340	138	137	174	159	+120	4
Deutschland	road	36 574	44 237	51 496	52 532	54 030	53 164	54 193	53 770	+47	95
	rail - diesel	479	441	953	822	803	772	731	732	+53	2
	rail - electric	960	973	1 317	1 281	1 289	1 324	1 392	1 423	+48	3
	inl. waterways	403	637	662	706	716	701	554	509	+26	1
Ellada	road	3 056	3 903	4 177	4 280	4 383	4 441	4 584	4 805	+57	94
	rail - diesel	53	64	44	47	48	53	43	45	-14	1
	rail - electric	3	11	10	11	11	12	13	14	+367	1
	inl.waterways	238	339	361	351	354	328	288	231	-3	4
España	road	11 811	17 676	18 633	19 719	19 451	20 205	20 466	21 713	+84	91
	rail - diesel	182	212	222	232	222	253	288	354	+94	1
	rail - electric	242	315	323	353	361	430	338	298	+23	1
	inl. waterways	487	1 273	1 364	1 414	1 414	1 465	1 481	1 616	+232	7
France	road	29 385	36 171	35 753	36 411	38 169	37 067	37 300	38 851	+32	96
	rail - diesel	491	387	427	431	454	319	386	339	-31	1
	rail - electric	656	763	794	810	803	837	834	918	+40	2
	inl. waterways	79	497	522	411	464	483	478	469	+493	1
Ireland	road	1 434	1 559	1 613	1 717	1 736	1 810	1 730	2 171	+51	96
	rail - diesel	43	47	35	34	56	59	48	77	+77	3
	rail - electric	1	1	1	1	1	1	1	2	+100	0
	inl. waterways	5	7	17	19	9	8	7	12	+140	1
Italia	road	24 750	30 185	30 776	32 300	33 002	33 011	33 702	33 834	+36	97
	rail - diesel	192	198	198	195	190	192	194	174	-19	1
	rail - electric	418	540	564	571	571	583	625	658	+57	2
	inl. waterways	192	198	212	204	210	223	227	218	+14	1
Luxembourg	road	512	871	1 036	1 132	1 146	1 167	1 107	1 140	+123	:
	rail - diesel	9	8	8	7	4	1	2	2	-78	:
	rail - electric	4	4	5	5	6	6	7	9	+125	:
	inl. waterways	:	:	:	:	:	:	:	:	:	:
Nederland	road	7 468	8 038	8 053	8 403	8 588	8 711	8 949	9 522	+28	:
	rail - diesel	40	33	33	28	27	:	:	:	:	:
	rail - electric	95	109	116	119	119	124	127	135	+42	:
	inl. waterways	:	556	624	669	672	687	697	657	:	:
Österreich	road	4 017	4 754	5 244	5 233	5 303	5 281	5 369	:	+34	:
	rail - diesel	71	70	71	73	80	95	101	101	+43	:
	rail - electric	190	229	254	261	264	263	269	275	+45	:
	inl. waterways	:	:	:	:	:	:	:	:	:	:
Portugal	road	2 059	3 026	3 263	3 568	3 758	3 948	4 104	4 362	+112	97
	rail - diesel	58	56	59	59	54	54	55	50	-14	1
	rail - electric	23	27	28	28	28	37	26	28	+22	1
	inl. waterways	52	43	42	40	47	50	46	46	-12	1
Suomi/Finland	road	2 896	3 631	3 530	3 524	3 468	3 555	3 505	3 416	+18	96
	rail - diesel	72	63	59	59	65	68	62	54	-25	2
	rail - electric	31	36	36	37	39	41	43	40	+29	1
	inl. waterways	65	30	29	32	32	42	42	38	-42	1
Sverige	road	5 371	6 073	6 018	6 257	6 158	6 397	6 431	6 385	+18	95
	rail - diesel	83	39	37	36	35	37	39	39	-52	1
	rail - electric	225	213	207	212	201	212	234	242	+8	3
	inl. waterways	82	87	56	56	45	45	67	69	-16	1
United Kingdom	road	28 621	36 312	36 048	36 324	36 904	37 053	36 687	38 063	+33	94
	rail - diesel	750	621	638	661	619	606	609	585	-22	1
	rail - electric	254	454	453	461	641	599	636	638	+151	2
	inl. waterways	913	1 193	1 079	1 148	1 110	981	915	1 053	+15	3
EU-15	road	165 865	206 077	215 341	221 414	226 335	226 370	228 750	:	+37	:
	rail - diesel	207 680	258 280	267 247	274 249	279 883	:	:	:	:	:
	rail - electric	3 217	3 802	4 237	4 283	4 469	4 610	4 692	4 811	+50	:
	inl. waterways	:	:	:	:	:	:	:	:	:	:
Index EU-15 (1985=100)	road	100	124	130	133	136	136	138	:		
	rail - diesel	100	124	129	132	135	:	:	:		
	rail - electric	100	118	132	133	139	143	146	150		
	inl. waterways	100	:	:	:	:	:	:	:		

NB: Road fuels include LPG, motor spirits and diesel.
Rail - electric: conversion factor used: 1 GWh = 86 toe.
Inland waterways: diesel oil; includes small crafts and coastal ships, using no fuel from international marine bunkers.
Germany: series affected by German reunification.
Source: Eurostat.

Table 7.5: Per capita deliveries of major road transport fuels* (kg)

	1985	1990	1991	1992	1993	1994	1995	1996	1997	change 1996-97 (%)	change 1990-97 (%)
Belgique/België	496	624	629	650	663	675	675	686	690	+0.6	+11
Danmark	524	583	659	702	700	736	759	758	776	+2.3	+33
Deutschland	546	655	683	694	649	689	691	653	623	-4.6	-5
Ellada	302	359	365	438	409	449	495	515	528	+2.4	+47
España	298	438	437	453	474	501	449	464	535	+15.5	+22
France	525	631	644	655	634	633	628	632	646	+2.2	+2
Ireland	384	449	457	482	488	509	525	548	583	+6.4	+30
Italia	445	535	556	575	571	580	598	571	576	+0.9	+8
Luxembourg	1 395	2 217	2 695	2 881	2 882	2 893	2 664	2 711	2 862	+5.6	+29
Nederland	419	484	485	512	521	526	540	572	575	+0.6	+19
Österreich	:	606	660	652	634	615	434	590	654	+10.7	+8
Portugal	200	331	362	383	400	406	428	445	440	-1.1	+33
Suomi/Finland	:	710	693	686	653	694	671	653	677	+3.7	-5
Sverige	:	686	677	699	684	707	704	696	700	+0.6	+2
United Kingdom	486	608	597	605	611	612	600	622	632	+1.6	+4
EU-15	:	584	598	616	605	621	614	612	619	+1.2	+6
Index EU-15 (1990=100)		100	103	105	104	106	105	105	106		

** Final deliveries of leaded/unleaded gasoline and diesel fuel.*
Source: Eurostat.

Finland and Germany under level of 1990

Per capita deliveries of road fuels - presented in Table 7.5 - only consider unleaded and leaded motor spirits and diesel fuel. Given the small amounts of liquified petroleum gas (LPG) and compressed natural gas (CNG) actually consumed at EU-15 level, their absence does not distort the trends. At EU-15 level, per capita deliveries in 1997 were 1.2% higher than the previous year. Growth can be noticed in nearly all Member States, especially in Spain and Austria where deliveries increased by more than 10%. Only Germany (-4.6%) and Portugal (-1.1%) delivered less fuels.

When looking back, it becomes apparent that 1997 deliveries are less then those of 1990 in Germany and Finland (both countries -5%). All other countries delivered more fuels, especially Greece, Denmark, Portugal, Ireland and Luxembourg. EU-15 averages an increase of 6% for this period.

Luxembourg exceptional

Deliveries per capita in Luxembourg are more than four and a half times higher compared to the EU-15 average (619 kg in 1997). This can be explained by the small size of the country, favourable fuel prices encouraging foreign vehicles to refuel and the more than 60 000 commuting cross-border workers.

Luxembourg aside, the highest deliveries are found in Denmark, where fuel prices are relatively low when considering the available income. Portugal features the smallest quantities delivered: in this country, fuel prices are high in terms of available income.

Price influences fuel mix

The price of road transport fuels influences consumers' choice, both in terms of the quantities and the type of fuel purchased. The basic fuel price is set by the oil production and the world market but excise duties and VAT rates can be set by individual countries. Persistent substantial price differences can influence decisions on the type of vehicle purchased, leading to changes in the vehicle stock and fuel mix over time. Table 7.6 indicates the share in fuels sales in the third quarter of 1997 and gives an insight on how this fuel mix differs between the countries. It should be noted that the information in Table 7.6 includes fuel used by goods transport, which is almost entirely diesel fuel.

Table 7.6: Share of fuel in sales (%)

(third quarter 1997)

	Diesel	Unleaded petrol	Leaded petrol
Belgique/België	62.4	29.8	7.8
Danmark	52.1	47.9	0.0
Deutschland	42.5	57.4	0.1
Ellada	45.4	24.2	30.4
España	55.7	19.2	25.1
France	62.9	25.6	11.5
Ireland	40.7	44.8	14.6
Italia	45.5	28.0	26.5
Luxembourg	53.1	41.5	5.3
Nederland	53.7	46.2	0.1
Österreich	56.9	43.1	0.0
Portugal	55.1	21.4	23.6
Suomi/Finland	43.4	56.6	0.0
Sverige	30.7	69.3	0.0
United Kingdom	39.9	43.5	16.6
EU-15	48.7	38.9	12.4

Source: Eurostat.

7.3. Emissions

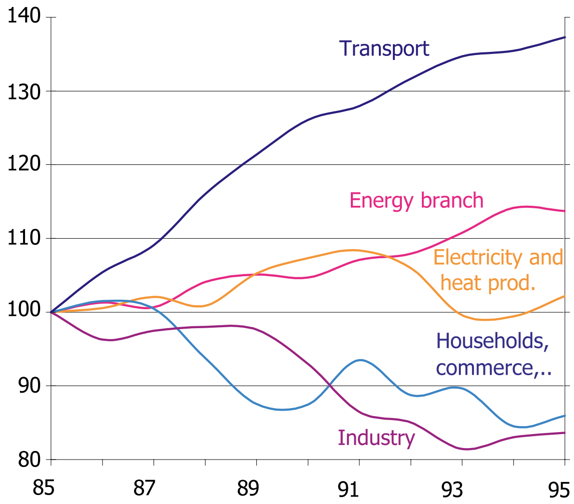
The transport share of the total energy consumption reached 31% in 1995. Nearly the entire consumption of this sector consists of fossil fuels.

Fuel combustion produces carbon dioxide (CO_2) and other emissions, some of them noxious. The quantities and profile of these emissions depend on the quantity and quality of fuel used, the technology used in the combustion, the end-of-pipe technologies (filters, catalysers) and other factors such as temperature and state of maintenance of combustion engines.

CO_2 emissions are the most significant indicator for the use of fossil fuels. Electricity and heat production is the sector producing the highest CO_2 emissions, followed by transport (see Graph 7.2 of Chapter 7.1). Table 7.7 and Graph 7.8 outline that it is however the transport sector that shows the highest increase over the last ten years, mainly due to an impressive growth of road transport. Air transport shows a high increase as well, but at a lower level in absolute numbers (Table 7.9).

In general, solid fuels produce more emissions than petroleum products. In the case of transport, coal for rail traction virtually disappeared. Coal and lignite is however used in electricity-generating power stations. The use of electricity for rail transport (and for electric motor vehicles) does correspond to a certain proportion of power station emissions.

Graph 7.8: Evolution of CO_2 emissions from fossil fuels - EU-15 (1985=100)



Source: Eurostat.

Secondary pollutants

Resulting of an incomplete combustion of fuels, harmful pollutants may interact chemically or physiologically to produce secondary pollutants like 'summer smog' and high ozone levels, mainly registered in large urban areas.

Table 7.7: EU-15 total internal emissions of CO_2 by sector (in million tonnes of CO_2)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	change (%) 1985-95
Total internal emissions	2 798	3 024	3 058	3 046	2 876	3 088	3 115	3 171	3 018	2 997	3 048	+9
Electr. and heat production	926	931	945	934	975	994	1 004	982	922	921	946	+2
Energy sector	126	128	127	131	133	132	135	136	140	144	143	+14
Final energy consumption	1 945	1 965	1 986	1 980	1 964	1 962	1 976	1 954	1 956	1 932	1 958	+1
Industry	626	603	610	613	611	582	541	532	510	520	523	-16
Households, services, etc.	734	745	737	688	643	642	686	651	658	620	631	-14
Transport	585	617	638	679	710	738	749	771	788	793	804	+37
of which:												
Belgique/België	18	20	20	22	22	23	23	24	25	25	25	+39
Danmark	11	11	12	12	13	13	13	13	13	14	14	+28
Deutschland	136	143	149	154	158	169	172	175	181	179	182	+34
Ellada	14	14	14	15	16	17	18	18	19	19	19	+37
España	44	47	50	60	63	66	71	73	72	75	77	+74
France	97	102	105	112	117	122	121	124	130	127	129	+33
Ireland	5	5	5	5	6	6	6	6	6	7	7	+36
Italia	81	86	86	91	95	97	100	104	106	106	109	+35
Luxembourg	2	2	2	2	3	3	4	4	4	4	4	+117
Nederland	26	27	27	28	29	30	31	33	34	34	36	+42
Österreich	13	13	13	14	15	15	17	17	17	17	18	+38
Portugal	8	8	9	10	10	11	12	13	13	14	14	+82
Suomi/Finland	10	10	11	12	12	13	12	12	12	12	12	+22
Sweden	18	20	20	21	22	21	20	21	21	22	22	+20
United Kingdom	104	111	114	122	130	132	130	133	136	137	137	+31

Source: Eurostat.

eurostat

Table 7.9: EU-15 total emissions of CO_2 - share by transport mode (in million tonnes of CO_2)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	change (%) 1985-95
Total transport sector	585	617	638	679	710	738	749	771	788	793	804	+37
of which:												
rail transport	11.7	11.2	11.2	10.2	9.5	9.1	9.1	8.7	8.7	8.3	8.5	-27
road transport	499.7	525.5	544.8	580	604.5	626.1	636.2	654.5	669.3	670.1	677.9	+36
air transport	61.5	64.4	67.8	74.3	78.5	82	82.6	85.3	89.1	92.8	96.5	+57
inland navigation	12.4	16	14.6	14.5	17.9	20.6	21.1	22	21.2	21.5	20.6	+66

Source: Eurostat.

Ever tighter emission standards

Progress has mainly been made in reducing emissions levels of road vehicles. This does not only concern the level of CO_2 emitted (whose reduction is mainly linked to the use of more fuel efficient vehicles) but mainly the levels of noxious substances. Table 7.10 outlines the various emission standards applying to vehicles of serial production in the European Union. The proposal for tighter standards applicable for the year 2000 have now been accepted and the next standards for 2005 have been adopted.

From the year 2005 onwards, cars should pollute about 70% less than today. The sulphur content of petrol and diesel will gradually be reduced to 50 ppm (parts per million) in 2005, about one tenth of the present values. Hence, the oil industry will have to invest substantially in the adaptation of its refineries. As from 1 January 2001, new model cars with petrol engines (2003 for diesels, 2005 for light duty goods vehicles) will have to be fitted with an onboard diagnosis system, constantly monitoring emission levels produced.

Table 7.10: European emission standards (applying to vehicles of serial production)

CARS

Petrol engine	as from:	CO* (g/km)	NOx* (g/km)	VOCs* (g/km)
EURO I (1)	1.7.1992	3.34	0.49	0.66
EURO II (1)	1.1.1996	2.70	0.25	0.34
EURO III (2)	1.1.2000	2.30	0.15	0.20
EURO IV (2)	1.1.2005	1.00	0.08	0.10

Diesel engine	as from:	CO* (g/km)	NOx* (g/km)	VOCs* (g/km)	Particulate matter (g/km)
EURO I (1)	1.7.1992	3.34	0.49	0.66	0.18
EURO II (1)	1.1.1996	1.00	-	0.9	0.10
EURO III (2)	1.1.2000	0.67	0.50	0.56	0.05
EURO IV (2)	1.1.2005	0.50	0.25	0.30	0.025

HEAVY DUTY VEHICLES (lorries)

	as from :	CO* (g per kw/h)	NOx* (g per kw/h)	VOCs* (g per kw/h)	Particulate matter <85 kW	Particulate matter >85 kW
EURO I	1.10.1993	4.5	8	1.1	0.612	0.36
EURO II	1.10.1996	4	7	1.1	0.15	
EURO III (proposal)	1.1.2000	2.1	5	0.66	0.1	

** CO = Carbonmonoxide; NOx = Nitrogenoxide; VOCs = Volatile Organic Compounds.*
(1) As measured on new test cycle for application in year 2000.
(2) EU agreement of 29.6.1998, approved by the Council of Ministers on 28.12.1998.

Leaded petrol to disappear very soon

In 2000, leaded petrol will be completely banned in the EU. Graph 7.11 shows that lead emissions are reduced proportionally to the increase in the share of unleaded petrol. In certain countries however, 1997 sales of leaded petrol still exceeded those of unleaded (see Table 7.6 in Chapter 7.2 - Energy consumption). By 2000, that situation will change, further reducing lead emissions.

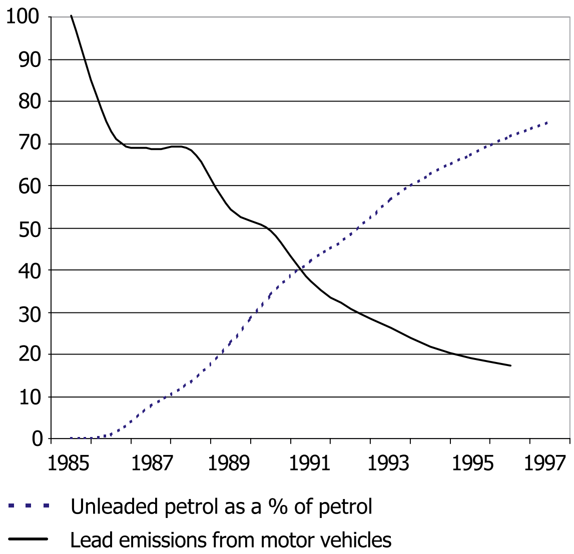
Noise often underestimated

The traffic and transport-linked emission of noise has been getting increased attention over the last years. The present scarcity of consistent statistics at European level should change in the future. Table 7.12 outlines the European Union's efforts to reduce noise emissions by setting production standards for various types of vehicles.

It should be noted that an increase of 3 dB(A) corresponds to a doubling of sound pressure; however, humans perceive a 10 dB(A) increase as a doubling of noise (loudness).

Measures taken in road transport include the wider use of 'quieter' car tyres with low rolling resistance (for increased fuel efficency) and the use of noise-absorbing tarmac apart from passive measures like the construction of noise barriers along roads through or near residential areas.

Graph 7.11: Lead emissions
(Emissions: 1985=100 - Share: %)



Source: Eurostat.

Table 7.12: Noise emission limits - EU standards - dB(A)*

Vehicle category	1972	1980	1982	1989-90	1995-96	1997
Passenger car (1)	82	.	80	77	74	.
Urban bus (1)	89	.	82	80	78	.
Heavy lorry (1)	91	.	88	84	80	.
Motorcycles < 80cm^3 (2)	.	78	.	77	.	75
Motorcycles > 80 - < 175cm° (2)	.	80-83	.	79	.	77
Motorcycles > 175cm^3 (2)	.	83-86	.	82	.	80
Motor assisted cycle < 25 km/h	.	.	.	.	.	66
Motor assisted cycle > 25 km/h	.	.	.	.	.	71

*: db (A) : A-weighted decibels : logarithmic scale, +3db(A) = doubling of noise pressure
(1) Method of measurement described in Council Directive 92/97/EEC of 10 November 1992, OJ L 371, 19.12.1992.
(2) Directive 97/24/EC of 17 June 1997, OJ L 226, 18.8.1997.
Source: DG VII.

Symbols and abbreviations

%	per cent
-	nil
:	not available
.	non-applicable
1970=100	reference year
AEA	Association of European Airlines
ECIS	European Centre for Infrastructure Studies
ECMT	European Conference of Ministers of Transport
ECU	European currency unit
EIB	European Investment Bank
EU	European Union
EU-15	European Union of 15 Member States
Eurostat	Statistical Office of the European Communities
GDP	gross domestic product
IACA	International Air Carrier Association
IRF	International Road Federation
NACE	general classification of economic activities within the European Communities
NST/R	standard goods nomenclature for transport statistics/revised
pkm	passenger-kilometre
PPS	purchasing power standard
tkm	tonne-kilometre
toe	tonne oil equivalent
UIC	Union Internationale des Chemins de Fer/International Union of Railways
UN-ECE	United Nations - Economic Commission for Europe

Countries :

B	Belgium - Belgique/België
DK	Denmark - Danmark
D	Germany - Deutschland
D-W	Germany - West
D-E	Germany - East
EL	Greece - Ellada
E	Spain - España
F	France
IRL	Ireland
I	Italy - Italia
L	Luxembourg
NL	Netherlands - Nederland
A	Austria - Österreich
P	Portugal
FIN	Finland - Suomi/Finland
S	Sweden - Sverige
UK	United Kingdom
CECs	Central European countries (Bulgaria, Czechoslovakia (until 1992), Czech Republic (from 1993), Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia, Slovak Republic (from 1993)
LI	Liechtenstein
NO	Norway
CH	Switzerland
USA	United States of America

Statistical sources

1. *European legal acts on transport statistics*

- Council Directive (80/1119/EEC) of 17 November 1980 on statistical returns in respect of carriage of goods by inland waterways (OJ L 339 15.12.1980)
- Council Directive (80/1177/EEC) of 4 December 1980 on statistical returns in respect of carriage of goods by rail as part of regional statistics (OJ L 350 23.12.1980)
- Draft Council Regulation (EC) on statistical returns in respect of carriage of passengers, freight and mail by air (COM(95) 353 final 14.9.1995)
- Council Regulation (EC) No 1172/98 of 25 May 1998 on statistical returns in respect of carriage of goods by road (OJ L163 6.6.1998 replaces Council Directive (78/546/EEC) of 12 June 1978 and Council Directive (89/462/EEC of 18 July 1989)).

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Contact points: Eurostat data shops (see list at the end of this publication)

http://europa.eu.int/eurostat.html

3. *International statistical sources*

- **United Nations - UN-ECE**
  Palais des Nations, CH-1200 Genève, Switzerland
  Tel (41-22) 917 24 53 Fax (41-22) 917 00 39
  http://www.un.org
- **European Conference of Ministers of Transport (ECMT)**
  24, rue Louis David, F-5755 Paris Cedex 16, France
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  http://www.oecd.org
- **Association of European Airlines (AEA)**
  Avenue Louise 350, B-1050 Brussels, Belgium
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- **Airports Council International (ACI)**
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  B-1000 Brussels, Belgium
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  33, route de l'Aéroport, CH-1215 Geneva Airport, Switzerland
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  http://www.iata.org/ar97
- **International Road Federation (IRF)**
  63, rue Lausanne, CH-1200 Genève, Switzerland
  Tel (41-22) 731 71 50 Fax (41-22) 731 71 58
  http://www.is.eunet.ch/irf
- **International Union (Association) of Public Transport (UITP)**
  avenue Herrmann Debroux 17, B-1060 Bruxelles, Belgium
  Tel (32-2) 673 61 00 Fax (32-2) 660 10 72
  http://www.uitp.com administration@uitp.com
- **International Union of Railways (UIC)**
  16, rue Jean Rey, F-75015 Paris, France
  Tel (33-1) 44 49 21 85 Fax (33-1) 44 49 21 89
  http://www.uic.asso.fr
- **Union Internationale des Societés de Transport Combiné Rail-Route (UIRR)**
  avenue du Port, 100, bte3, B-1210 Bruxelles, Belgium
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  http://www.uirr.com

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