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Panorama of transport

Statistical overview of transport in the European Union

Data 1970-2000

7

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FOREWORD

The Panorama of Transport sets out to describe, via annual statistics, the most important features of transport in the European Union. In so doing it provides European citizens and decision makers with information on medium and long term trends in the transport economy.

This publication 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, the environment and health, as a factor in our quality of life. Transport statistics are often an indicator of economic activity and European integration, as is shown by the notable increase in the proportion of international intra-EU transport, but they can also reflect short-term problems, for example the serious and immediate impact on aviation of security problems or fuel price increases.

The first edition of the Panorama published in 1999 dealt mainly with inland transport, with particular emphasis on freight transport for which Community statistics have been collected for many years. The second edition, published in 2001, also included air transport, for which international passenger transport has been increasing, since 1993 - the first year in which data were collected by Eurostat - at a rate close to a doubling every ten years.

This third edition covers for the first time all main modes of transport as it also includes maritime transport, a domain in which intra-EU trade has experienced a spectacular development, similar to that of road transport. When expressed as total tonnes transported, maritime transport is by far the most important mode of freight transport for the European Union, counting intra-EU and extra-EU transport together.

The *Panorama* is designed to provide statistics to support the development of Community transport policy. In particular, in order to meet the challenge of a transport policy which contributes to economic development while improving our quality of life, the European Commission proposed some sixty measures in its White Paper adopted, in September 2001, *European transport policy for 2010: time to decide* (www.europa.eu.int/comm/energy_transport/en/lb_en.html).

The Panorama exploits the wide range of data available in the Eurostat dissemination database (New Cronos), not only on transport but also on the economy, on the environment and on energy, bringing these data together and explaining them. As most of the data used for this publication have been extracted from the Eurostat database at the beginning of 2002, and as there is a need of good data coverage among all the EU countries, the year 2000 is in most cases the most recent year for which data were available.

The user who wishes to go further can contact Eurostat or the network of Data Shops. More up to date, more specialized or more detailed dissemination products can be obtained, such as the CD-ROM *Everything on transport statistics*, which includes all data, publications and documents on transport available at Eurostat. In particular, this CD-ROM contains, at the date of its issue, relatively fresh data extracted from the Eurostat dissemination database, one or two month earlier.

The next edition of the Panorama will, in addition to covering all the main modes of transport, put a special emphasis on the latest road freight transport statistics collected under the recent EU regulation; it will also give a first overview of the data on the ten acceding countries.

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PANORAMA OF TRANSPORT

Statistical overview of the transport sector in the European Union

CONTENTS

Foreword

1. The transport sector in the European Union 7

2. Transport infrastructure 11
   - 2.1. General development 11
   - 2.2. Physical characteristics of transport networks 14
   - 2.3 Trans-European transport networks (TENs) 19
   - 2.4 Expenditure 27

3. Means of transport 31

4. Enterprises, economic performance and employment 39
   - 4.1. Enterprises and employment 39
   - 4.2 Economic performance 44

5. Traffic and transport quantities and performances 49
   - 5.1. Transport of goods 49
   - 5.1.1. General development 49
   - 5.1.2. National goods transport 52
   - 5.1.3. International goods transport 56
   - 5.1.4. Transport by group of goods 63
   - 5.2. Passenger transport 69
   - 5.2.1. General development 69
   - 5.2.2. National passenger transport 73
   - 5.2.3. International passenger transport 78

6. Transport safety 83

7. Environment and energy 89
   - 7.1. General development 89
   - 7.2. Energy consumption 92
   - 7.3. Emissions 97

Statistical sources 103

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. Transport has shown a steady growth since the 1970s, although the trend has been less regular in goods traffic than in passenger traffic (see Graph 1.1). 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 average annual growth by transport mode (%)

	1970-2000	1990-2000	1999-2000
Total goods transport[1]	**+ 2.26**	**+ 2.83**	**+ 2.84**
Road goods transport	+ 3.26	+ 3.44	+ 2.29
Rail goods transport	-0.15	+ 0.59	+ 5.49
Inland ww. goods transp.	+0.67	+ 1.59	+ 3.65
	1993-2000	**1998-1999**	**1999-2000**
Air transport - passengers[2]	+ 8.00	+ 7.93	+ 8.68
Maritime transport - goods handled	:	-0.5	+ 1.25

(1) road, rail, inland waterways, pipelines.
(2) international traffic only.
Source: Eurostat, DG Energy and Transport.

A sector in its own right

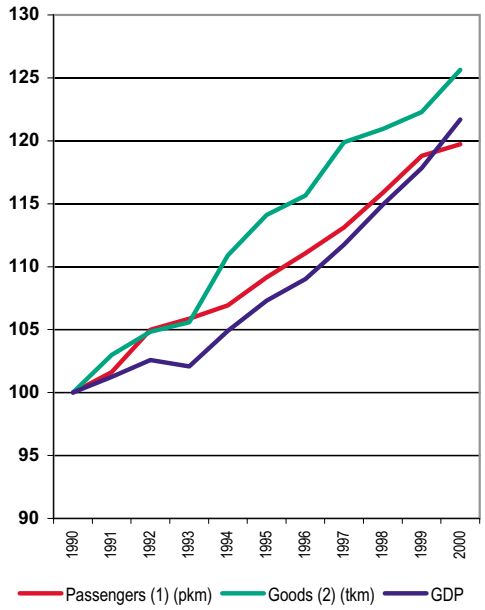
The transport services sector in the European Union delivers benefits in its own right: the sector accounts for an estimated 4% of the Union's gross national product and employs approximately 6.3 million people. The latter figure represents around 4.1% of all persons employed in the EU. An additional 2 million persons are employed in the transport equipment industry, and over 6 million in transport related industries.

Each day, the transport industries and services of the European Union have to get more than 150 million people to and from work, enable at least 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 1999, average intra-EU passenger transport demand was close to 33 km per person/day (taking only into account transport by passenger car, buses and coaches and railways).

Graph 1.1: EU-15 transport growth (1990 = 100)



(1) : Pass. cars, buses & coaches, tram & metro, rail, air.
(2) : Road, rail, inland waterways, pipelines, sea (intra-EU).

Source: Eurostat, DG Energy and Transport.

Continuous growth expected

Table 1.2 and Graph 1.3 shows that road haulage has been constantly growing and takes a largely dominant position in freight transport. Meanwhile rail's share of the freight market has slightly decreased in the past 30 years. The transport performance of inland waterway vessels has been growing only slowly over the last 30 years, but it is at least surprising that this performance is obtained with a massively reduced vessel fleet.

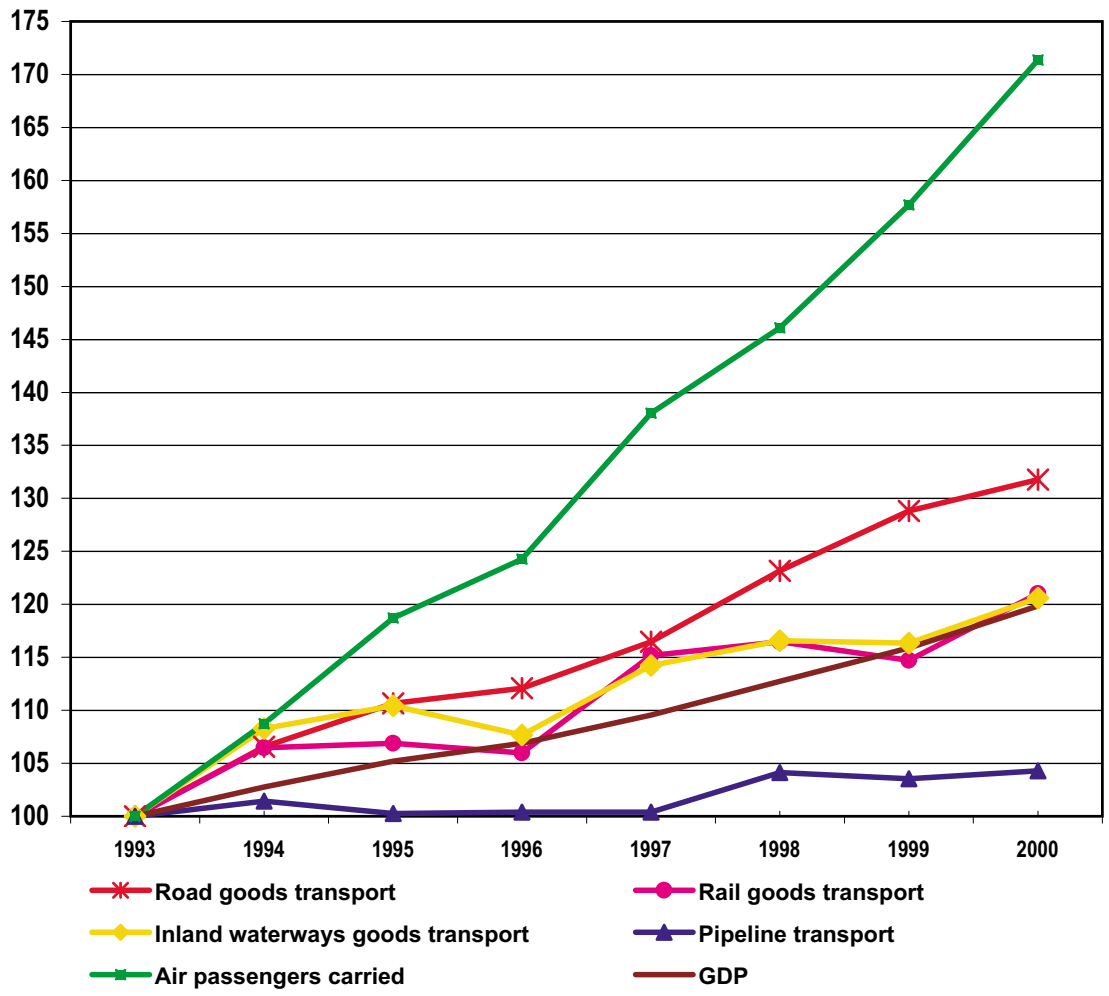
It is however air transport that has experienced the fastest growth in recent years. Passenger data available at Eurostat show that the number of passengers in international intra- and extra-EU

transport passed from 253 million in 1993 to 434 million in 2000. This corresponds to an average annual increase of 8%.

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 have now been completed (see Chapter 2.3).

Graph 1.3: Development of EU-15 transport: growth by mode (1993=100)



Source: Eurostat.

(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. (...)

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.

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

	1970	1999	Change 1970 - 99
Rail	170 662	152 723	-11%
Roads	2 639 646	3 231 706	+22%
of which motorways	*15 864*	*51 336*	+223%
Pipelines	11 441	21 579	+89%
Inland waterways	31 748	28 168	-11%
TOTAL NETWORK	**2 853 497**	**3 485 512**	**+21%**

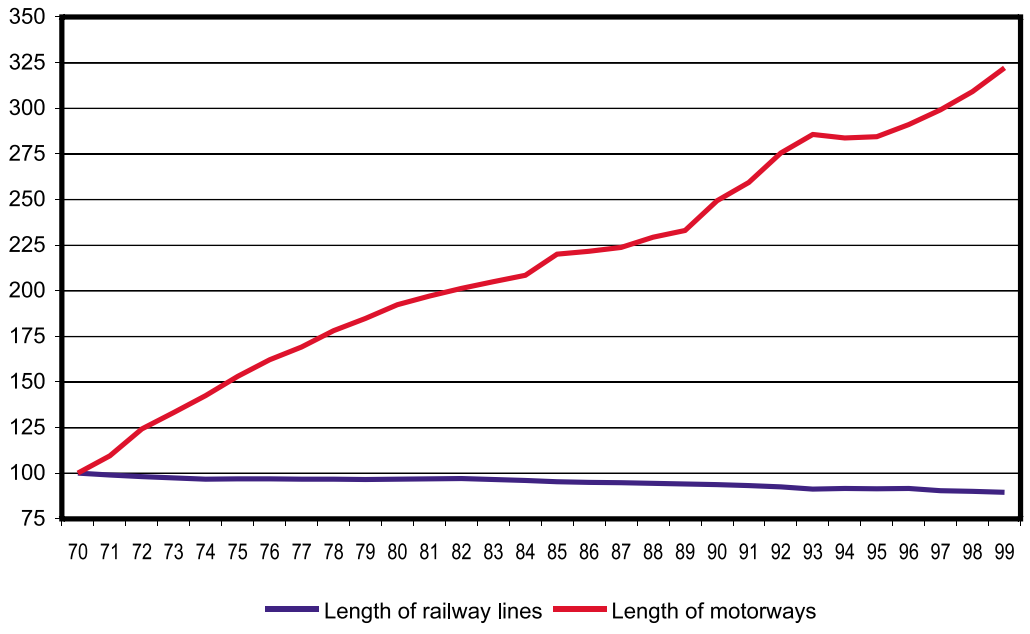
Source: Eurostat/ECMT/UN-ECE, national statistics.

Motorway network more than tripled since 1970

In 1999, the total length of railways in EU-15 amounted to 152 723 km (see Table 2.1). Although almost half of this network (48%) is now electrified, the overall length in use steadily decreased (see Graph 2.2) and stands 11% lower than in 1970. As far as network density is concerned, EU-15 offers 47.1 km of railways per 1 000 square kilometres (1999). This is nearly twice as much as in the United States (23.7 km/1 000 km^2 in 1998, including Alaska and Hawaii and inland waters) but less than in Japan (53.2 km/1 000 km^2 in 1998).

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 have been used. Local roads make up almost two thirds of the entire road network.

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



Source: Eurostat/ECMT/UN-ECE.

The total length of the road network in EU-15 amounted to over 3.2 million km in 1999 of which 51 336 km consisted of motorways (1.6%). The length of the motorway network in the EU more than tripled in less than three decades (see Graph 2.2). Equivalent figures for the United States show a total network of nearly 6.5 million km with a share of 88 700 km (1.4%) of motorways (1998). Japan featured 1.16 million km of roads with a 0.6% share of motorways (6 400 km – in 1998).

When relating the length of the entire road network in 1999 to the total area, EU-15 offers 1 013 km per km^2 while the equivalent value is 656 (1998) for the United States (motorways: 15.8 km and 9.0 km respectively). With 3 076 km/1 000 km^2, Japan's total road network is extremely dense, whereas the density of the motorway network (16.9 km/1 000 km^2) is slightly over the EU average.

Inland waterways decreased most since 1970

Only 9 of the 15 Member States are able to offer significant transport using inland waterways. In 1999, the total length of usable inland waterways (comprising rivers, canals and navigable lakes) amounted to 28 168 km of length which represents a density of 8.7 km per 1 000 km^2. This density is twice as much compared to the United States in 1998 (4.3 km per 1 000 km^2 - approximately 41 800 km of length, excluding the Great Lakes).

This network of lakes, rivers and artificially built canals offers a unique transport system in the nine Member States, still offering considerable potential – especially with regards to the Balkan countries – since the opening of the Rhine – Main – Danube canal. Nearly the entire network of navigable waterways is used for the transport of goods. Examples are few for the transport of passengers other than for leisure purposes (like scheduled passenger lines on the North Italian lakes and transport in Venice).

Pipelines not to be forgotten

In addition to the three main inland transport modes, the 21 579 km of pipelines should be mentioned, a network the length of which in 1999 constituted 14.1% of the rail and 77% of the inland waterway network. For statistical purposes, only oil pipelines are considered here.

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.

A 20% increase over 28 years

The total length of the three 'classic' networks experienced a considerable growth: from 2.8 million km in 1970 to 3.4 million km in 1999. This represents an increase of 20%. The most important share of this growth can be attributed to the road network with a growth of 22%, while the rail and inland waterways network both decreased by 11%.

In terms of modal share, the railway network makes up only 4.5% (1970: 6.0%) of the total length of the transport network in 1999 while the road network amounts to 94.7% (1970: 92.9%) and inland waterways to 0.8% (1970: 1.1%).

Busy skies

The airspace over the European Union can be considered as one of the busiest in the world. Obviously, in aviation one cannot talk about 'network length' and a classification of airports on the basis of their technical or infrastructural features is not useful for statistical purposes: the network of airports is very different from networks of surface links. Airports are by their nature intermodal nodes on a route network requiring virtually no en-route surface infrastructure.

The 30 or so largest airports in the European Union handle three quarters of total passengers and about 90 percent of extra-Community international traffic. In the frame of the guidelines for the transport TENs (trans-European networks - see Chapter 2.3), those airports are regarded as *International Connecting Points*, although they also take most intra-Community traffic as well. A further 60 or so *Community Connecting Points*, generally handling between one and five million passengers per annum, account for almost all the remaining international and intra-Community traffic. The remaining 200 airports in the network tend to be quite small, but fulfil a vital *Regional and Accessibility Point* role, often in relatively remote areas, although they take only five per cent of Community passengers.

Infrastructure investments are planned and undertaken at many of the major EU airports, particularly with regards to connections to the rail, especially high-speed rail, network.

Most of the trade with third countries via seaports

The crucial role played by seaports in European Union trade is evident: more than 345 million persons passed through EU seaports in 2000 and the total tonnage of goods handled is estimated at 3 000 million tonnes, 70% of all trade with third countries is channelled through the ports. Short sea shipping along the EU's and its neighbouring countries' coasts has a share of

70% of the total EU seaborne transport of goods. Hence the need for efficient infra-structures and services.

For quite a while, seaports have not been at the center of common transport policy. Investment in infrastructures gradually declined between 1970 and the late 1980's. At the beginning of the 1990's however, investment in ports picked up significantly. Sustainability and intermodality are two key-words that pushes the Commission to take various actions aiming at better connections between ports and the rail and inland waterway networks together with improvements in the quality of seaport services.

At EU-level, there are approximately 345 maritime ports handling over 1 million tonnes of goods or 200 000 passengers per year. In 2000, the five most important ports (Rotterdam, Antwerp, Marseille, Hamburg and Le Havre) were responsible for 22% of the total tonnage handled in the European Union (see Chapter 5.1). The main passenger ports correspond to those offering the major European ferry connections. Data for the period 1997-2000 suggest that the construction of fixed links (tunnels, bridges) had a considerable impact on the passenger frequentation of ports (see Chapter 5.2).

2.2. Physical characteristics of transport networks

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 reduced by 11% since 1970

At EU-15 level, the total length of the railway network decreased by 11% between 1970 and 1999 (see Table 2.5). The railway network decreased most in Portugal and Belgium (28 and 18% respectively), and remained the most stable in Italy, Luxembourg and Finland.

Table 2.3 outlines that in 1999, the railway network of Germany was the longest in EU-15: with 37 536 km this network constitutes 24.6% of the total EU-15 network. The French railway network comes second with 31 589 km or 20.7%. The UK and Italian network follow with 11.1% and 10.5% respectively. These four Member States alone stand for two thirds (67%) of the entire EU network.

Highest rail density in Belgium

In terms of network density things look different: despite a 18% decrease since 1970, Belgium still has the highest rail network density with 113.8 km/1 000 km^2, followed by Luxembourg (105.4 km/1 000 km^2) and Germany (105.1 km/1 000 km^2). The lowest density within the EU-15 can be found in Finland (17.3 km/1 000 km^2) and Greece (17.4 km/1 000 km^2).

Table 2.4: Railways: Dedicated high-speed rail network

Lines capable of speeds of 250 km/h or more						
	Belgium	Germany	Spain	France	Italy	EU-15
1995	-	-	-	1 124	-	1 124
1996	12	434	376	1 152	237	2 211
1997	71	434	376	1 152	259	2 292
1998	71	489	376	1 147	259	2 342
1999	74	491	377	1 147	259	2 348
2000	74	510	377	1 147	259	2 367

Source: UIC.

The case of Finland illustrates the typical situation of a country with 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 (24 km/1 000 km^2) is almost the same as in Spain (24.3 km/1 000 km^2).

Sweden and Finland have far more than 100 km of tracks per 100 000 inhabitants whilst Austria, in third position, follows with 70 km/100 000 inhabitants. It should be noted that the two Nordic countries feature a very uneven population distribution, a factor that is not considered in these ratios. The low rail network density for

Table 2.3: Length of transport networks 1999 - key indicators

	Railways[1]				Motorways		
	km	% electrified	km/100 000 inhab.	km/1 000 km…	km	km/100 000 inhab.	km/1 000 km…
Belgium	3 472	78	34.0	113.8	1 682	16.5	55.1
Denmark	2 324	26	43.8	53.9	880	16.6	20.4
Germany	37 536	48	45.7	105.1	11 515	14.0	32.3
Greece	2 299	0	21.9	17.4	*470*	4.5	3.6
Spain	12 319	56	31.3	24.3	8 800	22.3	17.4
France	31 589	45	53.5	58.1	11 000	18.6	20.2
Ireland	1 919	2	50.5	27.3	115	3.0	1.6
Italy	16 108	66	27.9	53.5	6 621	11.5	22.0
Luxembourg	274	95	68.5	105.4	115	28.8	44.2
Netherlands	2 808	73	17.8	67.7	2 235	14.1	53.9
Austria	5 643	61	69.7	67.3	1 634	20.2	19.5
Portugal	2 813	32	28.1	30.6	797	8.0	8.7
Finland	5 836	38	112.2	17.3	512	9.8	1.5
Sweden	10 799	75	121.3	24.0	1 484	16.7	3.3
United Kingdom[2]	16 984	30	28.5	69.6	3 476	5.8	14.2
EU-15	**152 723**	**48**	**40.6**	**47.2**	**51 336**	**13.7**	**15.9**

(1) Railways: Data for UIC member railways. Estimates in italic.
(2) United Kingdon data refer to Great Britain.
Sources: Eurostat / ECMT / UN-ECE, UIC, IRF, national statistics.

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

Railways[1]
Motorways
Other roads[2]
Pipelines[3]
Inland waterways

	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK	EU-15	EU-15 index 1970 =100
1970	4 232	2 352	43 777	2 571	13 668	36 117	2 189	16 089	271	3 148	5 907	3 591	5 870	11 550	19 330	170 662	100
	488	184	5 874	11	387	1 553	0	3 913	7	1 209	478	66	108	403	1 183	15 864	100
	93 539	62 592	*555 000*	34 692	139 221	710 384	86 695	281 405	4 949	81 890	102 053	41 763	73 444	110 846 [4]	356 155	*2 623 782*	100
	52	-	2 260	-	1 099	3 609	-	1 860	-	323	604	-	-	-	1 634	11 441	100
	1 553	-	6 808	-	-	7 433	-	2 337	37	5 599	350	-	*6 000*	-	1 631	31 748	100
1980	3 971	2 015	42 765	2 461	13 542	34 382	1 987	16 133	270	2 760	5 847	3 588	6 096	11 382	18 030	165 229	97
	1 203	516	9 225	91	2 008	5 264	0	5 900	44	1 780	938	132	204	850	2 683	30 838	194
	124 710	68 405	*594 000*	37 367	147 644	796 514	89 796	290 370	5 050	91 628	*103 553*	*50 410*	75 405	96 504 [4]	337 077	*2 811 929*	107
	458	77	2 880	-	1 753	5 254	-	3 069	-	391	777	-	-	-	3 166	17 825	156
	1 510	-	6 697	-	-	6 568	-	2 337	37	4 843	350	-	6 057	-	1 631	30 030	95
1990	3 479	2 344	40 981	2 484	12 560	34 260	1 944	16 086	271	2 798	5 624	3 592	5 867	10 801	16 914	160 005	94
	1 631	601	10 854	190	4 693	6 824	26	6 193	78	2 092	1 445	316	225	939	3 180	39 287	248
	138 575	70 173	*626 000*	38 312	156 243	801 274	92 303	297 419	5 013	*102 498*	104 807	61 222	77 233	132 619 [4]	378 934	*2 950 006*	112
	301	444	3 038	-	2 678	4 948	-	4 086	-	391	777	-	-	-	2 422	19 085	167
	1 513	-	6 669	-	-	6 197	-	1 366	37	5 046	351	-	6 237	-	1 631	29 047	91
1995	3 368	2 349	41 719	2 474	12 280	31 939	1 947	15 998	275	2 739	5 672	2 850	5 880	9 782	16 999	156 271	92
	1 666	796	11 190	420	6 962	8 275	72	6 401	123	2 208	1 596	687	394	1 231	3 308	45 329	286
	142 126	70 525	*631 000*	38 265	155 655	951 097	92 360	305 500	5 046	111 144	104 715	68 045	77 722	136 233 [4]	387 799	*3 140 999*	120
	294	409	2 460	-	3 691	4 830	-	4 235	-	391	777	-	-	-	2 602	19 689	172
	1 531	-	6 663	-	-	5 962	-	1 466	37	5 046	351	-	6 245	-	1 153	28 454	90
1996	3 380	2 349	40 826	2 474	12 284	31 852	1 945	16 014	274	2 739	5 672	2 850	5 881	10 923	17 001	156 464	92
	1 674	832	11 246	470	7 293	8 596	80	6 439	115	2 223	1 607	710	431	1 330	3 344	46 390	292
	142 126	70 504	*633 000*	*38 300*	154 805	960 561	92 570	306 900	5 053	111 212	104 445	*69 340*	77 782	136 915 [4]	389 585	*3 156 183*	120
	300	336	2 460	-	3 691	4 983	-	4 235	-	*391*	777	-	-	-	3 459	*20 632*	180
	1 531	-	6 760	-	-	5 678	-	1 466	37	5 046	351	-	6 245	-	1 153	28 267	89
1997	3 422	2 232	38 450	2 503	12 294	31 754	1 945	16 030	274	2 805	5 672	2 856	5 865	11 168	16 991	154 261	90
	1 679	855	11 309	*500*	7 750	8 864	94	6 445	118	2 360	1 613	797	444	1 423	3 412	47 663	300
	143 235	70 582	*633 000*	*38 300*	155 045	964 646	95 744	306 900	5 053	111 212	104 739	*69 340*	77 796	136 884 [4]	390 918	*3 166 510*	121
	300	336	2 460	-	3 691	5 746	-	4 235	-	*391*	777	-	-	-	3 936	21 872	191
	1 540	-	6 673	-	-	6 051	-	1 466	37	5 046	351	-	6 245	-	1 153	28 562	90
1998	3 410	2 232	38 126	2 503	12 303	31 727	1 909	16 041	274	2 808	5 643	2 794	5 867	11 156	16 847	153 640	90
	1 682	861	11 427	*500*	8 269	9 303	103	6 453	115	2 360	1 613	1 252	473	1 439	3 421	*49 271*	311
	144 168	70 601	*632 000*	*39 000*	155 004	971 064	95 732	*307 000*	*5 060*	*111 212*	104 748	*70 000*	77 894	136 593 [4]	392 545	*3 176 028*	121
	300	336	2 370	-	3 691	5 746	-	4 235	-	*391*	777	-	-	-	3 953	*21 799*	191
	1 529	-	6 740	-	-	5 732	-	1 477	37	*5 046*	351	-	6 245	-	1 153	*28 310*	89
1999	3 472	2 324	37 536	2 299	12 319	31 589	1 919	16 108	274	2 808	5 643	2 813	5 836	10 799	16 984	*152 723*	89
	1 682	880	11 515	470	8 800	11 000	115	6 621	115	2 235	1 634	797	512	1 484	3 476	*51 336*	324
	144 791	70 699	*632 000*	*39 000*	154 876	974 722	95 732	*307 000*	*5 060*	*111 212*	104 378	*70 000*	77 900	137 572 [4]	*393 000*	*3 180 370*	121
	300	330	2 370	-	3 698	5 746	-	4 364	-	*391*	777	-	-	-	3 603	*21 579*	189
	1 529	-	6 754	-	-	5 576	-	1 477	*37*	*5 046*	351	-	6 245	-	1 153	*28 168*	89

(1) Railways: Length in use. Data refer to main railway companies (UIC-members).
(2) Due to differences in definition, comparability is limited/low.
(3) Pipelines: only oil-pipelines longer than 40 km are considered.
(4) does not include private roads open to the public (approx. 74000 km).
Source: Eurostat, UIC, UN-ECE, national statistics.

Estimates in italic.

Table 2.6: Main* airports handling at least 80% of the country's total passenger traffic in 2000

BELGIUM (1 main airport**)	ITALY (26 main airports)
Bruxelles/National	Roma
DENMARK (4 main airports)	Milano/Malpensa
København	Milano/Linate
GERMANY (17 main airports)	Venezia
Frankfurt-Main	Napoli
München	Catania
Düsseldorf	Bologna
Berlin-Tegel	Torino
Hamburg	**LUXEMBOURG (1 main airport)**
Stuttgart	Luxembourg
GREECE (21 main airports)	**NETHERLANDS (4 main airports)**
Athinai	Amsterdam
Iraklion	**AUSTRIA (6 main airports)**
Thessaloniki	Wien
Rodos	Salzburg
Kerkira	**PORTUGAL (6 main airports)**
Kos	Lisboa
SPAIN (34 main airports)	Faro
Madrid/Barajas	Porto
Barcelona	**FINLAND (14 main airports)**
Palma de Mallorca	Helsinki
Malaga	Oulu
Las Palmas/Gran Canaria	Turku
Tenerife	**SWEDEN (19 main airports)**
Alicante	Stockholm/Arlanda
Arrecife/Lanzarote	Göteborg
Ibiza	Malmö
FRANCE (27 main airports)	**UNITED KINGDOM (32 main airports)**
Airport System - Paris	London/Heathrow
Nice	London/Gatwick
Marseille	Manchester
Lyon/Satolas	London/Stansted
Toulouse	Birmingham
IRELAND (3 main airports)	Glasgow
Dublin	London/Luton

* Airports with a total volume of 100 000 passengers per year or more.
** Only Brussels Airport reporting.
Source: Eurostat.

Greece is mainly due to the geographical characteristics of the country: numerous islands and extensive mountainous regions.

Gradual construction of the TEN boosts high-speed lines

In six Member States, dedicated 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 1 147 km or 48% of this track type, followed by Germany with 510 km (21%) and Spain with 377 km (16%). 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 entire high-speed network is thus substantially higher.

Within the near future many more of high-speed sections of track will be added to the European rail network. The adding of new high-speed lines to the global rail network so far has however not been able to compensate the putting out of service of other parts of the network.

Motorways more than tripled at Community level

Completely different tendencies can be observed for the development of road networks. Between 1970 and 1999 the total road network increased by 22%. This global increase should however be looked at with care: apart from 'motorways', the term 'road' is subject to various definitions. Keeping this in mind, the highest growth during the period 1970–99 has been achieved in Portugal (+ 69%), Belgium (+ 56%), France (+ 38%) and the Netherlands (+ 37%). Although motorways constitute only a small part of the entire road network, their length has more than tripled (at EU-level) during the observation period (from 15 864 km in 1970 to 51 336 km in 1999). Extraordinary growth can be noticed for Greece and Spain: the Greek motorway network increased from 11 km in 1970 to about 470 km in 1999. A similar development is recorded in Spain where the network increased from 387 km to 8 800 km over the same period, although differences in definition might overstate this increase.

In 1999, the most extensive motorway network within EU-15 can be found in Germany with 11 515 km, followed by France (11 000 km) and Spain (8 800 km). The Benelux countries offer the densest motorway network with values between 44.2 km/1 000 km^2 and 55.1 km/1 000km^2. The EU-15 average is 15.9 km per 1 000 km^2, a value close to those registered in Spain and the United Kingdom.

Inland waterways: easier from North Sea to Black Sea

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'. Inland waterways in the EU are nearly exclusively used for the transport of goods. Little passenger transport takes place using the inland waterway network. When it does it is mainly for leisure purposes.

Between 1970 and 1999, the total length of navigable inland waterways in the nine EU Member States able to perform transport activities using this mode decreased by 3 580 km

which represents 11%. Germany, with 6 754 km is the main contributor to today's network (24%). Part of the network has increased in importance with the opening of the Rhine – Main – Danube canal in the early 1990s, facilitating traffic to Austria and beyond (up to the Black Sea port of Constantza in Romania).

Netherlands: very long network compared to the country's size

France's waterways offer a slightly scattered network structure and experienced a 23% decrease over the last three decades. Italy ceased to use 860 km of navigable waterways, representing a loss of 37%. It should be noted that transport lines on the lakes in Northern Italy and in Venice represent about 40%, and the river Po approximately 25% of the total Italian network.

The Netherlands owns an extraordinary long navigable waterway system compared to the size of the country. Despite a loss of nearly 10% in usable length since 1970, the transport of goods over inland waterways continues to be an important mode, both in national and international transport (see Chapter 5.1 — Transport of goods).

Difficulties to measure an airport or a seaport

As a densely populated part of the world, the EU as a whole features an impressive quantity of airports. It is not easy to « measure » a country's airport network or airport characteristics. The latter could for instance be measured on the basis of the number of runways and aircraft stands (be it with contact or remote), but such type of information is not yet available at Eurostat. Instead, Table 2.6 offers an overview of the number of main airports in the individual Member States (i.e. with a volume of more than 100 000 passengers per year) and furthermore shows those individual airports that, together, are responsible for at least 80% of a country's total traffic (both national and international traffic).

In geographically small countries, 80% of the total traffic is often handled by a single airport (like in Belgium, Denmark, Ireland, the Netherlands and Luxembourg). Larger countries and countries featuring islands (that eventually constitute popular holiday destinations too, like Spain and Greece) often list a certain number of important airports. Indications on the volume of air cargo handled at the various European airports can be obtained in chapter 5.1 (Transport of goods).

Table 2.7: Main* maritime ports handling at least 80% of the country's cargo traffic in 2000

BELGIUM (4 main ports)	ITALY (41 main ports)
Antwerpen	Genova
Zeebrugge	Trieste
DENMARK (17 main ports)	Taranto
Fredericia (og Shell-Havnen)	Augusta
Aarhus	Venezia
Statoil-Havnen	Porto Foxi
Københavns (og Frihavnen)	Livorno
Helsingør	Ravenna
Rødby (Faergehavn)	Gioia Tauro
Esbjerg	Santa Panagia
Enstedvaerkets Havn	La Spezia
Aalborg Portland	Napoli
Frederikshavn	Milazzo
GERMANY (17 main ports)	Savona - Vado
Hamburg	Civitavecchia
Wilhelmshaven	Gela
Bremerhaven	PORTUGAL (7 main ports)
Rostock	Sines
Lübeck	Leixoes
Bremen	Lisboa
GREECE (59 main ports)	Setubal
Eleusis	FINLAND (18 main ports)
Piraeus	Skoeldvik
Thessaloniki	Helsinki
Agii Theodori	Kotka
Volos	Naantali
Megara	Rauma
Kavala	Rautaruukki
Chalkida	Hamina
Aliverio	Pori
Patras	Turku
Heraklion	Kokkola
Larymna	SWEDEN (28 main ports)
Milos Island	Göteborg
Igoumenitsa	Brofjorden Scanraff
Alexandroupolis	Trelleborg
Rio	Helsingborg
SPAIN (25 main ports)	Luleå
Bahía de Algeciras	Malmö
Tarragona	Stockholm
Bilbao	Oxelösund
Barcelona	Karlshamn
Valencia	Norrköping
Huelva	Gävle
Cartagena	Stenungsund
Gijón	Slite Industrihamn
Santa Cruz de Tenerife	Nynäshamn oljehamn
Las Palmas, Gran Canaria	UNITED KINGDOM (48 main ports)
La Coruña	Grimsby & Immingham
Palma de Mallorca	Tees & Hartlepool
FRANCE (20 main ports)	London
Marseille	Forth
Le Havre	Sullom Voe
Dunkerque	Southampton
Nantes Saint-Nazaire	Milford Haven
Calais	Liverpool
Rouen	Felixstowe
IRELAND (3 main ports)	Kirkwall
Dublin	Dover
Cork	Medway
Limerick	Belfast
NETHERLANDS (10 main ports)	Port Talbot
Rotterdam	Hull
Amsterdam	

*Main ports are ports that handle a cargo volume of at least 1 million tonnes.
Source: Eurostat

293 maritime ports handle over 1 million tonnes of cargo per year

The same principle has basically been applied for the seaports. Table 2.7 specifies the national distribution of the 293 main seaports in the EU (i.e. seaports that handled at least 1 million tonnes of cargo in 2000). The same table further lists those ports of a country that, together, handled at least 80% of a country's total cargo volume.

2.3 Trans-European transport networks (TENs)

The Maastricht Treaty provided the background for the development of trans-European networks (TENs) for telecommunications, energy and transport. TENs are a key element for the creation of the internal market and the reinforcement of economic and social cohesion. This development includes the interconnection and interoperability of national networks as well as the access to such networks.

This chapter outlines the main ideas and projects linked to the development of the transport TEN.

Environmentally responsible integration of national networks

A comprehensive, trans-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 periodically

The community guidelines for the development of the transport TEN (Council Decision No 1692/96/EC) mention the characteristics of the different networks. Periodically, 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 of the infrastructure and fixed installations. This includes the creation of high-speed and appropriate rail freight networks as well as the maintenance or upgrading of conventional lines;
- the achievement of technical interoperability of the European high-speed train network;
- consideration of safety, reliability, human health, environmental protection, technical compatibility and operational requirements.

For the road network, measures focus on :

- the creation of missing links and in particular those on cross-frontier intra-Community axes and those that are attractive to peripheral or enclosed areas;
- improvements on existing links, especially on cross-border axes and peripheral areas;
- connections with certain non-member countries;
- inter-modal connections aimed at combined-transport axes;

Table 2.8: Community financing of the transport-TEN 1993 - 2000 (million EUR)

Type of assistance	Instrument	1993 - 95	1996	1997	1998	1999	2000
Loans	European Investment Bank	7 666	3 504	4 943	4 415	5 977	4 989
Loan guarantees	European Investment Fund	161	303	55	71	266	55
Grants	European Regional Development Fund	999	2 639	527	:	:	:
Grants	Cohesion Fund	2 995	1 221	1 251	1 337	444	1 287
Grants, interest rate subsidies, loan guarantees and co-financing of studies	European Commission's specific TEN Budget line	625	280	352	474	497	581
	of which the 14 priority projects	*355*	*200*	*202*	*282*	*267*	*288*

Source: DG Energy and Transport.

- bypasses for the principal urban nodes located on the road TEN;
- 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: complementarily with other modes through improved port infrastructures.

Measures for the sea ports network comprise:

- new port infrastructures
- improved connections with the land networks
- Transhipment facilities and multimodal connections within the port area
- Improvement of sea access to ports (navigational facilities, clearing of ice)

Measures for the airport network focus on:

- Investments for airport infrastructure such as high speed rail connections at the airports designated as 'International Connecting points' (these include airports or airport systems with a volume of over 5 million passenger movements per year or greater than 150 000 tons of freight movements)
- Investment at airports designated as 'Regional Accessibility Points' (generally airports with an annual traffic volume of 500 000 to 900 000 passengers, airports on islands or landlocked areas)

Maps representing the TEN Outline Plans for the rail, road, inland waterways and airport network are included in this chapter.

'Selected projects' are now the priority

Originally fourteen transport projects of common interest were identified as priority projects during the European Council meeting in Essen in December 1994. Three of the original projects have been completed (the upgrading of the conventional rail link: Cork – Dublin – Belfast – Larne – Stranraer (Ireland), capacity enhancements at Malpensa airport (Northern Italy) and the Øresund fixed link between Denmark and Sweden) and have been removed from the list. In 2001, the Commission has proposed to add six new projects (numbered 15 to 20 in the box). Furthermore, two existing projects have been proposed to be modified (numbered 1 and 3 in the box). The modifications to project 1 concerns mainly of adding the Verona-Naples railway line and its Bologna-Milan branch to the Munich-Verona Brenner route. Those of project 3 concerns the adding of the mixed freight/high speed line between Montpellier and Nîmes to the Mediterranean branch of the TGV south (Madrid-Barcelona - Montpellier).

The TEN project list was re-aligned to reflect current policy guidelines, as laid down in the Commission's White Paper *'European transport policy for 2010: time to decide'*. These include:

- greater consideration of environmental issues
- the development of a better rail freight service network
- the encouragement of short sea and inland waterway shipping
- integration between rail and air modes
- measures concerning the implementation of intelligent transport systems.

Completing projects from the «Essen-list» most important

Despite the addition of new projects, the Commission considers completing outstanding agreed priority projects from the first phase (the «Essen-list») as very important. Financing is largely in place for these selected projects and work has begun on many.

Application of new technologies to the TEN

The TEN will also benefit from the development and application of new transport technologies. These are generically referred to as Intelligent transport systems (ITS). These include the development of a European Rail Traffic Management System (ERTMS), which is close to completion and will improve rail safety as well as ITS for road and air sectors. Similarly strategic benefits will accrue from the development of the European Global Satellite Navigation System GALILEO which has been upgraded to a priority status project (number 15 on the list of specific projects).

Multiple-source funding

The priority projects and in particular those located in areas eligible for Structural Funds and Cohesion Fund financing have benefited from substantial amounts of EU financing.

EU financing of TEN represents in most cases a small proportion of the total cost, except for some projects in the 'cohesion' countries. The greater part comes from public authorities in the Member States and sometimes the private sector.

The dedicated TEN transport budget (a total of more than ECU 1.8 billion for the period 1995-1999 has considerably helped to launch major projects. For the period 2000-2006 this budget has been increased to € 4.2 billion. As can be seen in Table 2.9, the budget for 2000 was € 581 million. With regard to the categories of projects, the Commission has continued to concentrate the greater part of the available resources (50%) on the 14 priority projects (including rail traffic management projects). Some 40% were dedicated to other important projects of common interest and 10% to traffic management projects (all modes except rail).

Some 58% of TEN budget for direct grants in 2000

When looking at the 2000 budget by form of intervention, it appears that 33% of the volume has been attributed for feasibility studies, 58% for direct grants and 9% for interest rate rebates. The third way of looking at the 2000 budget is by modal split: 66% went to rail projects (including traffic management), 12% to road projects, 3% to projects linked to inland waterways. Traffic management (all modes except rail) was granted 10%, airports 2% and projects of multi-modal nature 7%.

Structural Funds by far the main EU source

However, the Structural Funds, European Regional Development Fund (ERDF) and Cohesion Fund are by far the main source of Union grants for TEN projects. Due to the multi annual approach and the fact that funding is spent via regional and national authorities, it is not easy to determine exactly the amount of money invested through the ERDF.

The strategy pursued by the Cohesion Fund has been guided by the main concern of ensuring an appropriate linkage to trans-European transport networks and improving the overall efficiency of transport systems in those countries that benefit from the Fund. Beneficiaries of the Cohesion Fund are Greece, Spain, Ireland and Portugal. Details can be found in Table 2.9.

EIB for loans

One of the European Investment Bank's (EIB) priority objectives is to grant loans that help develop large infrastructure projects of common interest as can be seen from Table 2.9.

In September 2001, the Commission adopted the Indicative Multi-annual Programme for the funding of the transport TEN over the 2001-2006 period. The Commission allocates EUR 2780 million to various projects: 47% of the funds will be to the benefit of the infrastructure projects from the initial «Essen» list, 20% will be allocated to GALILEO, 23% to railway bottlenecks and cross-border projects and finally 10% to Intelligent Transport Systems (ITS) for the road and air sectors.

TINA for the candidates

The 'Transport infrastructure needs assessment' (TINA) report (published in October 1999 completed the Commission's mission to identify the necessary components of a transport TEN in the 12 candidate countries. The report takes into account traffic forecasts, the development of the network over time and its changing technical features as well as existing and future capacity imbalances.

The TINA Group agreed and approved an outline network in June 1999. The network consists of:

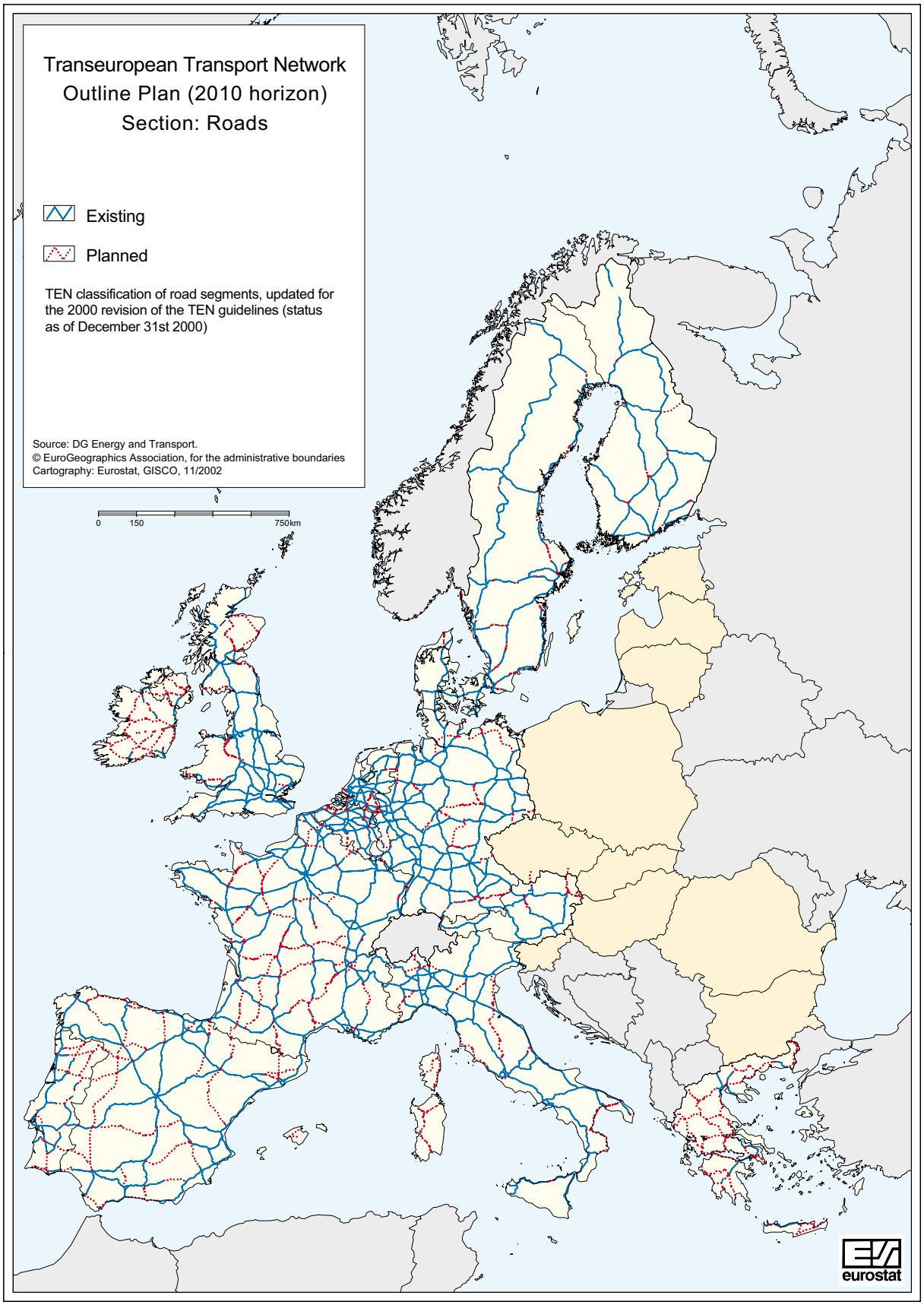
- 18 030 kilometres of roads
- 20 290 kilometres of railways
- 38 airports
- 13 sea ports
- 49 river ports

The estimated cost for the establishment of this network in the candidate countries is established at EUR 92 billion, between 1999 and 2015, of which 40% is attributed to measures in rail, 48% in road and 2% in inland waterway infrastructures. The remaining 10% have been calculated for network nodes such as airports, river and seaports and other terminals.

The Commission already gives assistance to the countries of Central and Eastern Europe under the PHARE programme, 1 billion to date for transport projects in those countries.

TENs for transport: 17 specific projects

1. **High-speed train/combined transport north-south**
   München – Nürnberg – Erfurt-Halle/Leipzig-Berlin
   Brenner axis: Napoli-Verona-München and Bologna-Milano
2. **High-speed train PBCAL (Paris-Brussels-Cologne-Amsterdam-London)**
   Belgium: F/B border – Brussels – Liège – B/D border
   Brussels – B/NL border
   United Kingdom: London – Channel Tunnel Access
   Netherlands: B/NL border – Rotterdam – Amsterdam
   Germany: Aachen – Cologne – Rhine/Main
3. **High-speed train south**
   Madrid-Barcelona-Perpignan-Montpelier-Nîmes-Madrid-Vitoria-Dax
4. **High-speed train east**
   Paris – Metz – Strasbourg – Appenweier – (Karlsruhe) with junctions to
   Metz – Saarbrücken - Mannheim and Metz - Luxembourg
5. **Conventional rail/combined transport : Betuwe line**
   Rotterdam – NL/D border – (Rhine/Ruhr)
6. **High-speed train/combined transport, France-Italy**
   Lyon – Turin
   Turin – Milan – Venice - Trieste
7. **Greek motorways:**
   Pathe: Rio Antirio, Patras – Athens – Thessaloniki – Promahon (Greek/Bulgarian border)
   Via Egnatia: Igoumenitsa – Thessaloniki – Alexandroupolis – Ormenio (Greek/Bulgarian border) – Kipi (Greek/Turkish border)
8. **Multimodal Link Portugal – Spain – Central Europe**
12. **Nordic Triangle**
    (Copenhagen-Oslo, Stockholm-Helsinki ; various rail/road projects)
13. **Ireland/United Kingdom/Benelux road link**
14. **United Kingdom West Coast main line (rail)**
15. **Global navigation and positioning satellite system (GALILEO)**
16. **High-capacity rail link across the Pyrenees**
17. **East European Combined Transport/High Speed Train**
    Stuttgart-München-Salzburg/Linz-Vienna
18. **Danube river improvement between Vilshofen and Straubing (Germany)**
19. **High-speed rail interoperability on the Iberian Peninsula**
20. **Fehmarn Belt: fixed link between Germany and Denmark**


Transeuropean Transport Network
Outline Plan (2010 horizon)
Section: Roads
Existing
Planned
TEN classification of road segments, updated for the 2000 revision of the TEN guidelines (status as of December 31st 2000)
Source: DG Energy and Transport.
© EuroGeographics Association, for the administrative boundaries
Cartography: Eurostat, GISCO, 11/2002
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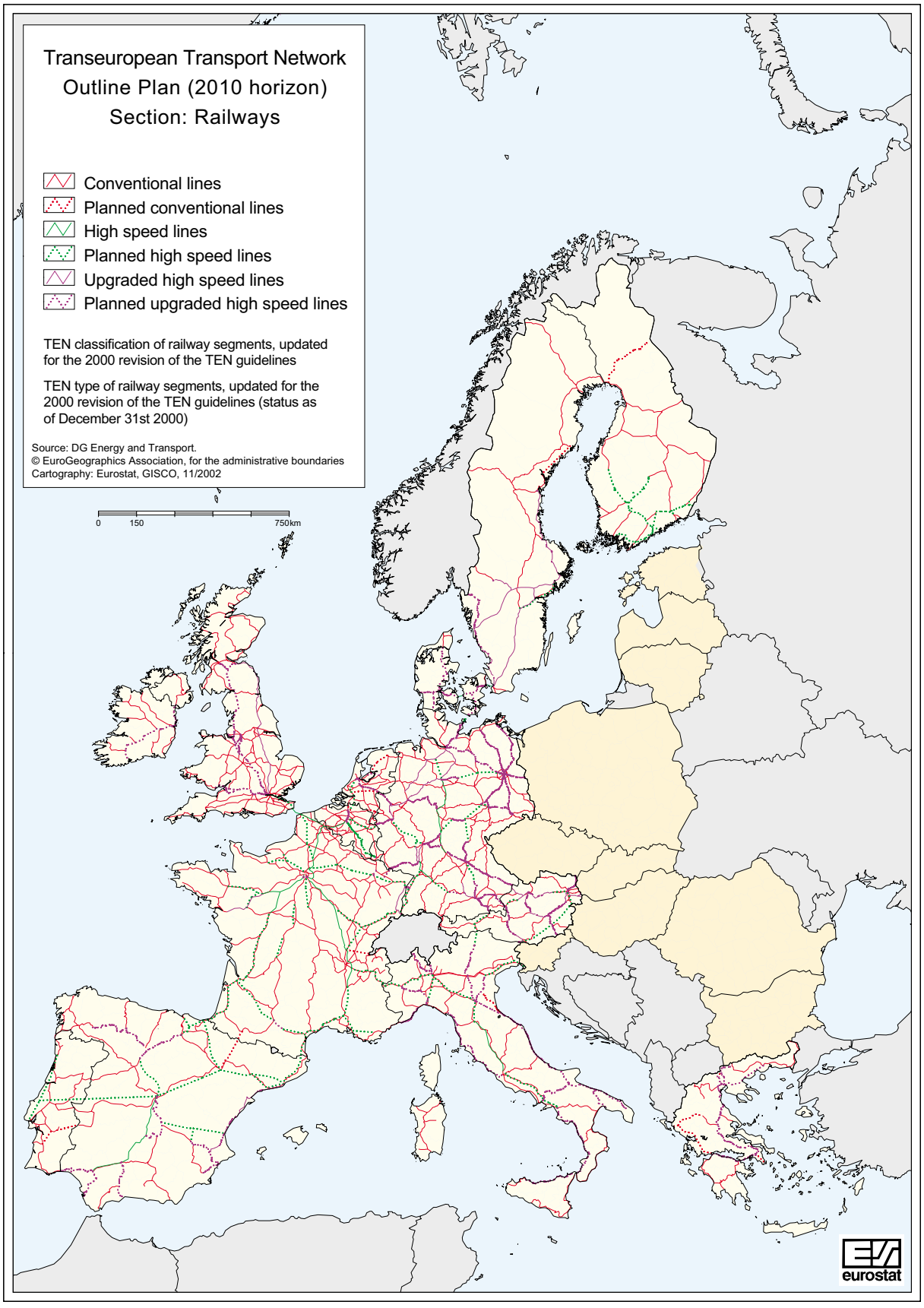
Transeuropean Transport Network
Outline Plan (2010 horizon)
Section: Railways
Conventional lines
Planned conventional lines
High speed lines
Planned high speed lines
Upgraded high speed lines
Planned upgraded high speed lines
TEN classification of railway segments, updated for the 2000 revision of the TEN guidelines
TEN type of railway segments, updated for the 2000 revision of the TEN guidelines (status as of December 31st 2000)
Source: DG Energy and Transport.
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Cartography: Eurostat, GISCO, 11/2002
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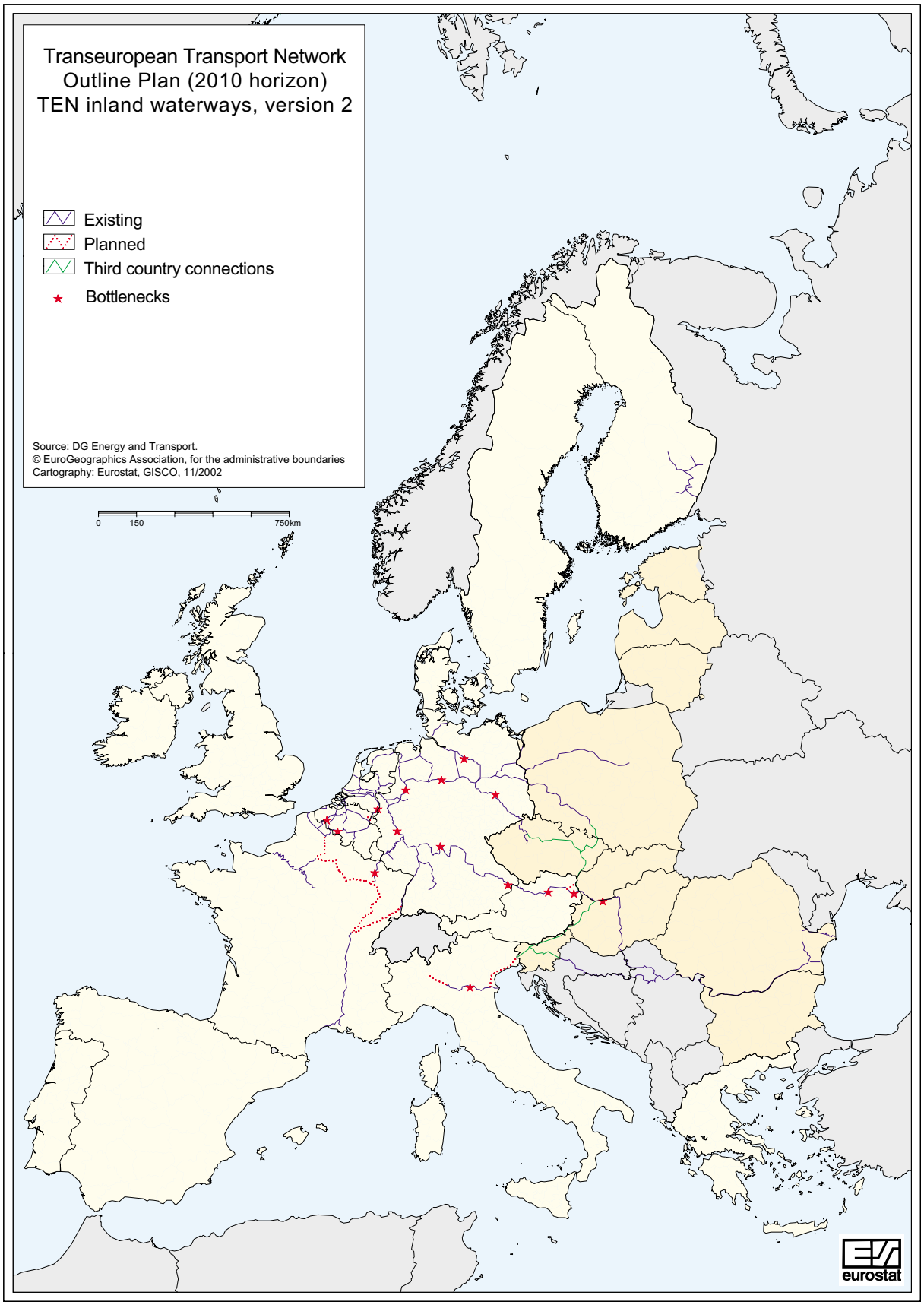
Transeuropean Transport Network
Outline Plan (2010 horizon)
TEN inland waterways, version 2
Existing
Planned
Third country connections
Bottlenecks
Source: DG Energy and Transport.
© EuroGeographics Association, for the administrative boundaries
Cartography: Eurostat, GISCO, 11/2002
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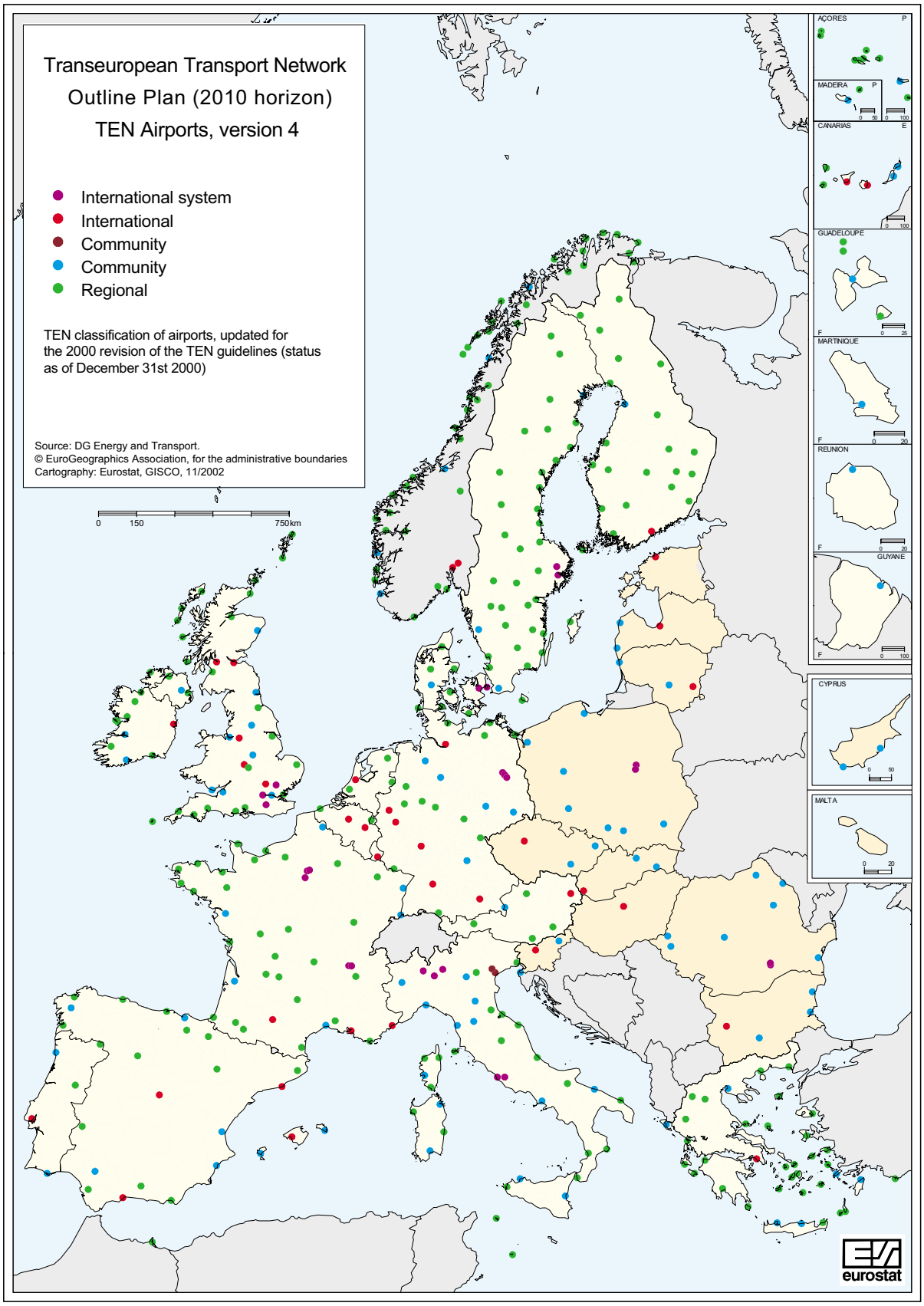

Transeuropean Transport Network
Outline Plan (2010 horizon)
TEN Airports, version 4
International system
International
Community
Community
Regional
TEN classification of airports, updated for the 2000 revision of the TEN guidelines (status as of December 31st 2000)
Source: DG Energy and Transport.
© EuroGeographics Association, for the administrative boundaries
Cartography: Eurostat, GISCO, 11/2002
0 150 750km
AÇORES
MADEIRA
CANARIAS
GUADELOUPE
MARTINIQUE
REUNION
GUYANE
CYPRUS
MALTA
eurostat

2.4 Expenditure

In 1995 the EU-15 Member States spent almost ECU 67 000 million on transport infrastructures in road, rail, navigable inland waterway and airports. Expenditure in this domain represents the total public investment of Member States in road, rail, inland waterway and airport infrastructures, like roads, rail tracks, canals, airports, transport terminals and the like. Figures do not include investments in rolling stock or other vehicles.

Public expenditure in transport is higher than the amount of ECU 67 000 million mentioned earlier, since the amount does not take into account investments in pipelines and maritime ports for instance.

Wide range of funding sources

Furthermore, since expenditure in the transport sector is performed by a wide range of public authorities and often spread over several years, reliable data become available only after a considerable lapse of time.

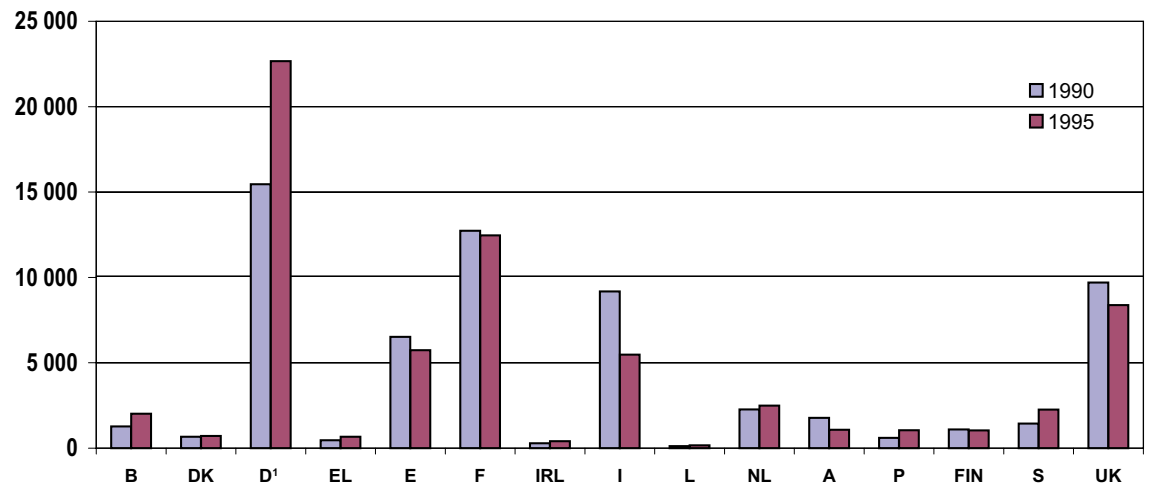
One of the few sources that offer a comprehensive breakdown of public expenditure by mode of transport is the European Conference of Ministers of Transport (ECMT), an intergovernmental organisation which administratively is a part of the OECD (Organisation for Economic Co-operation and Development). An extensive revision of public expenditure data is currently being undertaken. Results for the period 1996 to 2000 are expected to become available during the first semester of 2003. The next edition of the Panorama of Transport is thus likely to offer a selection of these data. Awaiting the new results, data from 1987 to 1995 will be focused upon.

The figure of ECU 66 648 million spent at EU-15 level in 1995 constitutes an increase of 28% compared to 1987 (in constant 1995 prices). Over the period observed, investments in the four transport modes reached a peak in 1992 (with ECU 73 879 million) and decreased slightly during the following years.

1% of EU-15 GDP for transport infrastructure

Table 2.9 offers an insight into how much the public bodies in the various Member States have been spending over the years and for what mode of transport. It is obvious that large countries invest more money on transport networks than small countries. Graph 2.10 outlines the absolute sums invested in the transport infrastructures and compares the 1995 situation to the one in 1990.

Graph 2.10: Total gross investment in transport infrastructure - in million ECU (1995 prices)



(1) 1990: without former GDR.
Source: ECMT.

Table 2.9 : Total gross investment in transport infrastructure - in million ECU (1995 prices)

		1987	1990	1991	1992	1993	1994	1995	1995 modal share	1995 as % of GDP
Belgium	**Total**	**1 366**	**1 270**	**1 473**	**1 774**	**2 088**	**2 166**	**2 020**	**100**	**0.96**
	Road	664	789	866	963	997	1 122	965	47.8	0.46
	Rail	488	244	299	444	729	663	805	39.9	0.38
	Inl. waterways	157	195	188	173	167	208	158	7.8	0.07
	Airports	57	42	120	194	195	173	92	4.6	0.04
Denmark	**Total**	**689**	**671**	**620**	**689**	**728**	**753**	**714**	**100**	**0.52**
	Road	345	232	214	238	272	310	335	46.9	0.24
	Rail	287	385	337	407	417	324	277	38.8	0.20
	Inl. waterways	-	-	-	-	-	-	-	-	-
	Airports	57	54	69	44	39	119	102	14.3	0.07
Germany [1]	**Total**	**16 025**	**15 461**	**22 234**	**23 391**	**22 311**	**22 775**	**22 666**	**100**	**1.21**
	Road	9 911	9 708	13 558	14 478	13 989	14 135	13 924	61.4	0.74
	Rail	4 781	3 619	6 021	6 611	6 296	6 987	7 034	31.0	0.37
	Inl. waterways	653	570	628	571	650	619	646	2.9	0.03
	Airports	680	1 564	2 027	1 731	1 376	1 034	1 062	4.7	0.06
Greece	**Total**	**425**	**464**	**489**	**580**	**714**	**525**	**673**	**100**	**0.75**
	Road	254	276	293	401	489	378	516	76.7	0.57
	Rail	154	167	178	153	189	120	*130*	19.3	0.14
	Inl. waterways	-	-	-	-	-	-	-	-	-
	Airports	17	21	18	26	36	27	*27*	4.0	0.03
Spain	**Total**	**3 134**	**6 523**	**7 125**	**6 551**	**6 477**	**6 428**	**5 737**	**100**	**1.28**
	Road	2 080	4 808	5 149	4 930	5 166	4 956	4 254	74.2	0.95
	Rail	883	1 394	1 744	1 441	1 152	1 146	987	17.2	0.22
	Inl. waterways	-	-	-	-	-	-	-	-	-
	Airports	171	321	232	180	159	326	496	8.6	0.11
France	**Total**	**9 527**	**12 737**	**13 988**	**14 160**	**13 602**	**12 915**	**12 466**	**100**	**1.05**
	Road	6 316	7 809	8 049	8 342	8 555	8 840	8 628	69.2	0.73
	Rail	2 867	4 317	5 193	4 964	4 222	3 385	3 148	25.3	0.26
	Inl. waterways	74	98	98	98	123	123	123	1.0	0.01
	Airports	270	513	648	756	702	567	567	4.5	0.05
Ireland	**Total**	**193**	**291**	**319**	**340**	**462**	**372**	**413**	**100**	**0.82**
	Road	161	244	262	295	394	306	347	84.0	0.69
	Rail	16	17	14	20	33	36	36	8.7	0.07
	Inl. waterways	-	-	-	-	-	-	-	-	-
	Airports	16	30	43	25	35	*30*	*30*	7.3	0.06
Italy	**Total**	**8 254**	**9 184**	**8 981**	**9 376**	**8 141**	**6 991**	**5 475**	**100**	**0.65**
	Road	4 951	6 752	6 946	6 984	6 006	5 181	3 713	67.8	0.44
	Rail	3 000	2 040	1 598	1 900	1 824	1 461	1 497	27.3	0.18
	Inl. waterways	43	23	16	24	16	10	6	0.1	0.00
	Airports	260	369	421	468	295	339	259	4.7	0.03
Luxembourg	**Total**	**113**	**118**	**168**	**190**	**185**	**166**	**171**	**100**	**1.22**
	Road	87	87	141	166	164	146	150	87.7	1.07
	Rail	23	30	26	23	20	19	20	11.7	0.14
	Inl. waterways	-	-	-	-	-	-	-	-	-
	Airports	3	1	1	1	1	1	*1*	0.6	0.01
Netherlands	**Total**	**2 091**	**2 271**	**2 371**	**2 413**	**2 484**	**2 605**	**2 495**	**100**	**0.79**
	Road	1 588	1 587	1 509	1 517	1 524	1 586	1 565	62.7	0.49
	Rail	263	390	499	537	639	723	627	25.1	0.20
	Inl. waterways	109	131	149	141	147	141	144	5.8	0.05
	Airports	131	163	214	218	174	155	159	6.4	0.05
Austria	**Total**	**1 392**	**1 775**	**1 587**	**1 471**	**1 560**	**1 366**	**1 080**	**100**	**0.60**
	Road	875	766	649	636	513	516	477	44.2	0.26
	Rail	437	894	804	690	897	727	490	45.4	0.27
	Inl. waterways	12	9	10	12	20	23	3	0.3	0.00
	Airports	68	106	124	133	130	100	*110*	10.2	0.06
Portugal	**Total**	**384**	**602**	**597**	**746**	**730**	**888**	**1 051**	**100**	**1.28**
	Road	257	382	372	501	502	601	654	62.2	0.80
	Rail	90	173	183	223	212	262	362	34.4	0.44
	Inl. waterways	2	-	-	-	-	-	-	-	-
	Airports	35	47	42	22	16	25	35	3.3	0.04
Finland	**Total**	**980**	**1 099**	**1 147**	**1 195**	**1 090**	**1 101**	**1 045**	**100**	**1.06**
	Road	836	912	945	898	835	815	722	69.1	0.73
	Rail	125	141	140	219	202	247	270	25.8	0.27
	Inl. waterways	2	10	15	14	2	2	1	0.1	0.00
	Airports	17	36	47	64	51	37	52	5.0	0.05
Sweden	**Total**	**849**	**1 440**	**1 296**	**1 439**	**1 779**	**2 134**	**2 263**	**100**	**1.23**
	Road	450	687	617	703	1 023	1 014	1 071	47.3	0.58
	Rail	283	541	619	694	726	1 088	1 146	50.6	0.62
	Inl. waterways	-	-	-	-	-	-	-	-	-
	Airports	116	212	60	42	30	32	46	2.0	0.03
United Kingdom	**Total**	**6 806**	**9 697**	**9 281**	**9 564**	**9 010**	**9 169**	**8 379**	**100**	**0.97**
	Road	4 838	6 195	5 969	6 125	6 056	5 915	5 279	63.0	0.61
	Rail	1 536	2 677	2 694	2 883	2 323	2 468	2 401	28.7	0.28
	Inl. waterways	-	-	-	-	-	-	-	-	-
	Airports	432	825	618	556	631	786	699	8.3	0.08
EU-15	**Total**	**52 228**	**63 603**	**71 676**	**73 879**	**71 361**	**70 354**	**66 648**	**100**	**1.01**
	Road	33 613	41 234	45 539	47 177	46 485	45 821	42 600	63.9	0.65
	Rail	15 233	17 029	20 349	21 209	19 881	19 656	19 230	28.9	0.29
	Inl. waterways	1 052	1 036	1 104	1 033	1 125	1 126	1 081	1.6	0.02
	Airports	2 330	4 304	4 684	4 460	3 870	3 751	3 737	5.6	0.06

(1) 1987 and 1990 figures exclude former GDR. Estimates in italic.
Source: ECMT.

A better view of the efforts made by the individual Member States can however be obtained by looking at the percentage this investment represents compared to the total gross domestic product (GDP) of a country.

In 1995, the average spending in EU-15 counted for 1.0% of the total GDP generated at EU-15 level. The two Member States of the Iberian peninsula performed particularly well with a share of nearly 1.3%. Sweden also scores higher than average with a share of 1.2%. Increased investments in rail infrastructure from 1993 onwards have influenced this figure.

Expected high share for the road network

Graph 2.11 outlines that throughout the period 1990–95, close to 65% of the total investments were dedicated to road infrastructure. However, considerable investments continue to be made in the railway infrastructure (1995: 29% of the total). The slight upward trend of the roads' share in the late 1980s seems to have stopped.

The inland waterways' share in investments is at a low level throughout the period observed and stands at 1.6% at EU-15 level in 1995. However, this image is heavily 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 2.3%. Countries with intensive inland shipping invest relatively more in this mode: for instance, in 1995, nearly 8% of infrastructure expenditure in Belgium was on inland waterways, nearly 6% in the Netherlands. The modal split by country is displayed in the second-last column of Table 2.9.

Combination with private capital

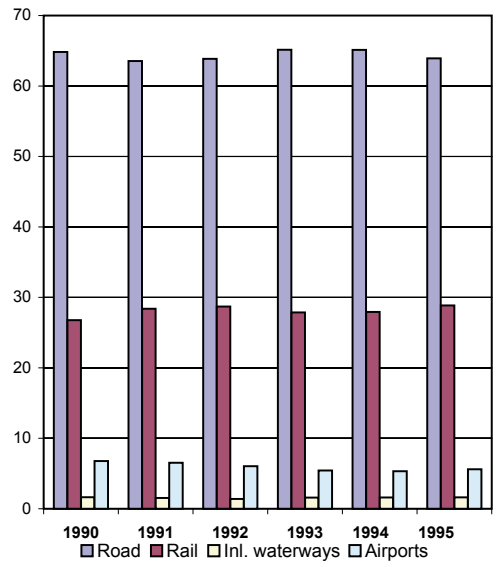
The concept of the trans-European transport networks (TENs) outlines the supra-national dimension of transport networks.

Public sector funds for the financing of transport infrastructure projects remain however of prime importance. Furthermore, funding of certain projects is increasingly combined with private capital.

National and EU funds often combined

EU funding can be substantial for countries and regions eligible in the frame of the allocation of Structural Funds (European Regional Development Fund and Cohesion Fund). Parts of the EU funding is dedicated to the trans-European transport network. The previous chapter gave details on the various instruments for the financing of the TENs.

Graph 2.11: Total gross investment in transport infrastructure in EU-15: modal split (%)



Source: ECMT.

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 passenger cars, buses, lorries, trains (composed of locomotive and wagons), inland waterway vessels and aircraft 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, inland waterways and air transport will be highlighted.

One out of 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 successful in export, too

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 2.3 — Trans-European transport networks), the rail equipment industry faces new challenges.

Decrease in rail material less high than it appears

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 3.2 shows that all Member States experienced very serious cuts in their stock of rail goods vehicles. In the entire EU, 985 000 goods wagons were taken out of service between 1970 and 1999. Without doubt, this is due to the increasing phasing out of old material. A cautious interpretation of these figures is however requested: the decline of stock is probably overstated in an increasing number of Member States. In the frame of the railway privatisation process, a growing part of equipment is outsourced or leased. Since figures mostly refer to material owned by railway companies, leased or otherwise outsourced rolling stock sometimes does not appear in the statistics anymore. The figures should thus be read with care.

Along with a higher share of electrified tracks, the stock of locomotives (defined as 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 1998 this figure stood at 52%. A general decline of the total number of locomotives is recorded: whereas the total number decreased by 12% in the period 1970 to 1994, a very sharp drop in numbers is registered in the second half of the 1990s in nearly all Member States.

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

		1970	1980	1990	1995	1997	1998	1999
Road	Passenger cars (million)	62.48	103.22	143.27	159.96	165.26	168.98	173.10
	Buses and coaches (1 000)	332	444	484	486	506	510	525
	Goods vehicles[1] (1 000)	7 408	10 628	15 747	17 851	*18 915*	*19 407*	20 135
	Trailers and semi-trailers (1 000)	1 693	3 250	6 409	6 977	:	:	:
Rail	Locomotives and railcars (units)	49 059	45 773	45 852	37 528	*38 116*	*36 616*	*34 454*
	Passenger vehicles[2] (units)	96 797	95 858	86 326	77 408	*74 679*	*74 044*	*75 357*
	Goods transport wagons[3] (1 000)	1508	1221	839	623	*557*	*524*	523
IWW	Self-propelled goods vessels[4] (units)	30 483	21 714	17 822	16 035	16 076	15 071	14 924

(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 3.2: Rail transport equipment

Stock of locomotives and railcars (units)

	1970	1980	1990	1995	1997	1998	1999
Belgium	1 536	1 740	1 727	1 579	1 579	1 595	1 617
Denmark	675	660	765	783	666	453	433
Germany	18 071	18 949	17 741	11 784	12 802	11 715	9 976
Greece	514	313	400	430	523	638	214
Spain	1 928	1 791	1 922	1 856	1 764	1 730	1 670
France	6 261	6 204	7 279	7 009	6 952	6 952	7 002
Ireland	307	192	166	171	158	158	172
Italy	4 715	4 916	4 818	4 660	4 490	4 454	4 623
Luxembourg	95	85	97	110	97	104	113
Netherlands	1 113	1 132	1 235	1 171	*1 213*	*1 079*	*1 027*
Austria	1 423	1 428	1 543	1 542	1 557	1 526	1 512
Portugal	626	583	530	633	618	618	624
Finland	877	752	669	761	747	746	742
Sweden	1 408	1 576	1 350	1 039	950	948	929
United Kingdom	9 510	5 452	5 610	*4 000*	*4 000*	*3 900*	*3 800*
EU-15	**49 059**	**45 773**	**45 852**	***37 528***	***38 116***	***36 616***	***34 454***
Index 1970 = 100	**100**	**102**	**94**	**88**	**57**	**55**	**70**

Goods transport rail wagons (1 000)

	1970	1980	1990	1995	1997	1998	1999
Belgium	48.9	43.4	30.3	20.3	18.9	19.1	18.6
Denmark	10.3	8.3	4.6	4.1	3.4	3.2	2.5
Germany	459.0	476.4	366.7	245.9	213.1	197.7	192.8
Greece	9.0	10.9	11.0	11.1	8.6	2.7	3.5
Spain	41.0	41.0	37.2	29.7	28.3	26.5	26.5
France	302.4	253.1	162.0	131.9	123.6	117.2	96.3
Ireland	9.5	4.7	1.8	1.8	1.6	1.8	1.6
Italy	125.9	113.4	99.7	89.1	76.7	76.0	76.2
Luxembourg	4.2	3.7	2.7	2.4	2.3	2.3	2.3
Netherlands	19.2	12.3	6.7	6.0	4.7	4.6	4.6
Austria	34.9	38.7	34.3	28.7	25.5	24.0	23.7
Portugal	9.0	6.7	4.6	3.9	4.2	4.6	4.2
Finland	21.9	21.5	15.2	14.0	13.7	13.1	12
Sweden	48.2	45.9	27.5	20.2	17.9	17.2	17.6
United Kingdom	364.9	141.2	34.4	14.2	*14.0*	*14.0*	*41.0*
EU-15	**1 508**	**1 221**	**839**	**623**	***557***	***524***	***523***
Index 1970 = 100	**100**	**81**	**56**	**41**	**37**	**34**	**35**

Passenger rail transport wagons (units)

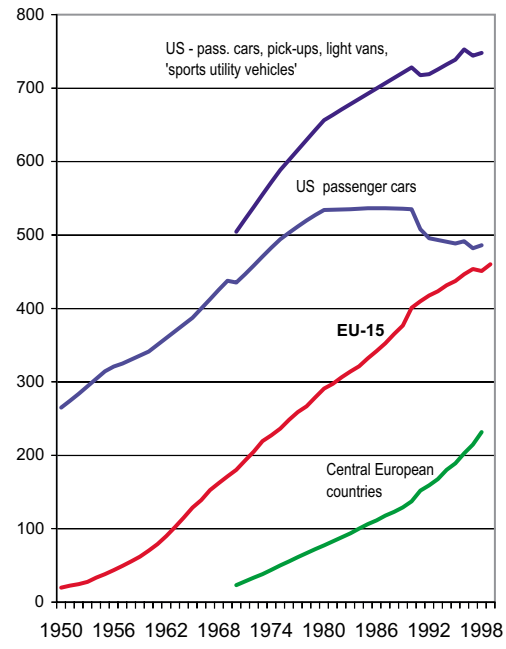
	1970	1980	1990	1995	1997	1998	1999
Belgium	3 415	3 641	3 286	3 110	3 430	3 389	3 468
Denmark	1 481	1 613	1 594	1 688	1 375	*1 140*	909
Germany	31 506	29 118	24 139	19 083	18 548	18 128	20 297
Greece	574	660	810	869	787	787	*517*
Spain	3 353	3 506	3 839	4 230	4 079	3 813	3 829
France	15 053	15 922	15 748	15 799	15 746	15 830	15 764
Ireland	481	343	314	318	347	*347*	373
Italy	11 357	13 611	14 025	13 527	12 273	12 213	11 890
Luxembourg	114	102	114	146	146	146	*146*
Netherlands	1 932	1 986	2 268	2 611	2 688	2 723	2 776
Austria	4 125	4 055	3 689	3 740	3 315	3 583	3 571
Portugal	980	1 143	1 232	1 341	1 367	1 406	1 431
Finland	1 043	1 095	957	977	959	968	994
Sweden	2 705	2 021	1 747	1 655	1 619	1 571	1 512
United Kingdom	18 678	17 042	12 564	8 314	*8 000*	*8 000*	*7 880*
EU-15	**96 797**	**95 858**	**86 326**	**77 408**	**74 679**	**74 044**	**75 357**
Index 1970 = 100	**100**	**99**	**89**	**80**	**77**	**76**	**78**

NB: Figures relate to UIC member companies only. Estimates in italic.
Sources: Eurostat, UIC, UN-ECE, national statistics.

The number of locomotives and railcars is estimated to have declined by over 25% at EU level between 1970 and 1999. The largest reduction in stock compared to 1970 was registered in the United Kingdom (– 60%, based on estimations), followed by Greece (- 58%) and Germany (– 45%). However, a part of the decrease in the last few years could be attributed to the aforementioned outsourcing of equipment (especially in the case of the United Kingdom where the entire rail transport has been privatised).

In the same period, the number of passenger rail wagons of the EU-15 area have declined more moderately (– 22%), but with substantial differences between Member States. The number of passenger rail wagons increased in seven Member States, with the strongest increase registered in Portugal (+ 46%) and the Netherlands (+ 43%). The total number of rail passenger transport vehicles taken off the tracks between 1970 and 1999 corresponds to the 1999 stock of these vehicles in the Benelux countries and France together.

Graph 3.3: Motorisation - cars per 1000 inhabitants



NB: United States - some of the pick-ups and light vans, etc. are used for commercial purposes.
Source: DG Energy and Transport.

It should however be noted that in 1999, the total number of passenger rail wagons at EU-15 level has increased again (+ 2% compared to 1998).

Over 170 million passenger cars on EU-15 roads

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

In 1999, 173 million passenger cars were on the EU-15 roads, an impressive 177% growth in less than three decades (annual average growth rate: 3.6%).

Graph 3.3 gives an overview of the development of the level of motorisation in the EU, the United States and the central European countries. Car density in the EU doubled in the last 25 years and reached 460 units per 1 000 inhabitants in 1999.

Unsurprisingly, average annual growth rates of the number of cars registered between 1970 and 1999 were highest in Greece (+ 9.1%), Portugal (+ 7.4%) and Spain (+ 7.0%). The lowest rates were registered for Denmark (+ 1.8%) and Sweden (+ 1.9%). In 1998, three Member States seem to have a car-density higher than the US average: Germany, Italy and Luxembourg (with 508, 545 and 572 cars per 1 000 inhabitants respectively). However, the US figure (approximately 486 cars per 1000 inhabitants in 1998) only takes into account the category 'passenger cars'; the impressive number of pick-up trucks, light vans and 'sports utility vehicles' used for private transportation (like passenger cars) are not included since they often constitute a statistical subcategory of 'commercial vehicles'. The level of motorisation in the United States is thus far higher. This is expressed in the upper curve of Graph 3.3, where all two-axle, four-tyre vehicles are taken into account, except those specifically declared as lorries.

The stock of buses and coaches expectedly progressed less than private cars. However, a 58% increase at EU-15 level is registered for the period 1970–1999. Mainly the first decade of the period under observation saw impressive developments. Between 1970 and 1999, only Belgium (– 9%) registered a negative development. Quite to the contrary, spectacular increases can be noticed in Ireland (+ 223%), Portugal (+ 215%) and Denmark (+ 175%). It should be noted that these figures include buses used in urban common transport.

Table 3.4: Road transport equipment

Passenger cars (million)								Cars per 1 000 inhab. 1999
	1970	1980	1990	1995	1997	1998	1999	
Belgium	2.06	3.16	3.86	4.27	4.42	4.49	4.60	450
Denmark	1.08	1.39	1.59	1.67	1.78	1.82	1.80	341
Germany	15.11	25.87	35.50	40.40	41.37	41.67	42.32	516
Greece	0.23	0.86	1.74	2.20	2.50	2.68	2.90	275
Spain	2.38	7.56	12.00	14.21	15.30	16.05	16.85	424
France	11.90	18.40	23.60	25.10	26.09	26.81	27.50	465
Ireland	0.39	0.74	0.80	0.96	1.13	1.15	1.30	346
Italy	10.18	17.69	27.42	31.70	30.74	31.37	31.40	544
Luxembourg	0.07	0.13	0.18	0.23	0.24	0.24	0.30	610
Netherlands	2.56	4.55	5.51	5.63	5.81	5.90	6.30	398
Austria	1.20	2.25	2.99	3.59	3.78	3.89	4.00	494
Portugal	0.42	0.92	1.85	2.56	2.95	3.20	3.30	330
Finland	0.71	1.23	1.94	1.90	1.95	2.02	2.10	407
Sweden	2.29	2.88	3.60	3.63	3.70	3.79	3.90	440
United Kingdom	11.90	15.60	20.70	21.90	23.50	23.90	24.60	414
EU-15	**62.48**	**103.22**	**143.27**	**159.96**	**165.26**	**168.98**	**173.17**	**460**
Index 1970 = 100	**100**	**165**	**229**	**256**	**265**	**270**	**277**	

Buses and coaches (1 000)							
	1970	1980	1990	1995	1997	1998	1999
Belgium	16.2	19.6	15.6	14.6	14.7	14.6	14.7
Denmark	5.0	7.4	8.1	13.5	13.8	13.9	13.9
Germany	63.9	95.8	100.4	86.3	84.0	83.3	84.7
Greece	10.5	18.0	21.4	24.6	25.6	26.3	26.8
Spain	30.7	42.6	45.8	47.4	50.0	51.8	53.5
France	41.0	65.0	75.0	80.0	82.0	82.0	85.6
Ireland	2.0	2.7	4.0	5.3	5.8	6.0	6.5
Italy	32.9	58.1	77.7	75.0	84.2	84.8	85.7
Luxembourg	0.6	0.6	0.8	0.8	0.9	0.9	1.0
Netherlands	9.5	11.2	12.1	11.5	11.2	10.8	11.2
Austria	6.8	9.0	9.4	9.8	9.7	9.7	9.8
Portugal	5.9	8.5	12.1	15.0	16.4	*17.0*	18.5
Finland	8.1	9.0	9.3	8.1	8.5	9.0	9.5
Sweden	14.3	12.8	14.6	14.6	14.8	14.8	14.8
United Kingdom[1]	84.2	83.3	78.0	80.0	84.0	85.1	89.0
EU-15	**332**	**444**	**484**	**486**	**506**	**510**	**525**
Index 1970 = 100	**100**	**134**	**146**	**147**	**152**	**154**	**158**

Goods vehicles (lorries and road tractors)[2] (1 000)							
	1970	1980	1990	1995	1997	1998	1999
Belgium	212	268	343	402	435	453	*480*
Denmark	245	249	287	333	336	347	362
Germany	1 188	1 511	1 653	2 215	2 315	2 371	2 466
Greece	105	401	743	884	952	987	1 020
Spain	716	1 362	2 401	3 024	3 310	3 510	3 736
France	1 504	2 515	3 568	3 597	3 453	3 400	3 370
Ireland	49	65	143	142	158	170	180
Italy	877	1 338	2 349	2 430	2 763	2 816	2 908
Luxembourg	9	9	11	15	16	17	18
Netherlands	286	314	507	578	635	680	760
Austria	121	184	253	290	301	310	320
Portugal	100	230	555	866	1 050	1 080	1 100
Finland	108	146	264	272	267	281	294
Sweden	145	182	310	308	321	338	350
United Kingdom	1 749	1 828	2 428	2 582	2 707	2 764	2 923
EU-15	**7 414**	**10 602**	**15 815**	**17 938**	**19 019**	**19 524**	**20 287**
Index 1970 = 100	**100**	**143**	**213**	**242**	**257**	**263**	**274**

Number of trailers and semi-trailers[3] (1 000)							
	1970	1980	1990	1995	1997	1998	1999
Belgium	25	51	95	126	:	:	:
Denmark	35	128	318	436	465	496	562
Germany	1070	1905	3565	3139	3253	3371	3502
Greece	2	5	9	12	13	13	:
Spain	18	48	106	157	182	201	221
France	81	156	165	182	181	311[4]	320 4
Ireland	9	12	19	17	:	:	:
Italy	104	264	600	840	812	815	800
Luxembourg	6	12	9	6	:	:	:
Netherlands	33	68	140	190	:	:	:
Austria	24	50	296	423	444	466	540
Portugal	31	72	160	290	303	317	332
Finland	10	23	345	434	453	477	500
Sweden	85	252	348	481	490	502	661
United Kingdom[5]	160	204	234	233	235	238	238
EU-15	**1 693**	**3 250**	**6 409**	**6 966**	**:**	**:**	**:**
Index 1970=100	**100**	**192**	**379**	**411**	**:**	**:**	**:**

(1) Data refer to Great Britain only.
(2) Difference in definition between countries: some countries include vans - therefore limited comparability.
(3) Difference in definition between countries: data for some countries include small trailers - therefore limited comparability.
(4) Methodology change: Until 1997, includes vehicules ‹ 10 years only; after 1998, includes vehicules ‹ 20 years only.
(5) Includes semi-trailers only.

Estimates in italic.

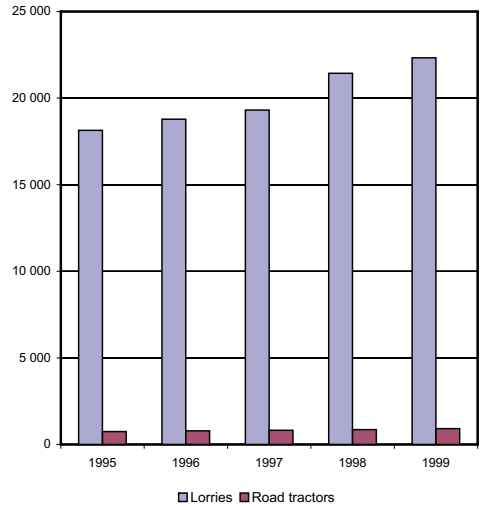
Sources: DG Energy and Transport, Eurostat/ECMT/UN-ECE, IRF, national statistics.

Light vans not uniformly classified

The number of goods road vehicles has experienced a substantial increase over the years: their number rose by 174% between 1970 and 1999. 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 and pick-ups. The fact that certain countries include vans and pick-ups or classify them in the 'passenger cars' category makes comparison between Member States 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 4.1% of all goods road vehicles in EU-15 (excluding Ireland and Italy) 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 approximately 70% of the goods vehicles have a carrying capacity of 'less than 1.5 tonnes': this class corresponds to relatively small 'light duty' vehicles (often vans), leaving a much less 'obstructive' impression on the road.

Graph 3.5: Lorries and road tractors in the EU[1]



(1) Excluding Ireland.
Source: Eurostat.

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.

Not all Member States are able to give a complete breakdown of the various trailer categories; however the number of semi-trailers registered in 6 Member States (Spain, France, Austria, Finland, Italy and Sweden) increased by more than 25% between 1995 and 1999 (1999: 1 418 490 units).

Table 3.4 also offers an overview of the number of trailers (coupled to lorries) and semi-trailers together. In 1999, their number nearly amounted to 8 millions at EU-level. Depending on the vehicle registers in the various countries, light trailers

Table 3.6: Inland waterway transport equipment

	Self-propelled goods vessels, tugs and pushers (units)							Dumb and pushed barges (units)						
	1970	1980	1990	1995	1997	1998	1999	1970	1980	1990	1995	1997	1998	1999
Belgium	5 092	3 107	1 871	1 608	1 264	1 250	1 236	455	190	167	173	157	153	149
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany [1]	6 038	4 464	3 230	3 637	3 425	3 294	3 142	2 200	1 732	1 566	1 290	1 273	1230	1 197
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	5 790	4 254	2 514	1 687	1 479	1 443	1 408	1 591	1 211	768	749	694	695	679
Ireland	-	-	-	-	-	-	:	-	-	-	-	-	-	-
Italy	3 124	2 347	2 755	3 069	3 184	3 184	3 197	393	217	372	431	459	474	437
Luxembourg	17	18	25	44	45	45	*45*	-	-	-	-	-	-	-
Netherlands	9 885	6 966	6 834	5 511	6 196	5 366	5 398	:	:	3 783	*3 440*	3 098	3 020	2 913
Austria	57	64	61	40	42	44	51	225	150	171	126	141	141	146
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Finland [2]	90	113	136	162	164	168	170	70	57	23	19	23	28	27
Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	390	381	396	277	277	277	277	1 610	1 228	411	361	361	361	361
EU-15	**30 483**	**21 714**	**17 822**	**16 035**	**16 076**	**15 071**	**14 924**	**6 544**	**4 785**	**7 261**	**6 589**	**6 206**	**6102**	**5909**
Index 1970=100	**100**	**71**	**58**	**53**	**53**	**49**	**69**	**100**	**73**	**111**	**101**	**95**	**93**	**123**

(1) Including former GDR for 1970-90 data.
(2) Including passenger vessels.
Source: Eurostat/ECMT/UN-ECE.

Table 3.7: EU-15 Airfleet[1] by operator country - Number of aircraft types in service at mid-year

	Belgium		Denmark		Germany		Greece		Spain		France		Ireland		Italy		
	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	
Aircraft type/usage																	
Business/Corporate/Executive	14	14	33	39	180	214	9	9	42	43	94	99	6	10	81	93	
Freight/Cargo less than 100 000 lbs MTOW	10	11	2	2	31	32	3	2	42	41	7	9	-	-	14	13	
Freight/Cargo more than 100 000 lbs MTOW	40	34	14	11	23	22	-	1	10	12	18	16	10	14	4	3	
Utility transport/Multi-Role/Convertible	1	-	7	7	12	14	-	-	14	14	22	23	-	-	-	-	
Hospital/Ambulance/other special purpose	1	1	2	2	17	14	-	-	5	9	35	32	2	2	4	6	
Passenger 50 seats or less	12	10	44	45	127	141	18	16	40	44	169	142	8	4	70	54	
Passenger 51 to 150 seats	76	42	56	51	212	203	50	41	148	116	133	183	53	49	122	126	
Passenger 151 to 250 seats	25	15	17	25	176	185	9	11	138	143	128	65	24	33	111	123	
Passenger 251 seats and more	14	4	7	9	83	74	7	8	23	16	77	95	7	7	27	21	
Total aircraft	**193**	**131**	**182**	**191**	**861**	**899**	**96**	**88**	**462**	**438**	**683**	**664**	**110**	**119**	**433**	**439**	

	Luxembourg		Netherlands		Austria		Portugal		Finland		Sweden		United Kingd.		EU-15		change
	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000	2002	2000-2002
Aircraft type/usage																	
Business/Corporate/Executive	12	25	20	19	43	51	29	37	11	11	34	29	159	158	**767**	**851**	11.0%
Freight/Cargo less than 100 000 lbs MTOW	-	-	4	4	1	1	2	2	-	-	13	15	30	28	**159**	**160**	0.6%
Freight/Cargo more than 100 000 lbs MTOW	17	11	10	6	3	2	-	-	-	-	-	-	37	32	**186**	**164**	-11.8%
Utility transport/Multi-Role/Convertible	2	2	6	6	2	3	1	1	1	1	12	12	26	27	**106**	**110**	4.8%
Hospital/Ambulance/other special purpose	-	-	3	3	5	4	1	2	2	2	6	2	40	41	**123**	**120**	-2.4%
Passenger 50 seats or less	16	13	41	37	38	38	12	15	7	7	61	53	145	148	**808**	**767**	-5.1%
Passenger 51 to 150 seats	2	3	59	54	34	37	31	32	45	43	21	43	278	292	**1320**	**1315**	-0.4%
Passenger 151 to 250 seats	3	2	40	57	15	16	16	20	15	14	10	20	190	177	**917**	**906**	-1.2%
Passenger 251 seats and more	-	-	48	47	10	11	7	7	4	4	4	4	186	172	**504**	**479**	-5.0%
Total aircraft	**52**	**56**	**231**	**233**	**151**	**163**	**99**	**116**	**85**	**82**	**161**	**178**	**1091**	**1075**	**4890**	**4872**	-0.4%

(1) All military aircrafts excluded.
* Includes those SAS passenger aircraft registered in Denmark and Sweden respectively, for which the operator country is 'multinational'.
Source: Aircraims CASE2 database.

with a load capacity of 'up to 4 999 kg' often have a substantial share. They may include very light trailers, often registered for private use.

Same performance with half the fleet

In 1998, EU-15 only offered less than half the amount of vessels than it did in 1970 (see Table 3.6). Various scrapping schemes in individual Member States have contributed to this important decrease. Nevertheless, the 1998 fleet offered roughly the same transport performance than in 1970. The improvement of transport efficiency in this domain is thus quite remarkable.

While the number of vessels increased in Italy, Luxembourg and Finland, the fleet decreased sharply in the other Member States offering substantial goods transport on navigable inland waterways. At EU level, more than 15 000 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 Belgium and France (– 75%), as well as for Germany (– 48%).

The number of dumb and pushed barges has experienced a similar drop between 1970 and 1998: their number was cut by 50%; only Italy and the Netherlands managed to increase their fleet.

70% of the entire fleet consist of passenger aircraft

Table 3.7 offers an overview of the civil aircraft fleet in the various Member States for mid-2000 and mid 2002. The information presented shows the fleet 'by operating country'. Nearly all aircraft operated in the country are also registered in that country, some of them could however carry a foreign registration. This is, for instance, the case if aircraft are temporary leased out to a different company. More than 70% of the entire fleet consist of passenger aircraft. Aircraft with a seating capacity of 51 to 150 clearly dominate the EU-15 fleet (nearly 38%% of all passenger aircraft in 2002, 27% of the entire fleet).

More than 17% of all civil aircraft are so-called business aircraft (851 units at EU-15 level in 2002, 11% more than in 2000). This category includes privately or company-owned planes but also airtaxis. The vast majority of these planes

have a capacity of less then 20 seats. The 'special purpose/ambulance' category (120 units in 2002) includes aircraft used for training, geo-survey and mapping, weather and atmospheric survey as well as surveillance and patrol.

It should be noted that 'combi-aircraft' (defined as 'passenger aircraft with enhanced capabilities for the carriage of freight on the passenger deck') have been included in the passenger aircraft categories according to their seat capacity.

'Quick-change convertible (passenger/ cargo)' aircraft are designed to allow a quick change of configuration from passenger to cargo and vice versa. Although their number is limited, one should be aware that this category includes both small (with a seat capacity of 10 to 20 passengers) and large aircraft (like a Boeing 747 with more than 500 seats). Such aircraft types are often used for night-time postal flights and day-time passengers flights.

Some 7% of aircraft fleet for cargo transport

Nearly 7% of the entire fleet (324 units in 2002) consists of dedicated cargo aircraft. Table 3.7 details two categories: up to 100 000 lbs. (= 45 359 kg) of maximum take-off weight (MTOW) and over 100 000 lbs. MTOW. The cargo version of a propeller driven Fokker F27 for instance has a MTOW of 45 000 lbs., an Airbus A300 (version B4-100F) 348 000 lbs. and a Boeing 747 (version 400F) 875 000 lbs.

Reduction of fleet less than expected

Following the September 11th 2001 disaster, one could expect a noticeable reduction of the aircraft fleet. Compared to 2000, the global aircraft fleet at EU-15 level only recorded a 1.5% decrease. The business aircraft category saw its share in the fleet increase by 2% compared to 2000 (851 units versus 767 units in 2000). Freight/cargo aircraft of the larger category (over 100 000 lbs. of MTOW) experienced a significant drop in numbers (-12% compared to 2000) although this might also be due to the enforcement of new noise emissions standards, banning certain aircraft types from EU airports. In general, the average age of freight/cargo aircraft is significantly higher than those of passenger aircraft; thus older models, not meeting the recent 'Chapter 3' standards in force since the first of April 2002, have disappeared from the fleet (see also Chapter 7.3 Emissions).

The negative effects are more noticeable when looking exclusively at the passenger aircraft: the fleet experienced a 2.3% decrease at EU level, passing from 3 549 units in 2000 to 3 467 in 2002. This result is however biased by Belgium (-44%), which experienced the bankruptcy of a major air carrier. If Belgium is excluded from the EU, the general decrease in the number of passenger aircraft would be established at 0.8%.

Table 3.8: EU Merchant Fleet - ships of 1000 grt and over (at 1 Jan. 2000)

	Total fleet controlled		National flag		Foreign flag		Share of foreign flag in total fleet	
	Number of ships	million dwt	Number of ships	million dwt	Number of ships	million dwt	Number of ships (%)	million dwt (%)
Belgium	128	7.30	1	0.00	127	7.34	99%	100%
Denmark [1]	613	15.30	357	6.66	256	8.67	42%	57%
Germany	1 900	29.20	468	7.51	1 432	21.73	75%	74%
Greece	3 167	131.70	745	40.78	2 422	90.94	76%	69%
Spain	232	3.60	123	1.58	109	2.03	47%	56%
France	210	5.50	122	2.53	88	2.95	42%	54%
Ireland	41	0.15	30	0.12	11	0.03	27%	20%
Italy	570	12.80	439	8.44	131	4.39	23%	34%
Luxembourg	2	0.01	2	0.01	-	-	0%	0%
Netherlands	597	5.00	444	2.79	153	2.16	26%	44%
Austria	50	0.80	22	0.10	28	0.70	56%	88%
Portugal	52	1.10	38	0.50	14	0.60	27%	55%
Finland	132	2.10	98	0.99	34	1.12	26%	53%
Sweden	377	14.60	165	1.54	212	13.02	56%	89%
United Kingdom	632	18.20	228	6.23	404	11.97	64%	66%
EU-15 (as at 1.1.2000)	**8 703**	**247.36**	**3 282**	**79.79**	**5 421**	**167.65**	**62%**	**68%**
EU-15 (as at 1.1.1999)	*8 326*	*242.00*	*3 350*	*81.40*	*4 976*	*160.60*	*60%*	*66%*
EU-15 (as at 1.1.1998)	*7 970*	*227.00*	*3 286*	*80.70*	*4 684*	*146.30*	*59%*	*64%*

(1) Including international registers like the Danish International Ship register; including vessels registered at territorial dependencies.
Source: ISL merchant fleet data bases; aggregates based on quarterly updates from the Lloyd's Maritime Information System.

The two categories most touched by the passenger aircraft decrease are those with 50 seats or less (from 808 to 767 units or –5%) and those offering 251 seats or more.

'Flags of convenience': an economic choice

Maritime transport plays a substantial role in the overall transport scene: in 2000, around 3 000 million tonnes were handled in EU ports (see chapter 5.1.4) and nearly 350 million passengers passed through ports' passenger terminals (see chapter 5.2.3.). However, while the Merchant fleet of the European Union handles much of this traffic, a substantial proportion is carried by vessels operated by or registered in non-EU countries.

Table 3.8 gives an overview of the EU Merchant fleet at the beginning of 2000, both for the EU as a whole and for individual Member States. The first pair of rows shows the total number of vessels and their respective dead weight tonnage (dwt) controlled by Member States. 'Controlled' means that the owner or operator of a vessel is registered in an EU country and controls its day-to-day operations. The vessel itself need not also be registered in the country of the owner or operator's registration nor even in another Member State. To illustrate this, the second pair of rows in Table 3.8 shows the number of vessels (and their respective dwt) actually registered in the owner/operator's own country of registration. The majority of the vessels (62% for the EU as a whole) sail however under a foreign flag (see the third pair of rows). These are often so-called «flags of convenience». The regulations governing a ship's management depends on the legal, safety, technological, taxation and social provisions of the Register in which it is registered. Some countries have 'international' or 'open' registers, where the requirements are different from those in the ''national» register. An operator's choice of register will largely be governed by economic considerations and account for the substantial variation in the share of foreign flagged vessels (ranging from 23% in Italy to 99% in Belgium – see the last pair of rows).

4. Enterprises, economic performance and employment

4.1. Enterprises and employment

The evolution of the transport sector is highly influenced by general economic activity. There is indeed a close inter-relation between the transport sector and the other sectors of the economy: the other sectors need an efficient transport sector to develop and the transport sector is dependent on the other sectors' activity.

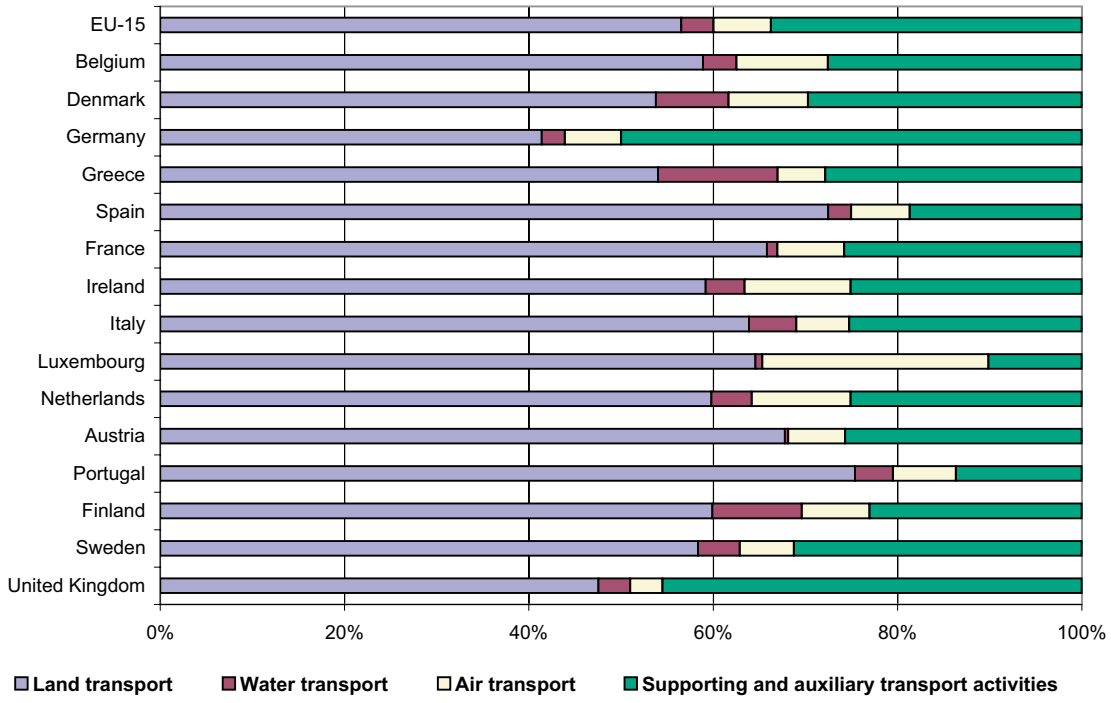
Transport: more than 7 million jobs at EU-15 level

The importance of the transport branch in the EU economy is best illustrated by the number of jobs it is generating: according to the latest available labour force survey results (the second quarter of the year 2001), more than 7 million persons were employed in the transport sector at Community level. This includes the following four categories: land transport (freight and passenger transport via railways, by road and via pipelines), water transport (both maritime and inland waterway transport), air transport and supporting and auxiliary transport activities.

Graph 4.1 shows the relative share in employment of the individual four transport categories. Land transport is the most important transport activity in terms of employment in all Member States, except for Germany. The EU average for land transport can be established at about 57% of the total jobs in the transport sector. In Germany, the largest transport branch (50% of the total number of persons employed), is the sector of 'supporting and auxiliary transport activities' consisting of cargo handling, storage and warehousing, other supporting transport activities and activities of travel and transport agencies as well as tour operators.

Within the land transport category, nearly all enterprises belong to road transport. In terms of employment, road transport takes a share of

Graph 4.1: Share of persons employed in various transport activities (NACE 60-63) - 2nd quarter 2001



Source: Eurostat.

Table 4.2: Number of enterprises by employment size class in 1999

	Total land transport (incl. pipelines)				Railways				Road transport			
	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total
Belgium	9 484	163	17	9 664	:	0	:	4	:	163	:	9 648
Denmark	:	:	:	12 162	:	:	:	22	:	:	:	12 136
Germany	:	:	:	85 001	:	:	:	132	:	:	:	84 731
Greece	:	:	:	:	:	:	:	:	:	:	:	:
Spain	:	:	:	198 749	0	:	:	6	198 335	367	42	198 744
France	78 192	1 124	140	79 456	20	5	2	27	78 139	1 118	137	79 394
Ireland	:	:	:	3 200[1,2]	:	:	:	:	:	:	:	:
Italy[4]	135 041	534	119	135 694	95	22	22	139	134 927	510	96	135 533
Luxembourg	:	:	:	631[2]	:	:	:	:	:	:	:	630 2
Netherlands	12 660	435	60	13 155	:	:	:	5	:	:	:	13 150
Austria	8 757	185	15	8 957	12	2	3	17	8 744	182	12	8 938
Portugal[4]	17 010	135	30	17 175	:	0	:	:	:	135	:	17 172
Finland[4]	20 824	72	17	20 913	2	0	2	4	20 822	72	15	20 909
Sweden	25 126	151	19	25 296	25	4	1	30	25 090	147	18	25 255
United Kingdom[4]	45 569	713	182	46 464	:	:	:	111	45 463	705	157	46 325

	Water transport (maritime and inland waterway)				Air transport				Supporting and auxiliary transport activities			
	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total
Belgium	:	:	0	332	:	:	:	101	2 984	:	:	3 133
Denmark	:	:	:	498	:	:	:	148	:	:	:	2 152
Germany	:	:	:	2 586	:	:	:	505	:	:	:	32 909
Greece	:	:	:	:	:	:	:	:	:	:	:	:
Spain	195	:	:	221	:	:	:	47	17 282	314	71	17 667
France	1 885	29	10	1 924	508	17	12	537	9 808	559	158	10 525
Ireland	:	:	:	45 3	:	:	:	34[3]	:	:	:	844[1,2]
Italy[4]	1 329	52	17	1 398	167	19	10	196	23 745	714	115	24 574
Luxembourg	:	:	:	:	:	:	:	13 2	:	:	:	215 2
Netherlands	4 360	25	15	4 400	150	0	5	155	5 555	190	40	5 785
Austria	77	1	0	78	73	2	3	78	2 101	86	19	2 206
Portugal[4]	:	:	:	101	:	:	:	23	2 340	47	9	2 396
Finland[4]	294	12	7	313	59	0	2	61	1 810	68	12	1 890
Sweden	732	35	9	776	182	7	5	194	4 247	88	30	4 365
United Kingdom[4]	1 187	33	15	1 235	842	55	37	934	15 824	619	174	16 617

Note: For Netherlands and Portugal employment size classes are defined in terms of employees.
(1) 1998.
(2) Provisional data.
(3) 1997.
(4) 2000.
Source: Eurostat (SBS)

more than 90% in land transport for Spain, Portugal, Sweden and United Kingdom. In the railway sector, Luxembourg and Belgium had the highest share of employment: more than 30%.

Low infrastructure costs for road transport enterprises

As can be seen in Table 4.2, the number of land transport enterprises is by far the highest in all countries for which data are available. Road transport enterprises account for a very large part in this category. The companies are fairly small and the costs for the infrastructure are relatively low. Railway and pipeline enterprises are far lower in number as a result of the high infrastructure costs and the limited liberalisation of the railway transport sector.

Greece, Finland and Denmark: highest employment in water transport

The employment share in water transport is particularly low in Luxembourg and Austria, countries that do not dispose of access to open seas. The employment in these Member States can largely be attributed to inland waterway transport activities only. The highest shares of the employment in water transport are registered in Greece, Finland and Denmark. The geographical features of these countries, some with a considerable amount of islands, explain this relatively high employment.

France is a special case as, even with a large maritime coastal area and many kilometres of inland waterways, it has very few people employed in water transport (just slightly more than 1%).

Table 4.2 shows that a high proportion of the enterprises is of the smallest category (1–49 persons). Although not obvious from the table presented, an important rate of self-employment is typical for inland waterway transport.

Air transport: 6% employment share at EU level

Among the four sectors observed, air transport shows the lowest number of enterprises. However, the distribution of the enterprises by size-classes displays the same pattern as for the other transport sectors: the enterprises with less than 50 persons employed have the highest share.

From Graph 4.1, it appears that at Community level, the average employment share of air transport was 6% (second quarter of 2001). Luxembourg shows by far the highest share: over 24%, largely explained by the presence of two airlines (of which one is a major all-cargo airline). In a geographically small country, this has an important impact on the distribution of shares. However, this should seen in the light of lowest number of persons employed in absolute figures compared to the other Member States.

Highest share of auxiliary activities for Germany

'Supporting and auxiliary transport activities' display the second highest employment figures within the four categories considered. As mentioned earlier, Germany excels here with a share of 50%, more than the EU average (which is about 34%). This share is the highest not only among the other Member States, but also among the four transport sectors observed. Only the United Kingdom comes close (45%); all other

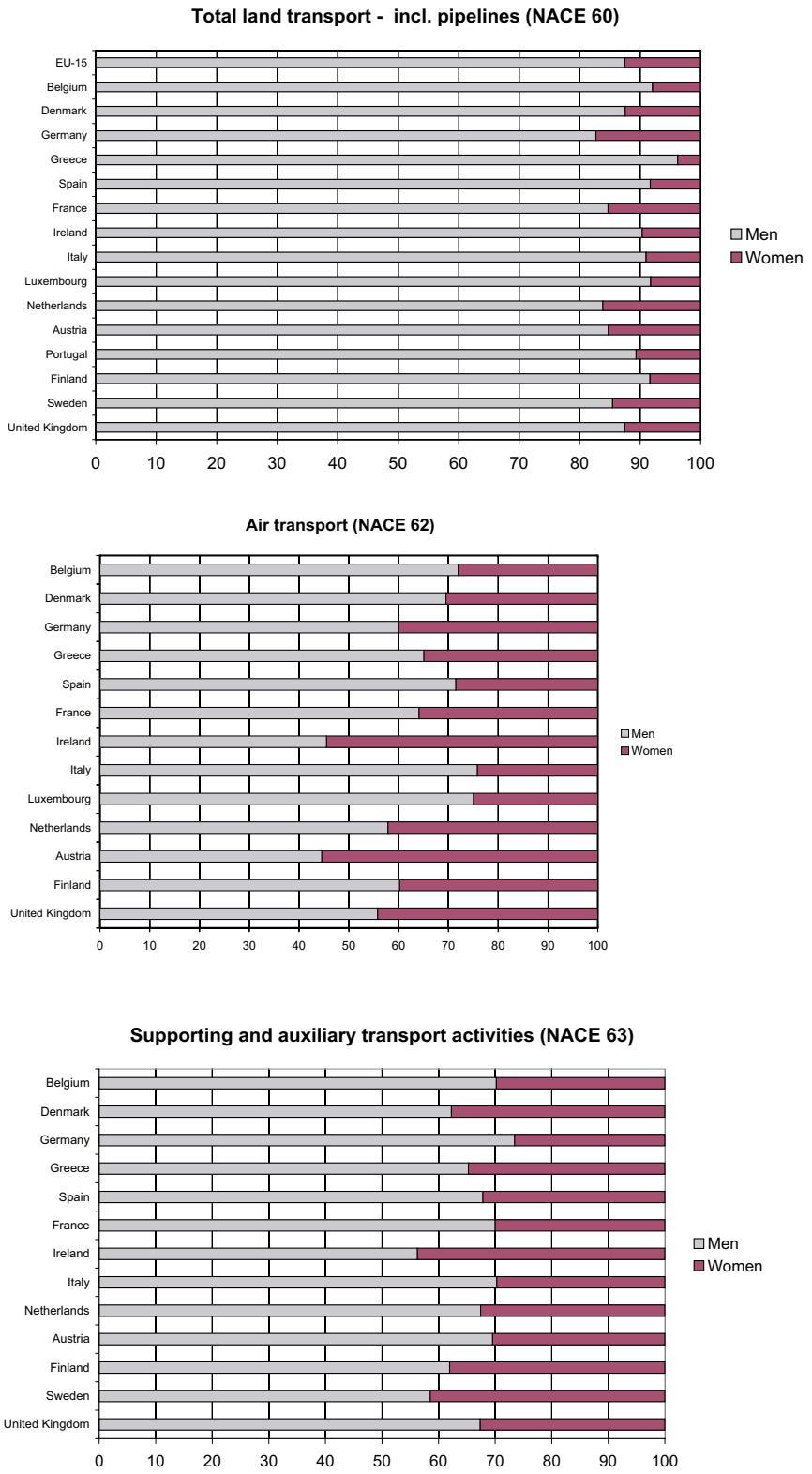
Table 4.3: Number of persons employed by size class in 1999

	Total land transport (incl. pipelines)				Railway				Road transport			
	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total
Belgium	53 049	14 136	60 273	127 458	:	0	:	41 425	:	14 136	:	86 016
Denmark	:	:	:	81 178	:	:	:	10 338[1]	:	:	:	70 888
Germany	:	:	:	965 000	:	:	:	:	:	:	:	:
Greece	:	:	:	:	:	:	:	:	:	:	:	:
Spain	:	:	:	484 276	0	:	:	39 832	374 296	34 805	35 344	444 445
France	264 299	116 015	283 509	663 823	:	:	:	:	:	:	:	:
Ireland	:	:	:	24 009[1,2]	:	:	:	:	:	:	:	:
Italy[4]	309 997	52 141	218 087	580 225	871	:	:	129 543	309 064	49 112	91 986	450 162
Luxembourg	:	:	:	9 917[2]	:	:	:	3 064[2]	:	:	:	6 853
Netherlands	85 023	43 027	62 973	191 023	:	:	:	:	:	:	:	:
Austria	50 511	17 343	70 250	138 104	:	:	:	:	:	:	:	83 061
Portugal[4]	49 855	13 760	26 751	90 366	:	0	:	:	:	13 760	:	84 041
Finland[4]	:	7 542	:	71 869	:	0	:	9 799	:	7 542	:	62 070
Sweden	71 616	13 443	44 180	129 239	:	:	:	12 094	71 450	13 048	32 622	117 120
United Kingdom[4,2]	221 300	63 902	285 947	571 149	:	:	:	48 754	:	:	:	522 043

	Water transport (maritime and inland waterway)				Air transport				Supporting and auxiliary transport activities			
	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total	1 - 49	50 - 249	250 ›	Total
Belgium	:	:	0	1 316	:	:	:	13 022	17 138	:	:	51 400
Denmark	:	:	:	10 747	:	:	:	11 734	:	:	:	31 358
Germany	:	:	:	25 000	:	:	:	49 000	:	:	:	511 000
Greece	:	:	:	:	:	:	:	:	:	:	:	:
Spain	2 457	:	:	7 409	:	:	:	36 275	78 589	32 388	53 535	164 512
France	3 826	3 198	8 269	15 293	1 312	1 808	59 575	62 695	59 170	60 962	131 627	251 759
Ireland	:	:	:	1 666[3]	:	:	:	6 215[3]			13 463[3]	
Italy[4]	:	5 085	:	20 245	:	2 013	:	25 331	112 937	72 466	72 976	258 379
Luxembourg	:	:	:	:	:	:	:	2 574[2]	:	:	:	1 874[2]
Netherlands	7 336	:	:	15 624	:	:	:	:	:	18 564	:	80 486
Austria	:	:	0	323	:	:	:	7 988	11 296	9 306	13 275	33 877
Portugal[4]	:	:	:	1 783	:	:	:	11 236	14 731	5 176	13 012	32 919
Finland[4]	:	1 477	:	8 430	:	0	:	9 717	:	7 452	:	22 753
Sweden	2 655	3 631	8 180	14 466	1 119	:	:	13 944	16 633	9 083	24 821	50 537
United Kingdom[4,2]	:	3 395	:	17 502	:	6 770	:	103 211	104 680	62 943	188 699	356 322

Note: For Netherlands and Portugal employment size classes are defined in terms of employees.
(1) 1998.
(2) Provisional data.
(3) 1997.
(4) 2000.
Source: Eurostat (SBS)

Graph 4.4 : Share of sexes in persons employed (in %), by NACE classification 2nd quarter 2001



Source: Eurostat (LFS).

Member States display far lower shares, most of them under 30%. Portugal and Luxembourg are lowest with a share under 15% (14 and 10% respectively).

Table 4.3 displays the number of persons employed by size class in 1999 (2000 data were available for Italy, Portugal, Finland and the United Kingdom).

Low female employment in land transport

Graph 4.4 gives an insight of the distribution of employment by sex in three of the transport categories considered. The source of these data is the Labour Force Survey (LFS). According to LFS, the data related to water transport for the majority of the countries were statistically unreliable and therefore, the graph for this mode of transport could not be presented.

From Graph 4.4 it appears that land transport, largely consisting of road transport, is dominated by male employment. At EU level, 13% of the employment is taken up by women, the two extremes consisting of Greece and Germany with 4% and 17% female employment respectively. However, with regards to the question of reliability mentioned earlier, the data on land transport by sex for Greece, Ireland, Luxembourg and Portugal should be carefully used.

Austria and Ireland: minority of men in air transport

The graph on air transport does not include Portugal and Sweden, as their data were statistically unreliable. As a consequence, EU-15 data also could not be presented.

In two Member States men constitute a minority in air transport employment: Austria (45%) and Ireland (46%). The highest share of men in the employment displays Italy: 76%.

LFS is warning readers on the reliability of data for Denmark, Greece, Ireland, Luxembourg and Finland.

Heterogeneity of auxiliary activities

Supporting and auxiliary transport activities incorporate quite heterogeneous activities like cargo handling, storage and warehousing but also supporting activities relating to land, water and air transport as well as employment in travel agencies and the like.

Again, it should be mentioned that the data for Luxembourg and Portugal were statistically unreliable and could not be used. These two countries are thus missing from the graph related to auxiliary activities, as well as EU-15.

Comparing the countries presented in Graph 4.4, it can be noticed that for the majority, the share of male employment is situated between 60-70% of the total employment. Germany displays the highest share of male employment with 73%.

4.2 Economic performance

Transport activities are important contributors to wealth creation. There are various ways to express the economic performance of an economic sector. In the case of the transport sector, composed of various sub-sectors, the choice is limited to those indicators for which disaggregated data are available. Thus, in the frame of this chapter, data on turnover, value added and investment will be highlighted.

Table 4.5 offers details on turnover per activity for the individual Member States — as far as those are available. Expressed in million ECU/EURO, total land transport (transport via rail, road and pipelines) and auxiliary transport activities roughly offer similar turnover figures.

High land transport turnover in 'strategic' countries

As far as data are available, it appears that turnover in land transport exceeded ECU/EURO 40 000 million in the United Kingdom, Germany, France and Italy (for the latter, the data refer to the year 2000). Small but geographically 'strategic' countries like the Netherlands and Belgium offer high turnover figures as well. Road transport is generating more than 80% of the land transport turnover in majority of countries, except for Denmark, Germany, Luxembourg and Austria. In Spain and Portugal the turnover of road transport represents more than 90% of the land transport turnover.

The figures for the water transport category reflect the relative importance of maritime transport in countries like Denmark, United Kingdom, Italy, France, Germany and the Netherlands. For all countries mentioned, the turnover of the water transport sector exceeds ECU/EURO 4 000 million, the highest value being registered by Denmark (about ECU/EURO 8 000 million).

With far less persons employed, the air transport category generates impressive turnover figures: the United Kingdom displays nearly ECU/EURO 29 400 million followed by France and Italy with ECU/EURO 13 350 million and 10 980 million respectively (the data for Italy and United Kingdom refer to the year 2000).

Turnover figures of auxiliary transport activities often come close to those of total land transport. They exceed them by a large margin in Belgium, Germany and Ireland. In the United Kingdom the turnover of auxiliary activities is almost twice as much as its total land transport sector, while in Luxembourg the situation is the opposite.

Table 4.6 gives an overview of the value added by activity. Here it appears that land transport generally offers the highest figures, followed by the auxiliary transport activities.

Both tables 4.5 and 4.6 should thus be seen in the light of the number of jobs the various categories create. As mentioned in the previous chapter, the employment in the auxiliary transport

Table 4.5: Turnover by activity in 1999 - in million ECU/EURO

	Total land transport (incl. pipel.)	Rail transport	Road transport	Water transport. (marit. + iww.)	Air transport	Auxiliary transport activities
EU-15	:	:	:	:	:	:
Belgium	9 884	1 576	8 262	1 647	3 589	13 257
Denmark	7 893	1 857[1]	5 755	7 923	2 177	7 046
Germany	52 896	10 980	41 245	4 430	9 167	67 626
Greece	:	:	:	:	:	:
Spain	25 475	1 233	24 242	1 204	5 634	28 169
France	48 610	:	:	4 511	13 348	46 994
Ireland	1 469[1,2]	:	:	305[3]	1 372[3]	2 689
Italy[4]	42 419	6 119	36 149	5 239	10 972	40 803
Luxembourg	951[2]	230[2]	721[2]	:	894[2]	445
Netherlands	12 837	:	10 517[1]	4 378[1]	:	8 884
Austria	7 834	:	6 107	93	2 041	9 831
Portugal[4]	3 824	:	3 607	362	1 429	4 819
Finland[4]	5 689	725	4 964	2 227	1 654	4 429
Sweden	11 691	1 334	10 353	3 327	2 745	13 074
United Kingdom[4]	55 560	8 682	46 587	6 954	29 385	92 882

(1) 1998.
(2) Provisional data.
(3) 1997.
(4) 2000.
Source: Eurostat (SBS).

Table 4.6 : Value added by activity in 1999 - in million ECU/EURO

	Total land transport (incl. pipelines)	Rail transport	Road transport	Water transport (marit. + inl.ww.)	Air transport	Auxiliary transport activities
EU-15	:	:	:	:	:	:
Belgium	5 796	2 113	3 669	100	611	2 997
Denmark	4 656	1 100[1]	3 267	1 536	784	2 271
Germany	24 072	3 699	19 869	2 790	7 797	20 861
Greece	:	:	:	:	:	:
Spain	13 412	2 042	11 370	444	2 107	7 786
France	24 899	:	:	749	4 028	14 349
Ireland	639[1,2]	:	:	82[3]	440[3]	522[1,2]
Italy[4]	18 538	4 812	13 687	1 582	1 266	11 984
Luxembourg	491[2]	179[2]	312[2]	:	324[2]	105[2]
Netherlands	7 880	:	6 526[1]	1 447[1]	:	4 302[1]
Austria	5 801	:	3 098	22	531	1 709
Portugal[4]	1 627	:	1 555	82	497	1 338
Finland[4]	2 958	476	2 482	588	624	1 039
Sweden	4 426	633	3 792	727	883	2 484
United Kingdom	25 059	3 350	21 601	2 724	11 535	22 428

(1) 1998.
(2) Provisional data.
(3) 1997.
(4) 2000.
Source: Eurostat (SBS).

activities branch is much lower than in the land transport category, although turnover figures are often similar.

Comparisons between countries rather than sub-sectors

The performance of the categories of transport under analysis is outlined in Table 4.7, which presents the ratios 'turnover per persons employed'. It should be noted that turnover per person comparisons should rather be made between countries and not between sub-sectors since they do not take into account infrastructure costs. And even so, infrastructure costs can vary substantially from country to country.

The average turnover per person employed in total land transport exceeds ECU/EURO 90 000 only in United Kingdom (data for 2000), Denmark and Sweden. Germany, Spain, Ireland, Austria and Portugal are below the EU average (72 200 ECU — calculated on the basis of available data).

The water and air transport sub-categories, as well as the auxiliary transport activities all display much higher figures compared to the land transport, although substantial differences between countries can be noticed.

Belgium's and Denmark's water transport activities showed a turnover per person employed of more than ECU/EURO 700 000, while the figures for Germany and Spain were much lower, with 177 000 and 163 000 ECU/EURO per person employed, respectively.

It should be reminded that the water transport domain regroups both maritime transport and transport via inland waterways. Due to the diverse national characteristics of water transport in the various Member States, a comparison between countries is somewhat problematic and the interpretation of these data requires caution.

In the air transport sector, Italy leads with ECU/EURO 433 200 per person employed, well ahead of Luxembourg, United Kingdom, Belgium and Austria, with a turnover per person employed higher than ECU/EURO 250 000. Portugal displays the lowest ratio and generates only 30% of the turnover per person employed of that of Italy.

The auxiliary transport activities had turnover levels above ECU/EURO 200 000 per person employed in Austria, United Kingdom, Sweden, Belgium, Luxembourg and Denmark. Amongst the available figures, the Netherlands and Germany display the lowest figures for this sector, with ECU/EURO 111 000 (in 1997) and 132 000 respectively.

Apparent labour productivity highest in water transport for majority of Member States

The comparison across sub-sectors becomes possible when looking at the apparent labour productivity (value added per person employed — see Table 4.8), a ratio that expresses the amount of value added in the production value in relation to employment.

Table 4.7 : Turnover per person employed in 1999 - in thousands of ECU/EURO

	Total landtransport (incl. pipelines)	Rail transport	Road transport	Watertransport (marit. + inl.ww.)	Air transport	Auxiliary transport activities
EU-15	:	:	:	:	:	:
Belgium	77.6	38.1	96.1	1251.2	275.6	257.9
Denmark	97.2	179.7[1]	81.2	737.2	185.5	224.7
Germany	54.8	:	:	177.2	187.1	132.3
Greece	:	:	:	:	:	:
Spain	52.6	31.0	54.5	162.5	155.3	171.2
France	73.2	:	:	295.0	212.9	186.7
Ireland	61.2[1,2]	:	:	183.3[3]	220.7[3]	199.7[1,2]
Italy[4]	73.1	47.2	80.3	258.8	433.2	157.9
Luxembourg	83.2[1,2]	64.7[1,2]	91.8[1,2]	:	289.1[1,2]	257.0[1,2]
Netherlands	:	:	:	280.2[1]	:	111.4[2,3]
Austria	56.7	:	73.5	288.1	255.5	290.2
Portugal[4]	42.3	:	42.9	202.9	127.2	146.4
Finland[4]	79.2	74.0	80.0	264.1	170.2	194.7
Sweden	90.5	110.3	88.4	230.0	196.9	258.7
United Kingdom[4,2]	97.3	178.1	89.2	397.3	284.7	260.7

(1) 1998.
(2) Provisional data.
(3) 1997.
(4) 2000.
Source: Eurostat (SBS).

The available data allow an insight on how the various sub-sectors perform.

For the majority of the Member States, apparent labour productivity was the highest in the water transport sector, while the land transport activity showed the lowest figures for all Member States (for the countries for which data were available).

The low figures could be partly explained by the high number of persons employed in this sector compared to the other activities. In Germany, France, Ireland, Luxembourg and Sweden air transport displays the highest apparent labour productivity compared to the other transport sub-sectors.

Table 4.8 : Apparent labour productivity (value added/employment) in 1999 - in thousands of ECU/EURO

	Total land transport (incl. pipelines)	Rail transport	Road transport	Water transport (marit. + inl. ww.)	Air transport	Auxiliary transport activities
EU-15	:	:	:	:	:	:
Belgium	45.5	51.0	42.7	75.7	46.9	58.3
Denmark	57.4	106.4[1]	46.1	142.9	66.8	72.4
Germany	24.9	:	:	111.6	159.1	40.8
Greece	:	:	:	:	:	:
Spain	27.7	51.3	25.6	60.0	58.1	47.3
France	37.5	:	:	49.0	64.3	57.0
Ireland	26.6[1,2]	:	:	49.4[3]	70.7[3]	38.8[1,2]
Italy[4]	32.0	37.1	30.4	78.2	50.0	46.4
Luxembourg	45.6[1,2]	55.3[1,2]	41.1[1,2]	:	108.7[1,2]	57.0[1,2]
Netherlands	:	:	:	92.6[1]	:	53.8[2,3]
Austria	42.0	:	37.3	69.3	66.5	50.5
Portugal[4]	18.0	:	18.5	46.0	44.3	40.6
Finland[4]	41.2	48.6	40.0	69.7	64.2	45.6
Sweden	34.3	52.4	32.4	50.3	63.3	49.2
United Kingdom[4,2]	43.9	68.7	41.4	155.6	111.8	62.9

(1) 1998.
(2) Provisional data.
(3) 1997.
(4) 2000.
Source: Eurostat (SBS).

Sector influences main type of investment

Finally, Table 4.9 shows the investment per person employed. They include investments made by private companies only. Only in certain cases (notably in rail and air transport), a small part of the investments might originate from public bodies, depending on a company's structure and ownership. Investments in the transport sector are quite heterogeneous: in road and water transport, this will mainly consist in the acquisition of transport equipment. In rail transport, this will also include investments made in infrastructure (tracks, railway stations). Supporting and auxiliary transport services include, among others, cargo handling, storage and warehousing; infrastructural investments thus take an important share in this sub-sector. Table 4.9 shows that the importance of the sectors is shared: for some countries the water transport sector displays the highest figures (Belgium, Denmark, Germany, Spain, Ireland, Italy and the Netherlands), for others it is air transport that leads (Austria, Finland, Sweden and United Kingdom). Compared to the other transport sub-sectors, auxiliary transport activities show the highest investment per person employed in France and Portugal.

Table 4.9 : Investment per person employed in 1999 - 1000 ECU/EURO

	Total land transport (incl. pipelines)	Rail transport	Road transport	Water transport (marit. + inl. ww.)	Air transport	Auxiliary transport activities
EU-15	:	:	:	:	:	:
Belgium	17.2	29.9	11.0	41.6	24.0	17.4
Denmark	11.4	34.7[1]	9.9	82.0	37.9	37.1
Germany	13.7	:	:	105.9	38.8	12.2
Greece	:	:	:	:	:	:
Spain	6.3	15.8	5.5	27.1	21.8	11.6
France	8.6	:	:	19.3	16.6	21.1
Ireland	6.9[2]	:	:	54.7[2]	28.3[2]	12.8[2]
Italy[3]	5.8	2.3	6.6	59.1	37.8	7.0
Luxembourg	21.3[2]	47.8[2]	7.9[2]	0.1	113.3[2]	6.7[2]
Netherlands	5.9[3]	:	:	53.1[1]	:	21.6[2]
Austria	15.7	:	13.4	6.5	78.8	7.9
Portugal[3]	12.3	:	12.0	7.8	13.3	38.0
Finland[3]	10.4	11.2	10.3	7.6	18.4	9.6
Sweden	12.4	8.7	12.8	26.2	27.4	23.0
United Kingdom[3,4]	7.7	5.3	7.8	18.5	33.6	22.3

(1) 1998.
(2) 1997.
(3) 2000.
(4) Provisional data.
Source: Eurostat (SBS).

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 1999 total European goods transport in the present 15 Member States, including intra-EU maritime transport, grew from 1 338 000 to 2960 000 million tkm (121%).

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

	Road	Rail	Inland water-ways	Pipe-lines	Sea (intra-EU)	Total
1970	412	283	103	68	472	1 338
1980	626	287	107	92	780	1 892
1990	933	255	108	76	922	2 294
1995	1 136	221	114	85	1 071	2 627
1997	1 201	238	118	85	*1 124*	*2 766*
1998	1 254	240	121	88	*1 167*	*2 870*
1999	1 318	237	120	89	*1 195*	*2 960*
1970 - 80	52%	2%	4%	35%	65%	41%
1980 - 90	49%	-11%	1%	-17%	18%	21%
1990 - 99	41%	-7%	11%	17%	30%	29%
1970 - 99	220%	-16%	17%	31%	153%	121%

Estimates in italic.
Source: DG Energy and Transport, Eurostat (pipelines), ECMT, UIC, national statistics. Sea transport 1999: gross estimate subject to revision.

Constant increase of road haulage, decrease of rail transport

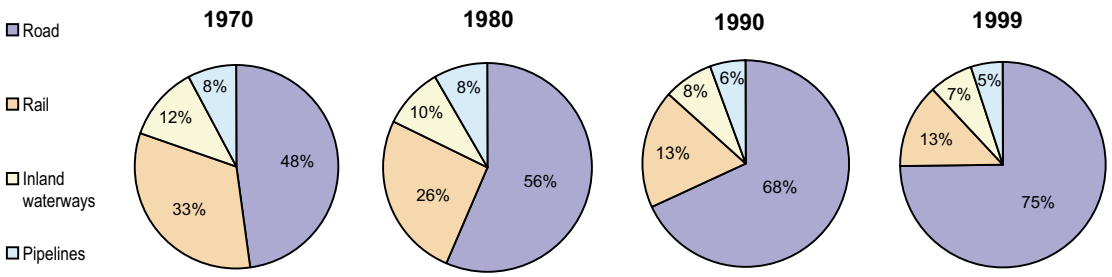
Considering only inland transport, it appears that the considerable growth has been almost entirely realised by road transport. As far as the other modes of transport are concerned, only pipeline transport has substantially grown since 1970 (by 31%), but in 1999 this mode is accredited with a rather modest share of only 5% of total inland transport (in tkm — see Graph 5.2).

Remarkably enough, Graph 5.3 shows that the development of the two remaining modes of inland transport, namely railway and inland waterways, is less spectacular. Goods transport by railways even decreased (– 16% since 1970). Inland waterway transport progressed by only 17% in nearly three decades. It should however be noted that the efficiency of the latter transport mode made a big step forward since the transport performance was done with a considerably reduced vessel fleet (see Chapter 3 — Means of transport).

Short-sea shipping: fast growth in the 1970s

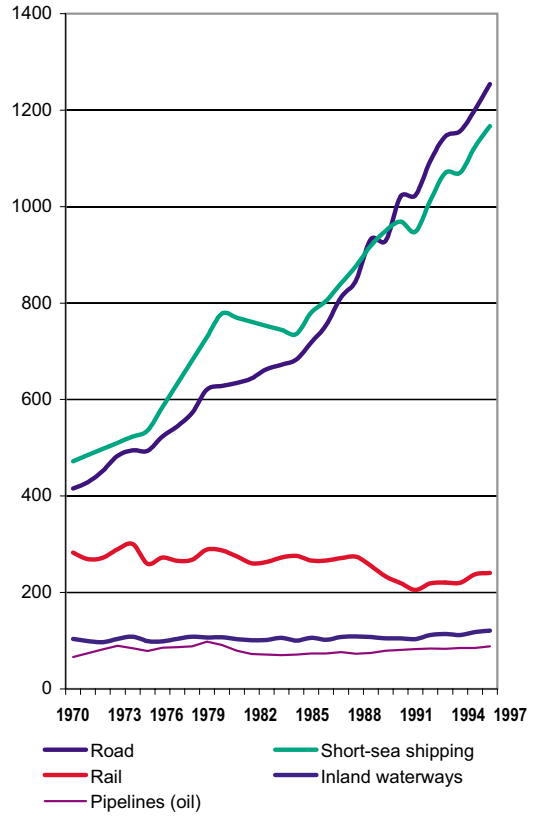
Maritime transport performance, restricted to intra-EU transport to allow a certain degree of comparison, has mainly progressed during the 1970s (+65% between 1970 and 1980). In 1999, the number of tonne kilometres declared stands 153% over those of 1970.

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



Source: DG Energy and Transport.

Graph 5.3: Goods transport evolution in EU-15 1970 - 1999 in 1 000 million tkm



Source: DG Energy and Transport.

Rail transport is taking care of more than a quarter of total transport in Austria, Finland and Sweden.

The most important Member State with regards to inland waterway transport is traditionally 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 well over 40% of all performed tkm in 1999. In Belgium, Germany and Luxembourg, inland shipping still accounts for a more than 10% of total transport.

Table 5.4: Goods transport: modal split by country 1999 - in % based on tkm performed

	Road	Rail	Inland water-ways	Pipe-lines
Belgium	71.2	14.0	11.8	3.0
Denmark	70.0	8.3	-	21.6
Germany	69.6	14.5	12.8	3.0
Greece	98.3	1.7	-	-
Spain	85.6	8.9	-	5.4
France	76.2	15.6	2.0	6.2
Ireland	92.4	7.6	-	-
Italy	86.7	8.0	0.1	5.3
Luxembourg	68.7	20.9	10.3	-
Netherlands	48.8	3.5	41.6	6.0
Austria	39.8	36.9	5.2	18.1
Portugal	86.5	13.5	-	-
Finland	73.2	26.0	0.8	-
Sweden	63.4	36.6	-	-
United Kingdom	83.5	10.0	0.1	6.3
EU-15	**74.7**	**13.4**	**6.8**	**5.1**

Source: DG Energy and Transport.

In 1999, for the European Union as a whole, 75% of all inland transport was performed by road, 13% by rail, 7% by inland shipping and 5% by pipelines. This modal split is based on the quantity of tonne kilometres hauled.

Goods transport by air has not been considered up to now since statistics on air freight are only available in the number of tonnes handled at the reporting airports. Various figures relating to individual airports do however suggest a rapid growth, although the absolute volume remains low compared to the other transport modes.

Road haulage dominant, except in two countries

Table 5.4 outlines that for all 15 Member States — in the Netherlands and Austria by a relatively small margin — road transport is the main carrier of goods. In Greece, Spain, Ireland, Italy, and Portugal, it performed even more than 85% of all inland transport.

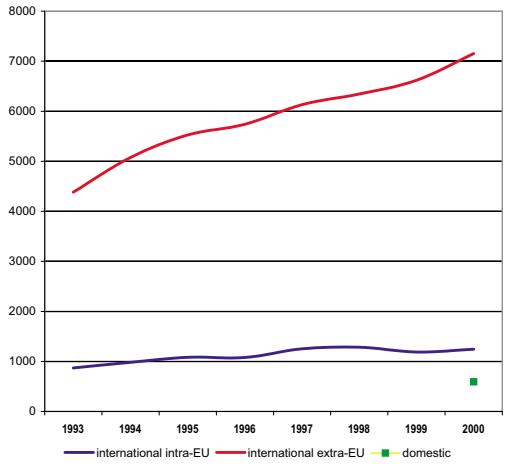
All figures and statistical information on the inland transport modes presented so far in this chapter, including the related tables and graphs are based on datasets that have been compiled by Directorate-General Transport and Energy according to the territoriality principle; i.e. transport performed on the territory of the country in question. Only this principle allows the establishment of the modal split indicators. Other datasets, based on detailed statistical declarations emanating from EU legal acts and compiled by Eurostat, have been used in the following chapters. This is particularly true for the international road transport

Table 5.5: Seaborne transport: gross weight of goods handled in all ports - in million t

	1997	1998	1999	2000
EU-15	**2 912.1**	**2 982.4**	**2 967.4**	**2 984.5**
Belgium	161.6	171.0	165.6	179.4
Denmark	124.0	105.0	97.2	96.5
Germany	213.3	217.4	221.6	242.5
Greece	101.3	110.5	112.5	127.7
Spain	270.6	280.3	295.7	234.9
France	305.1	319.0	315.2	336.5
Ireland	36.3	40.0	42.9	45.3
Italy	459.2	475.7	462.9	446.6
Netherlands	402.2	405.4	395.7	405.8
Finland	75.3	76.6	77.5	80.7
Portugal	54.7	57.6	58.8	56.4
Sweden	149.9	155.6	156.3	159.3
United Kingdom	558.4	568.4	565.5	573.0

These figures do not exclude double counting (based on inwards+outwards)
Source: Eurostat (Maritime database).

Graph 5.6: Evolution of EU air freight and mail transport (in 1000 t)



Source: Eurostat.

datasets (presented in Chapter 5.1.3), based on the activities of hauliers registered in the declaring Member States and relating to transport performance both on the territory of the declarant country and abroad. This 'nationality'-principle does not allow the establishment of modal split indicators.

3000 million tonnes handled in EU-15 ports in 2000

Not comparable with the transport performance of the other modes due to the unavailability of tkm figures, Table 5.5 displays the total volume (in tonnes) of goods (thus not restricted to intra-EU short-sea shipping) handled in all maritime ports of the EU. Since Eurostat's data collection on maritime transport is relatively recent, data are only available for the period 1997-2000. The total volume of goods handled in 2000 can be established at nearly 3 000 million tonnes of goods, a 0.6% increase over the previous year and 2.5% more than the volume handled in 1997. Overall, 66% of the total was cargo unloaded and 34% loaded. Whereas Ireland registered a considerable growth in the volumes handled (close to 25%) a noticeable decline was experienced in Denmark (-22%), where ferry traffic on various routes has been substantially reduced following the opening of fixed links (tunnel/bridges).

Faster growth of extra-EU air transport

Compared to the 3 000 million tonnes handled in maritime transport, the volumes of freight and mail transport by air are obviously low. Graph 5.6 shows that international extra-EU air transport increases substantially faster than international intra-EU transport. Domestic freight and mail transport is currently only available for 2000 and is represented as a dot.

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 5.7 indicates that for the European Union as a whole, in 1995 road haulage accounted for about 10 340 million tonnes of national transport; this stands out in contrast to only 573 million tonnes for rail transport and about 185 million tonnes for inland navigation. Figures for 1999 show that the volume (in tonnes) of road transport progressed slightly at EU level (estimated at 10 850 million tonnes – an increase of just under 5%). Increases were highest in Ireland, Greece and Spain. Conversely, Belgium, Sweden, the Netherlands and Luxembourg registered a decline in volumes forwarded. For Belgium, the decrease is quite noticeable. It should however be noted that the 1999 figures are based on new sample surveys, which might slightly affect the comparability with previous years.

When comparing the 1999 rail transport volume figures with those of 1995, a slight decrease at EU-15 level can be observed (estimated at -3.7%). Greece and Sweden display a clear drop in the number of tonnes forwarded whereas the decrease is less high in Belgium, Germany and Finland. Denmark's rail transport progresses most.

Less tonnes but over longer distance

However, if performance of road versus rail is measured in tonne kilometres (see Table 5.8), the modal split shows different proportions: in 1995, road transport was responsible for 856 000 million tkm and rail for nearly 121 000 million tkm of national transport. In other words, railways were responsible for 5.5% of the volume, but for 14.1% of the tkm performance of road haulage. For 1999, these figures can be estimated at 5.1% and 13.0% respectively, suggesting a stronger position for road transport. As for the data expressed in tonnes, the 1999 data are based on new sample surveys, which could affect comparability with previous years.

Expressed in tkm, it appears that in the period 1995-1999, the progress in road transport performance is quite substantial. At EU-level, the number of tkm increased by 11.7%. Except for Belgium and Luxembourg, national road transport increased in all Member States, especially in Greece, Portugal and Ireland.

Rail transport, displaying a decrease in the number of tonnes forwarded (-3.7%), increases when expressed in tkm (+ 2.6%). Figures suggest

Table 5.7: National transport of goods by country and mode - in 1 000 tonnes

	1985			1990			1995			1998			1999		
	Road (1)	Rail (2)	Inland waterways	Road (3)	Rail (4)	Inland waterways	Road (5)	Rail (6)	Inland waterways (7)	Road (5)	Rail (6)	Inland waterways (7)	Road (5)	Rail (6)	Inland waterways (7)
Belgium	265 383	34 426	21 437	276 871	30 228	21 134	351 431	27 198	18 019	282 574	24 490	18 976	214 889	23 696	:
Denmark	199 933	2 351	-	194 451	2 145	-	175 950	1 932	-	190 428	2 657	-	199 957	:	-
Germany	2 213 709	238 935	63 716	2 715 149	217 187	62 605	2 949 929	232 836	72 328	2 735 922	211 401	63 904	3 083 583	196 145	62 740
Greece	158 371	1 205	-	176 596	898	-	163 903	575	-	259 661	390	-	:	334	-
Spain	913 335	25 028	-	973 708	22 428	-	588 150	20 948	-	690 808	20 137	-	793 910	20 672	-
France	1 360 000	114 293	30 461	1 647 000	98 502	32 872	1 548 000	80 817	17 621	1 702 457	91 415	23 754	1 811 867	87 272	20 329
Ireland	89 736	3 379	-	78 955	3 277	-	78 531	3 179	-	:	2 680	-	137 719	:	-
Italy	327 555	17 221	1 599	889 066	21 084	740	1 220 919	27 425	607	1 130 936	30 164	1 054	:	29 398	1 355
Luxembourg	11 126	2 539	23	24 034	2 816	40	26 192	2 702	14	:	:	:	17 588	:	:
Netherlands	338 660	5 529	74 992	386 940	4 972	84 031	391 766	4 349	76 387	403 180	4 566	95 618	337 362	4 632	97 941
Austria	:	:	:	:	:	:	217 895	15 980	521	229 087	17 256	965	239 855	18 833	771
Portugal	190 558	4 690	-	237 946	5 389	-	263 229	7 631	-	262 752	7 723	-	273 052	8 288	-
Finland	:	:	-	:	14 465	-	349 118	21 903	-	316 882	23 613	-	410 848	19 466	-
Sweden	327 100	:	-	388 100	:	-	355 800	29 741	-	312 628	19 369	-	303 122	19 367	-
United Kingdom	1 406 199	139 322	-	1 686 999	137 622	-	1 658 409	95 379	-	1 560 521	:	-	1 617 134	:	-
EU-15	:	:	:	:	:	:	**10 339 222**	**572 594**	**185 497**	:	:	:	:	:	:

(1) I, E: 1986; P: 1987 - (2) E, P: 1986 - (3) L: 1992 - (4) D: 1991 - (5) IRL: 1993; - (6) UK :1994; I: 1993; L, DK: 1992 - (7) L :1992; I : 1993; B: 1996; - (8) I, FIN: 1997; - (9) B: 2000.
Source: Eurostat, Eurostat/ECMT/UN-ECE.

Table 5.8: National transport of goods by country and mode - in million tkm

	1985			1990			1995			1998			1999		
	Road (1)	Rail (2)	Inland water-ways	Road (3)	Rail (4)	Inland water-ways	Road (5)	Rail (6)	Inland water-ways	Road	Rail	Inland water-ways	Road (7)	Rail	Inland water-ways
Belgium	10 380	2 537	1 676	12 616	2 629	1 694	18 616	2 230	1 460	16 693	2 166	1 690	13 166	2 037	1 942
Denmark	8 342	608	-	9 354	568	-	9 327	448	-	10 108	476	-	10 421	421	-
Germany	:	37 802	12 964	:	33 092	14 108	201 299	35 700	17 152	210 402	35 763	14 483	226 892	34 629	13 970
Greece	10 352	291	-	12 485	222	-	12 357	152	-	19 322	121	-	*20 000*	98	-
Spain	74 144	8 795	-	*69 924*	8 750	-	78 744	7 992	-	91 329	9 174	-	98 147	9 543	-
France	91 100	37 494	4 503	118 200	33 482	4 266	135 300	28 797	2 258	145 459	32 267	3 449	159 026	31 060	3 066
Ireland	3 727	601	-	3 878	589	-	4 161	602	-	:	469	-	5 432	:	-
Italy	98 445	7 097	199	115 786	9 088	118	150 301	10 606	91	:	11 415	127	*155 000*	11 096	173
Luxembourg	206	87	1	454	113	1	531	104	1	:	:	1	400	:	:
Netherlands	18 189	1 062	6 718	22 581	1 020	6 897	26 683	721	5 746	28 240	763	8 759	31 970	622	10 260
Austria	:	:	:	:	:	:	11 069	2 999	83	11 715	3 093	127	12 282	3 522	98
Portugal	8 636	1 137	-	10 978	1 283	-	11 119	1 767	-	14 693	1 638	-	15 324	1 862	-
Finland	:	:	-	:	:	-	21 804	5 936	-	25 611	6 313	-	25 576	6 380	-
Sweden	21 177	:	-	26 519	10 275	-	28 357	10 438	-	30 369	9 216	-	30 424	9 265	-
United Kingdom	100 544	16 812	-	132 968	16 078	-	146 714	12 440	-	155 431	:	-	152 814	:	-
EU-15	:	:	:	:	:	:	**856 381**	**120 932**	**26 791**	:	:	:	***956 874***	:	:

(1) I, E: 1986; P: 1987 - (2) E, P: 1986 - (3) L: 1992 - (4) D: 1989 - (5) D, IRL: 1993; I, L: 1994 (6) UK: 1994 (7) B: 2000. Estimates in italic.
Source: Eurostat, Eurostat/ECMT/UN-ECE.

a sensible decline in Greece, Ireland, the Netherlands and Sweden, whereas Spain and Austria show a progress of 19% and 17% respectively.

Rail: important in larger Member States

It is obvious that average distances for road and rail in national transport are very different: Graph 5.9 shows that only 10% of the volume of goods (expressed in tkm) forwarded by rail have a distance of up to 150 km. The equivalent number for road haulage is 32%. This shows the flexibility of road transport for shorter distances and the relative importance of rail for longer distances. It should however be noted that certain Member States (Belgium, Ireland, Luxembourg and the Netherlands) are not able to perform national journeys of more than 500 km. 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 Germany, France or the United Kingdom. This can be illustrated by the share of national rail transport, as a percentage of road haulage (in tkm) in some Member States (1999): 30% in Sweden, 25% in Finland and 20% in France. Certainly influenced by the topographic features of the country, Austria's share is also high (29%).

Cabotage road transport

Apart from the 'traditional' national transport, cabotage transport (transport taking place on the territory of a country but performed by hauliers registered in another country) can also be considered as national transport from the point of view of the movements of goods. 'Traditional' national transport is based on the transport performance declared by the Member States for their own territory and hauliers registered in their country. Cabotage is declared by Member States for hauliers registered in their country that performed transport on the territory of another country. Thus, from the point of view of the reporting country, cabotage is considered as international transport. Further details on cabotage transport can be found in the following Chapter 5.1.3 *International goods transport*.

Dutch waterways 'compete' with rail

In the Netherlands national rail transport remains extremely low: only 2% of road haulage in 1999; but this is certainly connected with the strong competition of inland navigation, which has the biggest share of all Member States. This high share is certainly due to the important role of the port of Rotterdam, acting as location for redistribution to Europe.

A different situation occurs in Belgium; although one of the 'smaller' Member States, rail is, in 1999, responsible for 15% (1985: 24%) of the volume of national road haulage. Traditionally, Belgian railways have a relatively strong position both in national and international goods transport.

Inland waterway transport: mainly in Germany and the Netherlands

At national level, only four Member States have a substantial 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 (expressed in tkm), which in 1999 was about 16 times higher than the Dutch national rail transport. Figures in Tables 5.7 and 5.8 show that in Belgium and Germany inland waterways are of considerable importance for national transport; both countries feature a rather extended and connected inland waterway network. In France, the importance of inland navigation is more limited and restricted to some separated networks. However, both the volume (in tonnes) and the transport performance (in tkm) registered a noticeable increase in 1999 compared to the previous year, with +11% and +19% respectively.

Although the increase of national waterway transport in the Member States concerned cannot match the development of road haulage, national transport by navigable waterways remains stable.

Domestic air transport obviously close to zero in small Member States

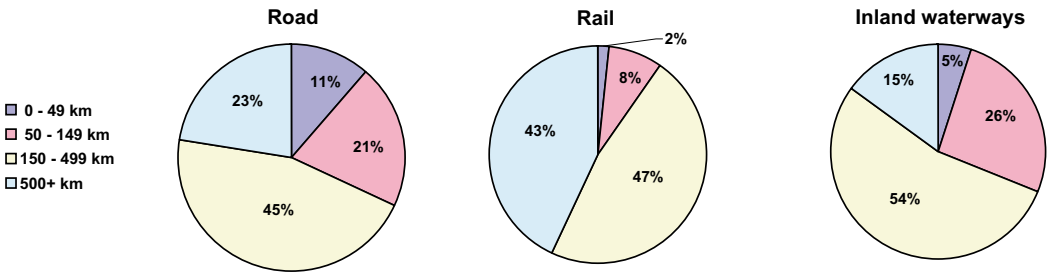
Domestic air transport is quite limited or non-existing in smaller Member States. Larger Member States and those featuring important islands display however noticeable volumes in air freight and mail. Table 5.10 shows that on the basis of data available, it appears that Germany features the highest volume of domestic air freight (nearly 205 000 tonnes). This volume is however only a fraction of what is forwarded by other transport modes in Germany: rail carried nearly 1000 times, inland waterways more than 300 times the volume (in tonnes) of that forwarded by air. Spain (with the Baleares and the Canary Islands) and France (with Corsica but also the overseas territories like Martinique, Guadeloupe and French Guyana) follow on second and third position with 126 000 and 111 000 tonnes respectively. The table also displays the airport that takes the highest share in domestic air freight and mail transport.

Table 5.10: Volume of freight and mail carried in domestic air traffic in 2000 - in tonnes

	Main airport in domestic air transport		
	Tonnes	Airport	Share (%)
Belgium	:	:	:
Denmark	:	:	:
Germany	204 732	Frankurt/Main	32%
Greece	24 422	Athinai	46%
Spain	126 127	Madrid-Barajas	33%
France	110 916	Airport System Paris	36%
Ireland	5 032	Shannon	45%
Italy	46 605	Bergamo-Orio al Serio	17%
Luxembourg	-	-	-
Netherlands	41	Rotterdam	99%
Austria	1 214	Wien-Schwechat	33%
Portugal	:	:	:
Finland	9 484	Helsinki	37%
Sweden	:	:	:
United Kingdom	63 999	Belfast-Aldergrove	23%

Source: Eurostat.

Graph 5.9: National goods transport by distance class, on the basis of tkm forwarded



NB: Data according to the most recent year available - Rail: without L, UK; inland waterways: countries considered: B, D, F, L, NL, A.

Source: Eurostat.

Storebælt fixed-link make Danish figures drop

In some ways, the situation of seaborne transport is similar. At the level of the EU (without however Finland), 259 million tonnes of goods have been handled during the year 2000 in the main ports in national transport. Table 5.11 shows that the United Kingdom, Italy, Spain and Greece are the countries that display the highest volumes. But it is the share of national transport in total seaborne transport that appears to be more interesting information: a little more than 30% of the tonnage handled in Greek ports had national origin and destination. Spain, Italy, and Denmark followed with a share of 21%, 16% and 15% respectively. The geographical features of the above mentioned countries (islands, either large in number or only a few but important ones, or a country with a very important coastline) largely explain this relatively high share.

For Denmark, the substantial drop of the national share during the observation period is notably influenced by the discontinuation of important ferry services after the opening (in 1998) of the Storebælt fixed link, enabling to reach Sjælland (with Copenhagen) via the island of Fyn without having to take a ferry.

Table 5.11: National seaborne transport in the main ports 1997 - 2000, in 1000 tonnes

	1997	1998	1999	2000	2000 - as share in total seaborne transport (%)
Belgium	4 197	4 000	4 521	5 073	2.9
Denmark	24 316	15 530	10 499	11 149	15.1
Germany	5 357	5 218	7 454	5 246	2.3
Greece	:	:	:	29 088	30.2
Spain	:	:	:	46 680	21.0
France	:	20 499	18 366	18 679	5.8
Ireland	774	1 007	809	1 384	4.0
Italy	74 557	67 404	64 713	58 761	15.6
Netherlands	576	545	869	778	0.2
Portugal	5 498	6 284	6 371	5 490	10.8
Finland	not declared	:	:	:	:
Sweden	13 286	13 903	12 597	12 068	9.1
United Kingdom	:	:	:	64 424	12.8

Source: Eurostat.

5.1.3. International goods transport

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

European transport statistics, as provided by Eurostat, illustrate the structure and development of international European transport for all modes of inland transport over the years. This chapter highlights the developments of the last decade.

In 1999, international goods movements of Member States amounted to approximately 272 000 million tonne kilometres (tkm) for road (without cross-trade and cabotage transport), 85 000 million tkm for rail and 68 000 million tkm for inland waterways. Compared to 1990, international road transport increased by 54.1%, rail transport by 15.2% and transport over navigable inland waterways by 9.4%.

General structure of transport quite heterogeneous

The territory 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 the materials and products are imported by sea; in connection with their transhipment in European seaports (like Rotterdam, Antwerp, Marseille, 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. However, there are considerable differences in the size of transport between the respective Member States, as well as in the modes to be used.

Rhine axis most important for the Netherlands and Germany

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 international transport (see Table 5.12).

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 the most important part of inland shipping in the European Union. A considerable part of these goods is transhipped in the big seaports, like Rotterdam, Antwerp or Hamburg.

Noticeable is also Austria's navigable waterways, with the Danube offering a major transport corridor to some central European countries.

Rail: strong position in Scandinavia

Although at EU-level railways are taking care of only a minor part in total international transport, the importance of this mode is substantial for some Member States; railways carry substantial volumes in international transport in Sweden and Finland. The modal comparison in international goods transport throughout the Member States is impossible due to the fact that road transport declarations include transport performed outside the country where hauliers are registered whereas the territorial principle applied to transport performance declarations of rail and inland waterways. Furthermore, Italy for instance has no inland waterway connection with any other Member State; international goods transport by rail for the United Kingdom became only possible with the opening of the Channel tunnel. The Republic of Ireland records rail goods transport to and from Northern Ireland as national traffic.

Table 5.12: International transport by inland waterways - loaded and unloaded (million tkm)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999[1]	Change 1990-99 (%)
Belgium	3 264	3 242	3 186	:	:	:	3 897	3915	4006	4025	23
Germany	31 952	32 126	32 691	32 979	:	34 998	34 466	35 693	36 660	35 281	10
France	2 895	2 521	2 651	2 464	2 432	2 575	2 352	2 530	2 743	3 112	7
Luxembourg	7	5	8	8	6	:	6	28	35	7	0
Netherlands	22 739	22 448	21 659	20 006	22 995	22 551	22 607	25 973	24 939	23 988	5
Austria	:	:	:	:	974	943	1 077	1 030	1 079	1 152	:

(1) France: data refer to 2000.
Source: Eurostat (New Cronos).

Table 5.14: International rail transport - loaded and unloaded (million tkm)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	change 1990-99 (%)
Belgium	4 954	4 929	4 878	4 691	4 942	4 644	4 321	4 771	4 903	4 966	0
Denmark	569	630	631	543	607	602	570	706	674	608	7
Germany	22 127	22 984	20 936	21 101	24 532	25 373	25 101	28 563	30 084	29 376	33
Greece	358	306	329	320	155	140	185	108	191	241	-33
Spain	1 381	1 365	1 253	1 049	1 490	1 762	1 990	2 269	2 148	1 943	41
France	12 983	12 802	13 003	11 506	13 551	13 803	15 227	16 683	16 241	:	25 [1]
Ireland	-	-	-	-	-	-	-	-	-	-	-
Italy	10 141	10 840	9 979	9 357	:	11 065	10 607	11 357	10 992	10 415	3
Luxembourg	419	408	376	:	:	:	:	:	:	:	:
Netherlands	2 016	2 017	1 770	1 673	1 934	2 280	2 375	2 605	3 015	3 096	54
Austria	:	:	:	:	:	8 098	8 523	9 660	7 990	8 048	:
Portugal	156	171	211	155	236	251	250	394	409	318	104
Finland	:	:	:	:	:	3 357	3 107	3 597	3 572	3 373	:
Sweden	8 039	7 208	8 492	8 156	7 920	7 833	6 843	4 854	4 803	4 880	-39
United Kingdom	193	192	353	336	529	:	:	:	:	:	:

(1) 1990-1998
Source: Eurostat, Eurostat/ECMT/UN-ECE.

Germany by far first in rail transport performance

In absolute terms, Germany performed in 1999 close to 30 000 million tkm in rail goods transport, considerably ahead of France and Italy with 16 200 million and 10 400 million tkm respectively (see Table 5.14). In relative terms, Portugal's international rail transport more than doubled between 1990 and 1999, whereas Sweden's transport recorded a decline of 39%. Sweden's decline from 1996 onwards can largely be explained by the fact that transport on the so-called «ore-line» in Northern Sweden was taken over from the Swedish State Railways by MTAB (Malmtrafik i Kiruna AB) as from 1 July 1996. In Greece, the conflicts in the former Yugoslavia affected one of the main lines for international freight transport (from Thessaloniki to the border town of Idomeni), explaining the strong decrease in the period 1994-1997. Rail figures display a considerable increase again for 1998 and 1999, without however reaching the transport performance level of the early 1990s.

Transhipment often needed in Spain

Although there is no competition from inland shipping, rail transport from and to Spain appears remarkably low (1 943 million tkm in 1999). 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 are available, road haulage is still responsible for a large part of Spanish international goods transport.

Road: plus 54% in a single decade

In 1999, the international goods transport by road at EU-level amounted to approximately 271 500 million tkm. This represents an increase in volume of over 54% in a decade (1990–99). Its volume is three times as big as international rail transport and nearly four times that of inland shipping.

Table 5.15 shows that the Member States with the most voluminous international road haulage in 1999 were Germany (45 652 million tkm), France (41 975), the Netherlands (41 005) and Spain (35 066). The port of Rotterdam, where goods are unloaded from ships and often continue their journey by lorry, can partly explain the surprisingly high transport performance of hauliers registered in the Netherlands.

Cross-trade initially under quota system

All data and related comments on road transport in the previous sections of this chapter apply to 'regular' international road transport: reporting countries declaring international road transport (loaded or unloaded in the reporting country) by hauliers registered in their respective country. Road transport is however more important than suggested in the previous paragraphs since cabotage and cross-trade transport are also categories of road transport

Table 5.15: International road transport - loaded and unloaded (million tkm)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999[1]	Change 1990-99 (%)
Belgium	19 433	20 604	18 210	20 178	23 073	22 833	21 084	21 920	19 900	17 118	-12
Denmark	5 145	5 872	6 384	10 423	11 433	12 421	11 344	11 226	10 796	12 276	139
Germany [2]	21 432	23 137	24 203	25 681	2 772	29 507	31 679	36 736	41 884	45 652	113
Greece	2 119	1 983	2 732	1 415	636	867	841	1 734	1 272	*1 400*	-34
Spain	12 271	13 086	14 187	15 385	19 334	22 513	25 251	28 351	32 814	35 046	186
France	30 689	30 972	33 398	31 446	34 560	36 072	40 333	37 831	40 293	41 975	37
Ireland	1 008	780	411	887	:	:	:	:	:	1 106	10
Italy	20 498	18 423	19 661	18 179	19 309	12 497	23 940	19 754	:	24 465	19
Luxembourg	:	:	1 661	1 615	1 395	:	:	1 213	:	1 461	:
Netherlands	30 896	29 033	30 468	31 232	32 719	33 901	35 147	35 999	36 809	41 005	33
Austria	:	:	:	:	:	12 474	13 103	13 613	14 610	15 654	:
Portugal	5 152	6 901	6 140	5 764	6 739	:	8 846	10 046	9 954	10 990	113
Finland	:	:	:	:	:	:	2 570	2 122	2 413	3 716	:
Sweden	:	:	:	:	:	3 097	2 768	2 566	2 829	2 721	:
United Kingdom	10 650	11 228	11 753	12 480	14 373	14 441	15 491	16 252	16 085	16 908	59

(1) All countries: 1999 data based on sample-surveys (Council Regulation (EC 1172/98).
(2) Break in series (1994-1995) due to method. changes.
Source: Eurostat (New Cronos), Eurostat estimates (italic).

Cross-trade road transport (international road transport, carried out by vehicles neither registered in the country of loading, nor in the country of unloading) was, before 1993, 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.

Cross-trade: share of 10%

Table 5.16 displays the number of tkm performed in cross-trade transport. The figures express the performance by nationality of the operators and are not related to the territory where this transport took place. In fact, if cross-trade transport

Table 5.16: Cross-trade road goods transport performed by hauliers registered in the reporting Member States (million tkm)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Share (1999) in total international transport (%)
Belgium	2 292	1 973	3 126	3 170	3 822	3 800	3 745	2 924	3 848	3 330	15.2
Denmark	:	:	:	653	602	496	427	482	390	436	3.4
Germany	:	:	:	:	:	*2 762*	*2 656*	*3 293*	*3 855*	4 354	8.7
Greece	:	:	:	:	:	:	:	:	:	*0*	*0.0*
Spain	:	:	:	219	220	376	456	493	707	791	2.2
France	2 499	2 851	3 157	3 254	3 254	2 831	2 719	2 226	*2 811*	2 957	6.6
Ireland	184	109	:	:	:	:	:	:	:	229	17.2
Italy	:	:	150	142	152	182	237	:	:	509	*1.6*
Luxembourg	:	1 248	1 847	2 055	1 979	:	1 763	2 599	:	3 436	70.0
Netherlands	4 385	4 908	5 050	4 954	5 352	5 958	6 259	6 480	6 998	8 246	16.6
Austria	:	:	:	:	:	2 981	3 347	4 059	4 753	5 827	27.0
Portugal	134	247	219	325	442	466	*361*	328	352	688	6.0
Finland	:	:	:	:	:	:	153	*21*	64	*102*	2.7
Sweden	:	:	:	:	:	64	41	14	44	*54*	2.0
United Kingdom	360	539	260	213	275	290	400	*392*	397	292	1.8
EU-15	:	:	:	:	:	:	:	:	:	**31 251**	:

Source: Eurostat, national statistics (italic).

and 'regular' international transport for 1999 are taken together, it appears that cross-trade transport is far from negligible: 31 251 out of 302 764 million tonne kilometres, or 10.3% (1998: 8.8%).

Especially smaller Member States with a geographically central location have a relatively high proportion of cross-trade transport, not only in absolute numbers but also when compared to 'regular' international transport. This is notably the case for Belgium and the Netherlands. Largely due to the small size of its home markets, Luxembourg's cross-trade transport was even more than twice as important as 'regular' international transport. For all other Member States, and especially the peripheral ones, this type of transport is of lesser importance.

Data presented in Table 5.16 suggest that throughout the period observed, fluctuations occurred at Member State level. However, a general upward trend can be noticed for most countries. There can however be no doubt about the favourable effects (economical efficiency, reduction of environmental pressure due to less empty journeys) of cross-trade transport, which offers an important step for the realisation of a European common transport market.

Cabotage: international or national?

From the point of view of the movements of goods, cabotage transport (transport inside a country by a haulier based in another country) should constitute a category of national road transport. In the economical sense however, as well as from the point of view of the declaring country, this type of road haulage is considered as international transport, since it is performed outside the territory of the reporting country. This is also the concept that applies to the road transport data collected under Council Regulation (EC) 1172/98. In the frame of this publication, Eurostat will consider cabotage transport as part of international transport.

Cabotage transport was gradually introduced in 1990 through the introduction of authorisation quotas. In the Benelux countries, quotas were already abolished at the end of 1992. The cabotage regime was extended to the EFTA states (except Switzerland) on 1 July 1994 following the creation of the EEA. The quotas were steadily increased and entirely abolished on the 1 July 1998.

Although Table 5.17 suggests a considerable increase of cabotage transport over the years, the overall influence remains small: with 956 874 million tkm in 1999, national transport by resident hauliers was still 130 times more important than cabotage (7284 million tkm).

Hauliers from small countries have more incentive to undertake cabotage due to their limited national markets and the fact that other national markets are geographically close. Table 5.18 and Graph 5.19 outline that road transport enterprises from the Benelux countries have been particularly active in the market: in 1999, they were responsible for half of the entire cabotage transport performed in the EU.

The long time fears for 'unfair competition' from low labour cost countries remain unfounded: only 5% of the entire cabotage transport performance was carried out by hauliers registered in Greece, Spain and Portugal.

Table 5.18: Cabotage transport performed by hauliers from each reporting country, 1999 – in million tkm

EU-15	***7 284***
Belgium	936
Denmark	102
Germany	1 533
Greece	*0*
Spain	271
France	756
Ireland	249
Italy	350
Luxembourg	1 039
Netherlands	1 632
Austria	222
Portugal	99
Finland	33
Sweden	19
United Kingdom	44

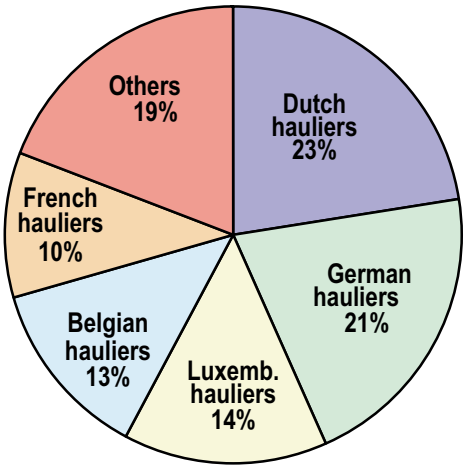
Source: Eurostat. Estimates in italic.

Table 5.17: Total cabotage by hauliers from EU countries [1] - in million tkm

1991	1992	1993	1994	1995	1996	1997	1998	1999
646	745	881	1 144	1 672	2 204	3 538	*4 816*	*7 284*

(1) The figure for 1994 includes cabotage performed by hauliers from Sweden and Finland, which joined the EU only on 1.1.1995. Austria joined the cabotage regime in 1997.
Source: DG Energy and Transport (figures up to and including 1998); Eurostat (1999). Estimates in italic.

Graph 5.19: The most active 'caboteurs' in 1999 (based on tkm)



Source: Eurostat.

High increases in air transport

The development of international freight transport by air (worldwide) is displayed in Table 5.20. Figures are expressed in tonnes of freight (cargo and mail) handled at the airports of the reporting countries. Most countries show a clear upward trend in the quantities loaded and unloaded. It should however be noted that countries report for 'major airports' only. Thus, the figures for the individual years sum up the volumes handled at a certain number of airports. If airports pass the threshold of compulsory reporting, the increase will be most noticeable. The number of reporting ('major') airports in Spain for instance passed from 20 in 1994 to 28 in 1995.

Luxembourg airport fifth in international extra-EU air cargo handling

These elements have not to be considered when looking at Table 5.21 which displays the 'top-20' airports in the EU with regards to cargo loaded and unloaded in 2000, separately for international intra-EU and international extra-EU freight traffic.

With regards to international intra-EU cargo traffic, the German airports of Cologne-Bonn and Frankfurt (Main) lead the ranking, both handling over 200 000 tonnes of freight and mail. Within the top-20 ranking, the airports of Milano-Malpensa (Italy) and East Midlands (United Kingdom) not only display the highest increase compared to the previous year (with 72% and 29% respectively) but also feature the highest average annual growth since 1993 (with 48% and 26% respectively). It should be mentioned that the airport of Milano-Malpensa has been subject to considerable investments in the frame of the trans-European transport network (one of the 14 priority projects), notably with regards to runway capacity and cargo facilities.

Volumes of freight and mail handled in international extra-EU transport are sensibly higher: the three most important airports in this respect (Frankfurt, London-Heathrow and Amsterdam) all handled well over one million tonnes. Within the

Table 5.20: Development of the volume of cargo and mail handled in worldwide international air traffic (1000 tonnes)

	1993	1994	1995	1996	1997	1998	1999	2000	Average annual increase 1993-2000
Belgium	306	375	426	449	518	585	:	:	6.7 [1]
Denmark	:	:	:	:	:	:	:	:	:
Germany	1 520	1 721	1 807	1 876	2 019	1 948	2 054	2 244	5.7
Greece	81	82	:	73	106	101	105	110	4.6
Spain	179	174	244	281	309	309	340	353	10.2
France	853	1 006	1 034	1 058	1 025	1 030	1 038	1 060	3.2
Ireland	50	43	58	39	70	59	66	72	5.4
Italy	403	438	459	475	454	446	420	459	1.9
Luxembourg	:	:	287	281	340	383	448	501	11.8 [2]
Netherlands	773	842	982	1 084	1 163	1 174	1 182	1 268	7.3
Austria	73	85	96	98	109	111	122	127	8.2
Portugal	86	94	101	102	:	:	:	:	:
Finland	:	:	:	:	92	94	91	92	:
Sweden	103	128	145	171	195	198	185	:	10.3
United Kingdom	1 215	1 486	1 584	1 657	1 847	1 990	2 095	2 210	8.9

(1) 1993-1998.
(2) 1995-2000.
Source: Eurostat; Sweden: SIKA-Institute/Swedish Civil Aviation Agency.

Table 5.21: Top 20 airports in EU-15 based on cargo loaded/unloaded worldwide

		Intra-EU freight traffic				Extra-EU freight traffic		
Rank 2000	Airport	Volume handled in 2000 (1000t)	Change 1999-2000 (%)	Aver. evolution 1993-2000 (%)	Airport	Volume handled in 2000 (1000 t)	Change 1999-2000 (%)	Aver. evolution 1993-2000 (%)
1	Köln/Bonn /D	236.6	14.3	15.4	Frankfurt (Main)/D	1 401.3	11.7	5.3
2	Frankfurt (Main)/D	216.5	5.0	0.8	London-Heathrow/UK	1 123.8	3.9	8.3
3	London-Heathrow/UK	174.6	-0.4	0.9	Amsterdam-Schiphol/NL	1 118.0	5.5	7.5
4	East Midlands/UK	123.8	28.6	26.3	Airport-system Paris/F	877.5	9.3	:
5	Airport-system Paris/F	109.5	-1.8	:	Luxembourg/L	450.5	14.6	:
6	Amsterdam-Schiphol/NL	104.5	-13.1	1.5	London-Gatwick/UK	306.1	9.2	8.4
7	Madrid-Barajas/E	75.2	11.8	9.2	Milano-Malpensa/I	243.6	15.9	15.3
8	Athinai/EL	55.6	3.4	4.3	Köln/Bonn/D	150.0	-0.1	6.9
9	Luxembourg/L	50.3	-8.9	:	Madrid-Barajas/E	146.3	3.7	7.7
10	Helsinki/FIN	48.8	10.5	:	London-Stansted/UK	113.5	-4.5	15.5
11	London-Stansted/UK	47.3	-1.2	17.6	Roma-Fiumicino/I	109.7	10.1	-6.6
12	Barcelona/E	42.7	10.2	10.9	Manchester-Intl./UK	101.3	12.9	16.3
13	Wien-Schwechat/A	42.3	-8.5	2.8	Wien-Schwechat/A	81.4	13.9	12.8
14	Milano-Malpensa/I	40.0	71.8	48.2	München/D	80.7	11.6	11.4
15	Roma-Fiumicino/I	28.5	4.2	-8.9	Athinai/EL	46.6	9.0	5.6
16	München/D	27.4	-14.8	3.3	Helsinki/FIN	40.3	-1.7	:
17	Dublin/IRL	26.2	-15.0	:	Maastricht/NL	38.5	:	:
18	London-Luton/UK	24.7	0.3	4.0	Düsseldorf/D	34.6	1.3	6.8
19	Vitoria/E	24.2	31.2	:	East Midlands/UK	32.3	104.2	38.2
20	Düsseldorf/D	20.1	-10.1	0.2	Manston (Civil)/UK	31.1	41.3	47.9

NB: Belgium, Denmark, Portugal and Sweden did not report for 2000.
Source: Eurostat.

top-20, it appears that in 2000, the East Midlands airport (United Kingdom) doubled its volume compared to the previous year. In the higher ranks, Milano-Malpensa and Luxembourg also display considerable growth rates. The fact that the airport of Brussels – also a major cargo-handling airport – is missing in the 2000 ranking is due to the fact that Belgian authorities did not report for 2000.

EU's main sea ports: 2 442 million tonnes handled

For seaborne transport as for aviation, it is hard to proceed to a correct comparison of the transport performance of the various transport modes as long as no tonne kilometres indications are available. The information on seaborne transport presented in this chapter refers to the cargo tonnage handled (i.e. loaded and unloaded) in the main ports of the various EU Member States. «Main ports» refer to those ports that at least handle 1 million tonnes of cargo per year. Over time, certain ports may however reach this threshold and start reporting, making year-to-year comparisons somewhat risky. This should be taken into account when looking at Table 5.22, which offers thus an insight of the development of the tonnage handled in ports that were over the threshold in the reference year considered. An indication of the total tonnage handled in all ports (including the volume in national traffic) can be found in Chapter 5.1.1 *Transport of goods – General development*.

All main ports of the EU taken together handled 2 442 million tonnes of cargo in international traffic in 2000. The most important volumes were handled in the main ports of the United Kingdom

Table 5.22: International seaborne transport in the main ports: goods loaded and unloaded

	1997	1998	1999	2000	
	1000 t	1000 t	1000 t	1000 t	% of which intra-EU
Belgium	154 387	163 904	157 814	170 822	31.6
Denmark	64 921	62 267	61 249	62 856	50.8
Germany	200 907	205 521	206 986	227 635	41.8
Greece	56 927	65 650	66 763	67 103	24.9
Spain	207 194	227 265	241 178	175 243	19.6
France	:	285 579	281 870	303 332	31.6
Ireland	27 744	29 832	31 485	33 107	60.3
Italy	303 959	332 092	324 413	318 503	12.4
Netherlands	399 149	401 956	394 747	402 454	28.0
Portugal	42 138	43 374	44 773	45 219	33.0
Finland	70 248	71 694	71 123	75 394	67.7
Sweden	108 509	112 499	117 244	120 015	59.9
United Kingdom	:	:	:	440 305	40.7

Source: Eurostat.

(440.3 million t – or 18% of the EU total) followed by those of the Netherlands (402.5 million t – or 16%) and Italy (318.5 million t – or 13%).

Port of Dunkerque: from rank 16 to rank 9

Table 5.23 further specifies that individual ports sometimes can take a very important position, mainly in the smaller Member States: the port of Rotterdam alone – by far the most important EU port with regards to tonnage handled – accounts for a volume of 302.5 million tonnes. In the period observed, the top-5 ranking remains strictly unchanged although the ports of Antwerp, Hamburg and Le Havre increased their volume by around 10%. Rotterdam and Marseille did not progress compared to 1997. It should however be noted that the various rankings in Table 5.23 refer to the total tonnage handled in the individual ports – including (often minor) volumes loaded and unloaded in national transport.

In the lower ranks, the port of Dunkerque (France) gradually moved up from position 16 in 1997 to position 9 in 2000. The volume handled in this port increased by nearly 22% over the period 1997-2000. The statistically combined ports of Bremen and Bremerhaven miss the top-15 in 2000 by a small margin. These ports displayed the highest increase compared to 1997 (28.2%). The only port in the top-15 ranking with a noticeable decrease (-14% compared to 1997) was the port of London, due to the closure of a major oil terminal.

Table 5.23: TOP 15 ports - on the basis of gross weight of goods handled (in 1000 t)

	1997		1998		1999		2000		change 1997-2000 (%)
1	Rotterdam	303 427	Rotterdam	306 991	Rotterdam	299 506	Rotterdam	302 485	-0.3
2	Antwerpen	104 592	Antwerpen	111 592	Antwerpen	103 591	Antwerpen	115 988	10.9
3	Marseille	92 936	Marseille	90 929	Marseille	87 643	Marseille	91 279	-1.8
4	Hamburg	69 583	Hamburg	68 912	Hamburg	73 358	Hamburg	76 950	10.6
5	Le Havre	58 207	Le Havre	62 783	Le Havre	60 303	Le Havre	63 883	9.8
6	London	55 692	London	57 311	London	52 206	Grimsby & Immingham	52 501	9.4
7	Tees & Hartlepool	51 249	Tees & Hartlepool	51 454	Grimsby & Immingham	49 757	Tees & Hartlepool	51 472	0.4
8	Grimsby & Immingham	47 991	Grimsby & Immingham	48 387	Tees & Hartlepool	49 316	London	47 892	-14.0
9	Trieste	46 664	Trieste	47 557	Genova	46 775	Dunkerque	44 318	21.7
10	Genova	43 633	Genova	45 213	Forth	45 396	Bahía de Algeciras	44 016	18.0
11	Forth	43 102	Forth	44 400	Trieste	44 515	Trieste	44 015	-5.7
12	Bahía de Algeciras	37 299	Wilhelmshaven	43 950	Bahía de Algeciras	42 047	Genova	43 797	0.38
13	Amsterdam	36 942	Bahía de Algeciras	42 126	Wilhelmshaven	39 731	Wilhelmshaven	43 402	19.1
14	Taranto	36 720	Dunkerque	39 036	Dunkerque	38 025	Amsterdam	42 044	19.3
15	Wilhelmshaven	36 443.05	Taranto	36 593	Sullom Voe	37 680	Forth	41 143	-4.5

Source: Eurostat.

5.1.4. Transport by group 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. The NST 2000, aiming at a further harmonisation with mainly nomenclatures used in foreign trade statistics, is expected to become the new standard in the near future.

Soon from NST/R to NST 2000

The NST/R is widely used in EU-15. Nearly all Member States apply 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 refers to national and international transport. Depending on data availability, statistical information of various Member States was compiled to give the best possible view. This means that footnotes attached to the various graphs should be carefully read. The 10 chapters consist of a grouping of the 24 groups of goods, derived from the NST/R. The window offers a concise description of this grouping.

Not all Member States feature inland waterway transport

Table 5.24 (national transport) and Table 5.25 (international transport) outline the transport performances (expressed in million tonnes) of the three inland modes for selected Member States. It should be noted that data were compiled on the basis of data availability. This does however not distort the significance in the relative distribution by NST/R chapters. Furthermore, not all Member States contribute to the account of inland waterway transport.

It is recalled that figures presented in this chapter are based on tonnes forwarded and not on tonne kilometres (tkm) performed. The results of this analysis cannot be compared with equivalent data expressed in tkm (that take into account the distances travelled).

Apart from showing the absolute importance of national transport with regard to the volumes forwarded, Table 5.24 shows the dominance of road transport. When the three transport modes are taken together, Chapter 6 of the NST/R (crude and manufactured minerals, building materials) appears to be the most important group of all types of goods forwarded (45%). Chapter 9 (machinery, transport equipment, manufactured and miscellaneous articles) and Chapter 1 (foodstuffs and animal fodder) follow with 19% and 11% respectively.

Share of road: 93% in national, 'only' 39% in international transport

The situation is quite different in international transport (see Table 5.25). Surprisingly, it appears that in 1999, 'only' 39% of the total amount of

NST/R chapters

0 Agricultural products and live animals
1 Foodstuffs and animal fodder
2 Solid mineral fuels
3 Petroleum products
4 Ores and metal waste
5 Metal products
6 Crude and manuf. minerals, building materials
7 Fertilizers
8 Chemicals
9 Machinery, transport equipment, manufactured and miscellaneous articles

Table 5.24: National transport in 1999 - by group of goods (NST/R chapter) - in 1000 tonnes

	NST/R chapters											
	0	1	2	3	4	5	6	7	8	9	Total	Modal split
Road transport	627 936	1 018 758	69 001	365 074	113 676	207 254	3 943 053	102 252	402 455	1 633 316	**8 482 775**	92.9%
Rail transport	17 515	12 805	101 771	37 330	47 438	63 790	75 682	9 568	23 367	48 792	**438 058**	4.8%
IWW transport	7 965	13 055	19 006	34 122	6 046	3 050	102 377	4 349	10 767	8 837	**209 574**	2.3%
Total	**653 416**	**1 044 618**	**189 778**	**436 526**	**167 160**	**274 094**	**4 121 112**	**116 169**	**436 589**	**1 690 945**	**9 130 407**	100%
Share	**7%**	**11%**	**2%**	**5%**	**2%**	**3%**	**45%**	**1%**	**5%**	**19%**	**100%**	

Note: Road and rail: countries considered: B (Rail: 1998), D, EL (Rail and Road: 1998), E, F (Rail: 1998), NL, P, UK (Rail: 1994).
Inland waterways: B, D, F, NL, AT.
Source: Eurostat.

Table 5.25: International transport in 1999 - by group of goods (NST/R chapter) - in 1000 tonnes

	NST/R chapters											
	0	1	2	3	4	5	6	7	8	9	Total	Modal split
Road transport	59 966	56 540	2 881	9 288	5 941	34 383	61 217	5 298	53 351	162 728	**451 593**	38.7%
Rail transport	26 450	6 925	16 715	16 250	22 175	39 784	18 681	4 407	19 723	97 512	**268 622**	23.0%
IWW transport	19 795	25 048	41 573	72 084	74 640	18 693	102 227	14 846	34 998	43 644	**447 548**	38.3%
Total	**106 211**	**88 513**	**61 169**	**97 622**	**102 756**	**92 860**	**182 125**	**24 551**	**108 072**	**303 884**	**1 167 763**	100%
Share	**10%**	**9%**	**3%**	**7%**	**7%**	**8%**	**15%**	**2%**	**10%**	**29%**	**100%**	

Note: Road and rail: countries considered: B, D, EL (road 1998), E, F (rail: 2000), I , NL (rail: 2000), A, P, FIN (road: 1998), UK (rail: 1994). Inland waterways: B, D, F (2000), L, NL, A. 'Regular' international road transport only, i.e. without cross-trade and cabotage transport.
Source: Eurostat.

tonnes forwarded use the road as mode of transport, just ahead of inland waterways with 38%. The remaining 23% is carried by rail.

International transport of all inland modes considered, Chapter 9 has the most important share with 29%, followed by minerals and building materials (Chapter 6) with 15% and chemicals (Chapter 8) as well as agricultural products (Chapter 0) with both a share of 10%.

Inland waterway vessels forward the highest volume in four out of ten NST/R chapters (Chapter 2, 3, 4, 6 and 7).

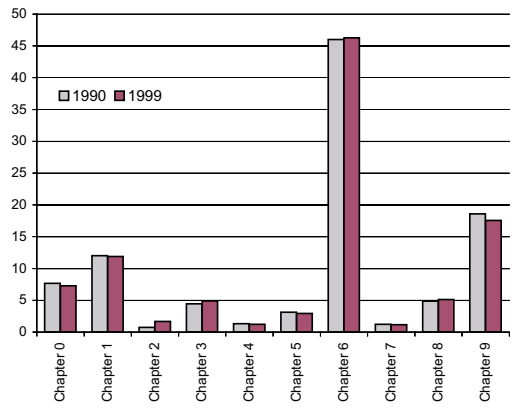
The most complete picture can however be obtained when looking at Graphs 5.26 to 5.31: they offer both an insight by mode of transport, show the modal particularities and demonstrate the relative importance of rail and inland waterway transport for heavy and bulky goods like building materials, ores and petroleum products.

The following paragraphs will focus on the characteristics of the distribution of the NST/R chapters within the inland transport modes.

Minerals and building materials very dominant only in national road transport

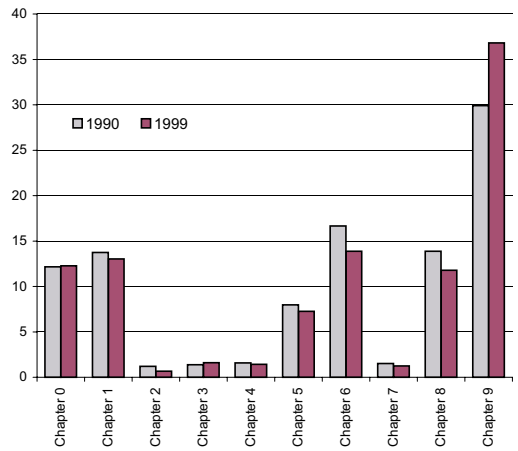
Looking at the two graphs of road transport individually (Graph 5.26 and 5.27), it appears that there have been no major changes in the percentage shares of the various goods groups between 1990 and 1999, especially with regards to national transport. More interesting is the comparison of the various NST/R chapters between national and international transport. It then appears that the transport of crude and manufac-

Graph 5.26: Share of NST/R goods chapters in national road transport in 1990 compared to 1999 (%)



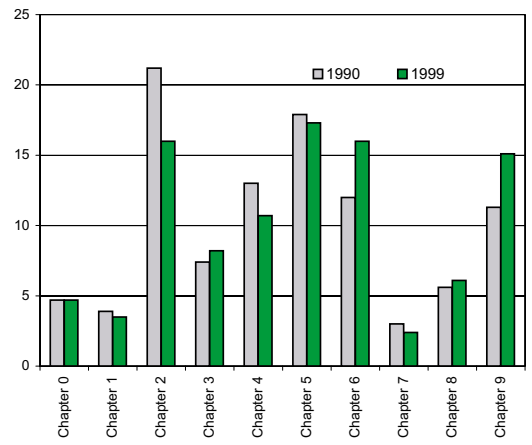
NB: Data are based on tonnes forwarded by the following Member States: B, DK, D, EL, E, F, IE, I, NL, P, UK. Greece: 1998 data instead of 1999.
Source: Eurostat.

Graph 5.27: Share of NST/R goods chapters in international road transport in 1990 compared to 1999 (%)



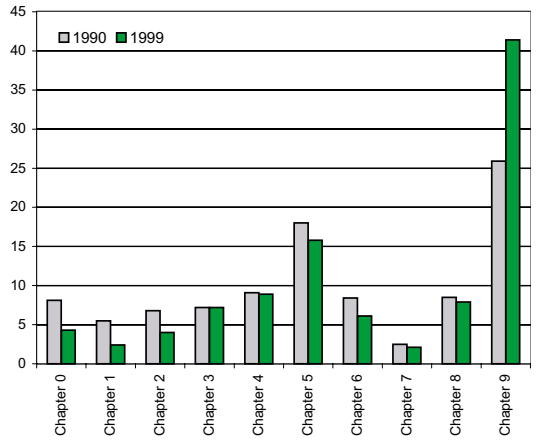
NB: Data are based on tonnes forwarded by the following Member States: B, DK, D, E, F, NL, P, UK.
Source: Eurostat.

Graph 5.28: Share of NST/R goods chapters in national rail transport in 1990 compared to 1999 (%)



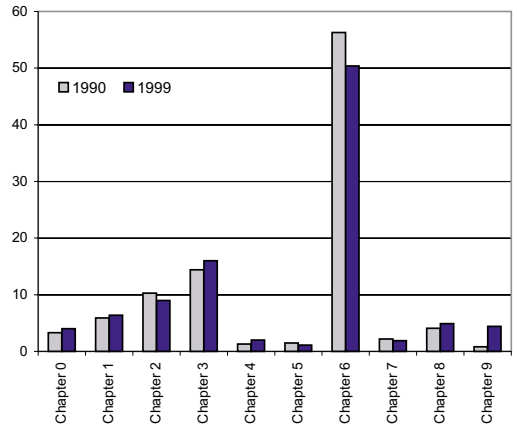
NB: Data are based on tonnes forwarded by the following Member States: B, D, EL, E, F, IRL, I, NL and P. - F, IRL: 1998 data instead of 1999.
Source: Eurostat.

Graph 5.29: Share of NST/R goods chapters in international rail transport in 1990 compared to 1999 (%)



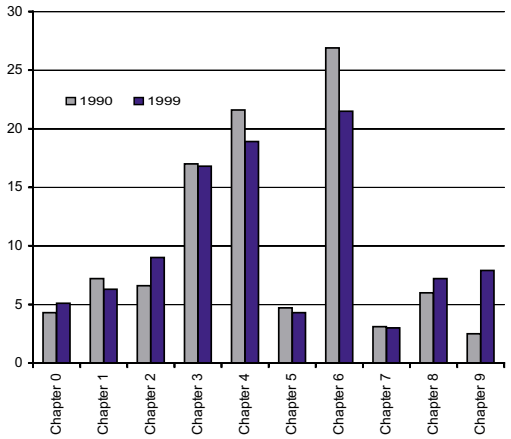
NB: Data are based on tonnes forwarded by the following Member States: B, D, EL, E, F, I, NL, P and FIN. - F: 1998 data instead of 1999; NL: 2000 data instead of 1999.
Source: Eurostat.

Graph 5.30: Share of NST/R goods chapters in national inl. waterway transport in 1990 compared to 1999 (%)



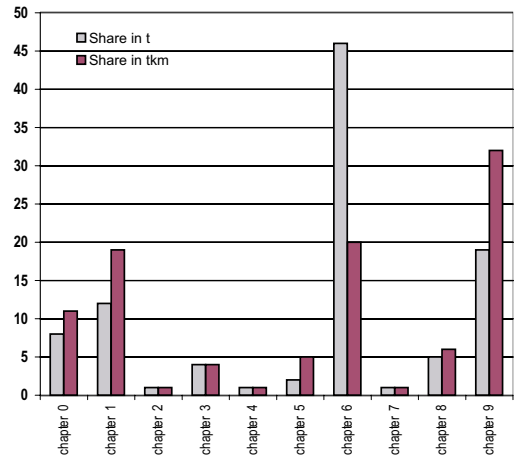
NB: Data are based on tonnes forwarded by the following Member States: D, F, NL.
Source: Eurostat.

Graph 5.31: Share of NST/R goods chapters in international inl. waterw. transport in 1990 comp. to 1999 (%)



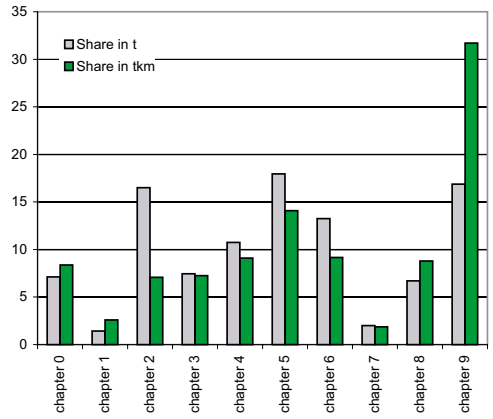
NB: Data are based on tonnes forwarded by the following Member States: D, F, L, NL.
For L : 1998 data instead of 1999 - for NL : 2000 data instead of 1999.
Source: Eurostat.

Graph 5.32: Share of NST/R goods chapters in national road transport 1999 - tonnes and tonne-kilometres (%)



NB: National goods transport in all Member States except B, EL and I have been taken into account.
Source: Eurostat.

Graph 5.33: Share of NST/R goods chapters in international rail transport 1999 tonnes and tonne-kilometres (%)



Note: data of the following countries were compiled:B, D, EL, E, I, NL, A, P, FIN, S.
Source: Eurostat.

tured minerals and building materials (Chapter 6) alone accounts for nearly half (46%) of the total volume of national road transport whereas the same goods category represents only around 14% in international traffic (all percentages refer to 1999).

The other most remarkable difference concerns NST/R Chapter 9 (Machinery, transport equipment, manufactured articles and miscellaneous goods): here, the opposite applies: in national transport, the share amounts to 18%, whereas in international transport, this same group accounts for 37%.

Graph 5.27 further outlines that apart from NST/R Chapter 9, there is a more equal distribution in the kind of goods in international than in national transport.

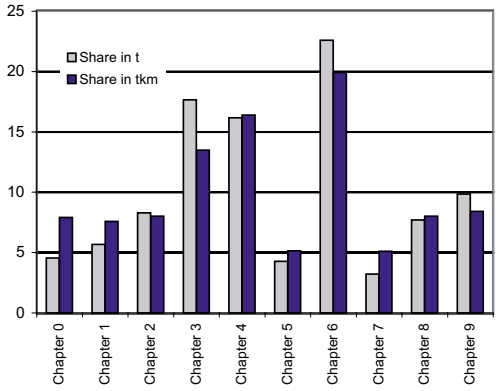
Goods in containers increasingly allocated to 'miscellaneous goods'

Although not visible in Graph 5.27, it should be noted that NST/R goods group 24 — 'miscellaneous articles' —, a subgroup of Chapter 9, is largely responsible for the higher share in 1999 compared to 1990: whereas group 24 was responsible for 30% of the volume in tonnes of Chapter 9 in 1990, it increased to 42% in 1999. It has been experienced that goods in containers, for which the content is not exactly known by reporting authorities, are increasingly allocated to 'miscellaneous goods'. Similar remarks can be made for rail transport.

National rail transport: most balanced shares

Rail transport shows quite different characteristics when comparing national and international transport. In national transport (see Graph 5.28), the share of solid mineral fuels (NST/R Chapter

Graph 5.34: Share of NST/R goods chapters in international inland waterway transport 1999 - tonnes and tonne-kilometres (%)



Note: data of the following countries were compiled: B (1998), D, F (2000), L (1998), NL, A.
Source: Eurostat.

2), still dominant in 1990, decreased mainly on behalf of minerals and building materials (Chapter 6) and machinery, transport equipment and miscellaneous articles (Chapter 9). The transport of metal products (Chapter 5) remained important and had the highest share in 1999. Considering the three inland transport modes, national rail transport features the most balanced shares of the various goods groups.

In international transport (see Graph 5.29), metal products (Chapter 5) are the second most important group of goods, dominated only by machinery, transport equipment and miscellaneous articles (Chapter 9), which increased substantially compared to 1990 (from 26% to 41%).

Ores and metal waste: low share in national, high share in international transport

With a share of 50% in 1999, crude and manufactured minerals and building materials (Chapter 6) dominate national inland waterway transport (see Graph 5.30). The second most important group of goods consists of petroleum products (Chapter 3). Between 1990 and 1999, their share increased from 14 to 16%. Solid minerals fuels (Chapter 2) follow with 9% (1999).

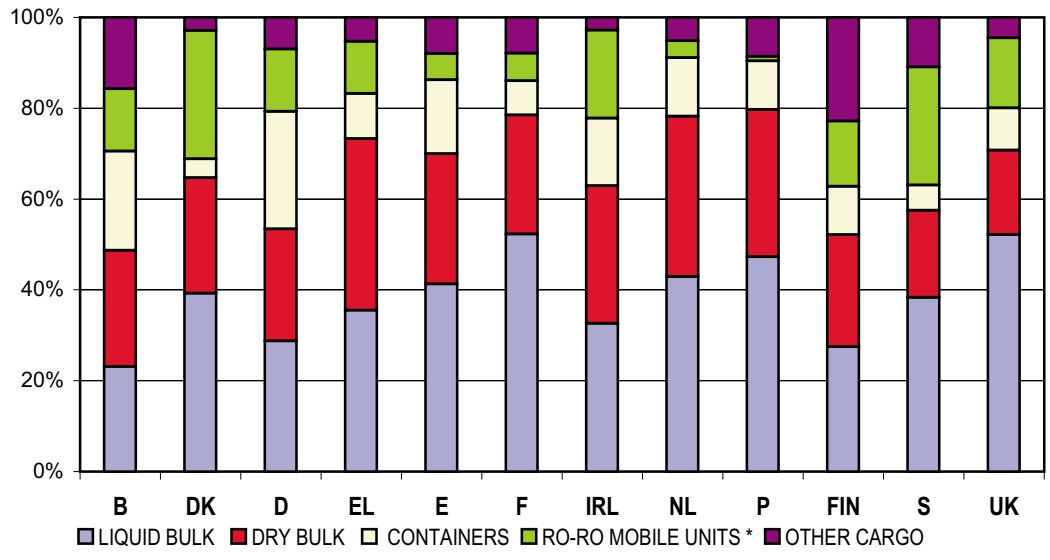
These three NST/R chapters together account for 75% of the entire national transport on inland waterways in 1999.

Chapter 6 takes the highest share in international inland waterways transport as well (see Graph 5.31), but only by a small margin (share: 22% in 1999). Ores and metal waste (Chapter 4), having a very low share in national transport (2%) are of considerable importance in international transport with a share of 19%. The share of petroleum products is, with 17%, the third most important type of goods (almost the same share as in national transport). Overall, there is a more even distribution in the type of goods in international transport than in national transport. Finally, the increase of the share of Chapter 9 in 1999 compared to 1990 is noticeable, both in national and international transport. The remark on the problems in reporting procedures made earlier (road transport) also seems to apply to a certain extent to inland waterway transport.

Machinery, transport material and manufactured articles: relatively light but travelling far

All elements outlined so far were based on volumes carried in tonnes, and did not take into account over what distance these were forwarded. Information given in Graph 5.32, 5.33 and 5.34 compiles datasets for a selection of

Graph 5.35: Maritime transport: share of types of cargo handled (inward and outward) in main ports in 2000 (in % of total cargo handled)



* Ro-Ro mobile units : roll on roll off; either self-propelled or not.
NB: EL: based on data for first 2 quarters of 2000 - FIN: did not report national traffic - I: did not report any data at the time of establishment of this publication.
Source: Eurostat.

countries, which reported international transport data for 1999 both expressed in tonnes and tonne kilometres.

In road transport for instance (Graph 5.32), the share of Chapter 6 reaches 46% when expressed in tonnes, yet only 20% when expressed in tonne kilometres. Hence minerals and building materials remain – weightwise – the dominant type of goods, those goods were however carried over a relatively short distance. The opposite, albeit at a lesser degree, can be said for Chapter 9 and Chapter 1: here, quantities are carried over much longer distances.

The situation for Chapter 9 is similar in rail transport (Graph 5.33): expressed in tonnes, its share is only 17%, whereas it registers nearly the double (32%) when expressed in tonne kilometres. The opposite is true for solid mineral fuels (Chapter 2), where distances covered are obviously lower (weightwise a share of 17% but a weight-over-distance share of only 7%).

In international transport over navigable inland waterways, the general situation is far more balanced. Only goods belonging to Chapter 0 (Agricultural products and live animals) have a noticeable higher share in tkm whereas petroleum products (Chapter 3) and minerals and building materials (Chapter 6) dominate in tonnes and score lower when expressed in tkm.

Ro-Ro: substantial in Denmark and Sweden

In maritime transport, consistent data are available by type of cargo, a more general classification of goods compared to the NST/R goods chapters. The information displayed in Graph 5.35 refers to the share (in%) of the various types based on the total weight of the cargo handled in the main ports of the individual Member States in 2000. 'Main ports' refer to ports handling over 1 million tonnes of cargo annually.

It appears that bulk cargo continues to play a dominant role in all Member States : the share of liquid and dry bulk together ranges from around 50% in Belgium, Germany and Finland to around 80% in Portugal, France and the Netherlands. The handling of containers is important in Germany and Belgium (share of 26% and 22% respectively), but of minor importance in Denmark (4%) or Sweden (6%). For countries featuring major car ferry services, the share of ro-ro (roll on – roll off) mobile units is substantial : 28% in Denmark, 26% in Sweden and 19% in Ireland. For Finland, 'other cargo', which notably includes forestry products, accounted for nearly a quarter of the total, the highest for any country.

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.

Increased mobility demand mainly satisfied by cars

In the past, this demand for mobility has 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 activities 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;
- an increasing number of households where at least two family members work on different locations which is not the place of residence;
- 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.

More than double as 'mobile' as in 1970

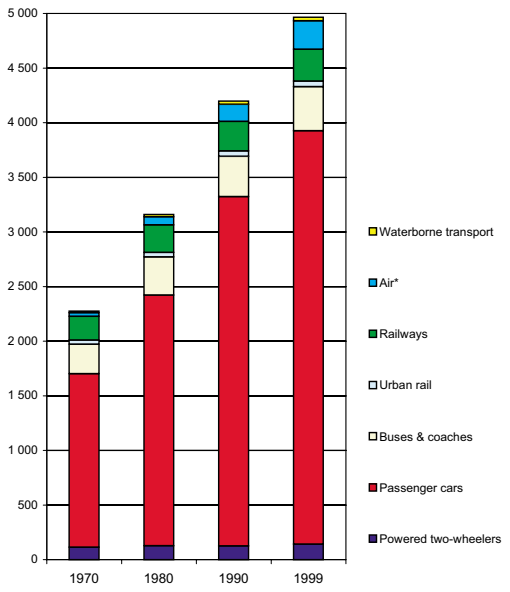
In 1999, transport demand in EU-15 (considering transport in passenger cars, on powered two-wheelers, buses and coaches, subways, trams, trolleys, railways and aeroplanes) could be established at 4 965 billion passenger kilometres (pkm) per year. When considering the equivalent figure of 1970 (2276 billion pkm), the transport demand increased by nearly 120% compared to 1970.

The shares of transport by car, buses and coaches and rail taken together appear to be virtually the same in 1970 (91.2 %) as in 1999 (90.2%).

Air travel progresses most

Disregarding the transport performance of powered two-wheelers and waterborne transport (see Table 5.38 and Graph 5.39), overall passenger transport performance in EU-15 rose by 123% between 1970 and 1999. As could be expected, passenger car transport progressed more than the average (+ 138%) but it is air transport that saw the biggest increase passing from 33 billion pkm in 1970 to 260 billion pkm in 1998 (+ 688%). Air transport data mentioned here refer to international intra-EU and domestic travel only. All transport modes have experienced the most important increase in the 1970 to 1980 period, except for urban rail (trams and metro).

Graph 5.36: EU-15 passenger trips by mode of transport - in million pkm



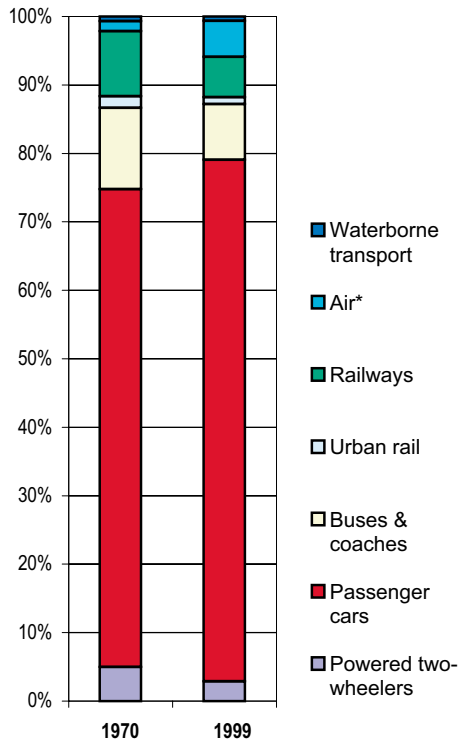
* intra-EU and domestic passengers only.
Source: Eurostat, ECMT, UIC, national statistics, DG TREN studies.

Maritime passenger transport mainly to the account of main ferry connections

The fact that for maritime transport there are currently no passenger kilometre data available (pkm data will be available in the future though) handicaps the comparison with the other transport modes. The data available at Eurostat outline the number of passengers embarked and disembarked in the various ports of the EU.

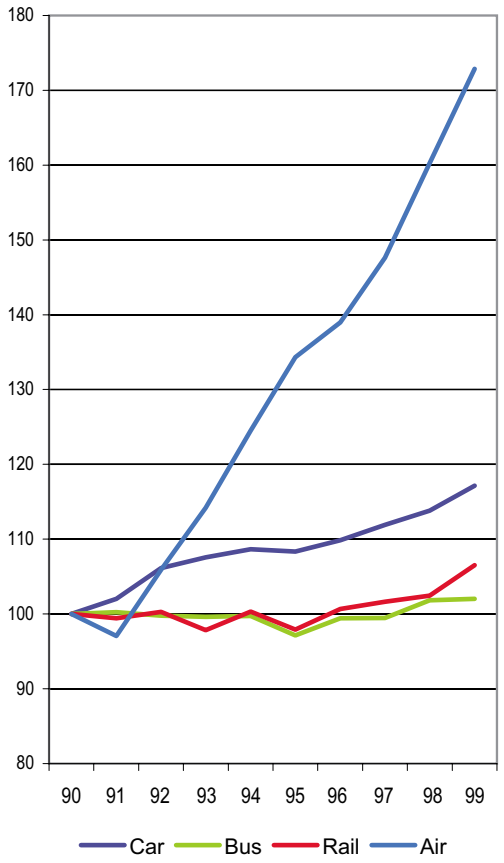
Table 5.40 shows these passenger volumes for the individual Member States. Luxembourg and Austria, with no direct access to the sea are obviously missing in this table. An estimated 345 million passengers passed through EU ports in 2000. This figure should be treated with care: it takes into account passengers that have made national, international intra-EU and international extra-EU journeys. Thus, passengers in national

Graph 5.37: EU-15 passenger trips modal split (%)



* intra-EU and domestic passengers only.
Source: Eurostat, ECMT, UIC, national statistics, DG TREN studies.

Graph 5.39: Evolution of passenger transport in EU-15 (1990=100) - on the basis of tkm performed



Source: DG TREN.

Table 5.38: Passenger transport performance by mode in EU-15

	1 000 million pkm					
	Passenger cars	Buses and coaches	Tram & metro	Railway	Air*	Total
1970	1 588	271	39	217	33	**2 147**
1980	2 294	350	41	253	74	**3 012**
1990	3 196	370	49	270	157	**4 043**
1995	3 500	384	48	268	202	**4 402**
1999	3 784	403	51	292	260	**4 791**
1970-80 (%)	+44.5	+29.2	+4.6	+16.7	+124.2	**+40.3**
1980-90 (%)	+39.3	+5.7	+19.4	+6.8	+112.6	**+34.2**
1990-99 (%)	+18.4	+8.9	+4.9	+8.1	+65.3	**+18.5**
1970-99 (%)	+138.3	+48.7	+31.1	+34.8	+687.9	**+123.1**

* Intra-EU and domestic passengers only.
Sources: ECMT, UIC, UITP, DG TREN studies, national statistics, estimates.

and intra-EU traffic are double counted, once at embarkation and once at disembarkation. Thus the figures in Table 5.40 should be considered from the point of view of the various ports in the Member States: they express the port passenger frequentation or passenger 'throughput' at national level.

Graph 5.41 gives the breakdown of the passenger transport by national, international intra-EU and international extra-EU transport. The large majority of the maritime transport of passengers goes to the account of ferry-services.

Substantial domestic air transport in large Member States

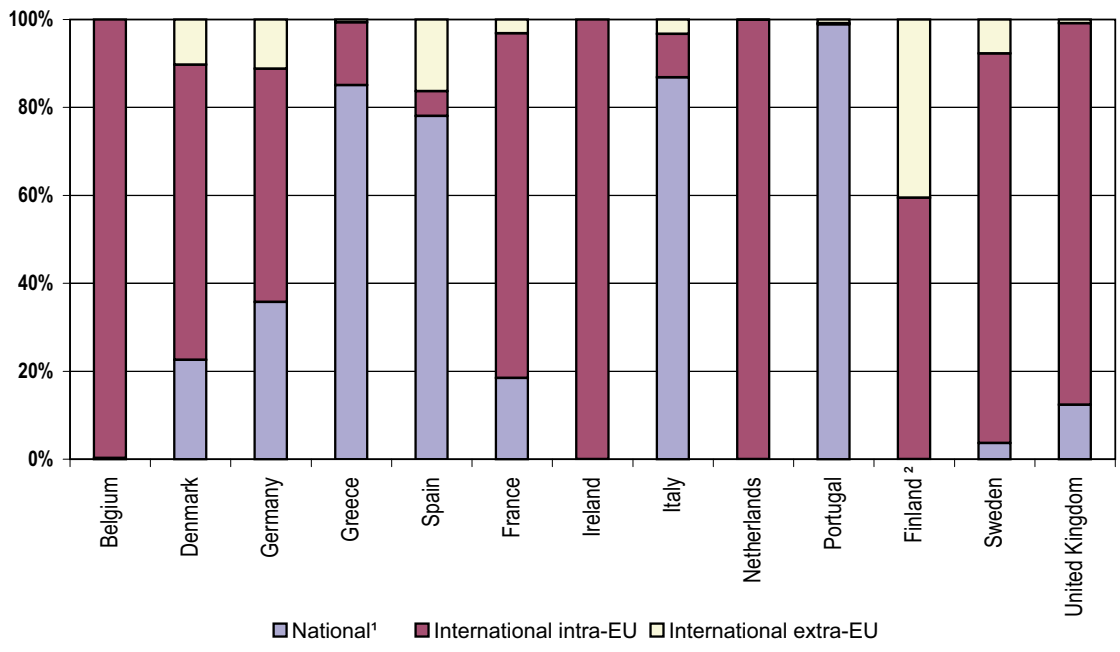
Graph 5.42 offers an insight on the development of total passenger air transport at EU-level between 1993 and 2000 based on the number of passengers carried. It appears that the number of passengers carried on international intra-EU and international extra-EU flights follow the same

Table 5.40: Maritime passenger transport in Member States: number of passengers embarked and disembarked in all ports (in 1000)

	1997	1998	1999	2000
Belgium	1 946	1 696	1 553	1 520
Denmark	75 928	63 448	57 345	51 830
Germany	:	:	:	31 378
Greece	:	:	:	27 867
Spain	13 939	15 349	16 225	17 258
France	33 124	30 825	30 436	27 842
Ireland	4 380	4 682	4 358	4 218
Italy	80 184	80 621	85 439	86 376
Netherlands	1 964	1 840	1 949	2 004
Finland[1]	15 191	15 986	16 146	15 964
Portugal	:	473	472	534
Sweden	40 949	41 749	41 574	36 573
United Kingdom	36 287	36 884	35 813	33 851

(1) National transport not declared.
Source: Eurostat (Maritime database).

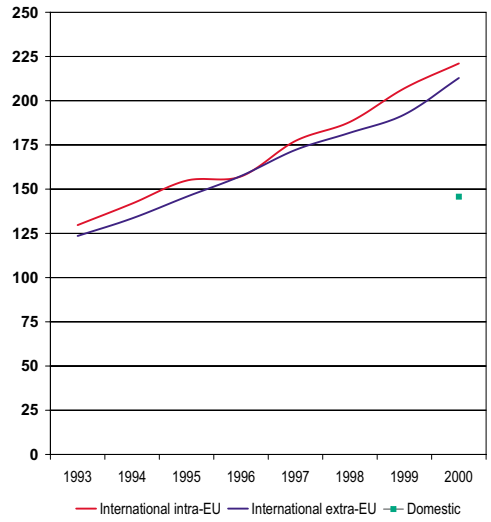
Graph 5.41: Maritime transport: share of national, international intra-EU and international extra-EU passenger transport, 2000



(1) National passengers counted twice (at port of embarkation and disembarkation) - (2) National transport not declared.
Source: Eurostat.

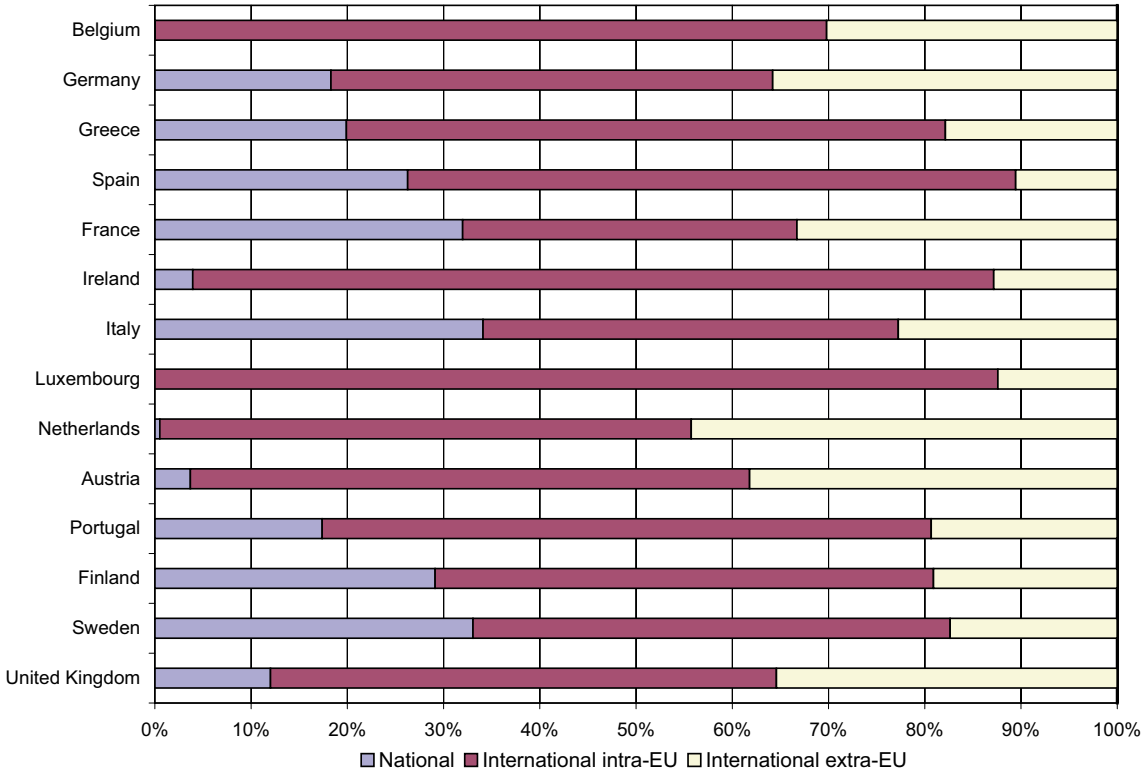
trend and are quite similar in number (2000: 221 million passengers on intra-EU flights, 213 million passengers on extra-EU flights). Please note that data for domestic air transport are only available for 2000 (146 million passengers on domestic flights in the various EU countries). Graph 5.43 details the above-mentioned breakdown by individual Member State for the year 2000. Passengers on domestic flights obviously play a considerable role in geographically large Member States. Conversely, domestic figures are either very low or non-existent for smaller countries like Belgium, the Netherlands or Luxembourg.

Graph 5.42: Evolution of passenger air transport in EU-15, in million passengers



Source: Eurostat.

Graph 5.43: Passenger air transport: distribution between national, international intra-EU and international extra-EU transport, 2000



Note: no data available for Denmark.
Source: Eurostat.

5.2.2. National passenger transport

The statistics on national passenger transport performances 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, except perhaps at a local level like for instance in and around Venice, the following paragraphs offer a first insight on national particularities of the three main motorised inland transport modes (passenger cars, buses and coaches and railways).

Furthermore, it should be noted that the tables indicating the passenger kilometres performed (Tables 5.44 to 5.46) apply to those on the national territory. This thus includes the national lags of international trips.

The second part of this chapter is dedicated to passenger transport by sea and air. Compared to the other transport modes, Eurostat's data collection on maritime and air transport is relatively recent. Passenger kilometre indications for these two modes are not yet available; and the data presented for those modes refer to the number of passengers at arrival and departure.

EU average: 10 000 km per year in a car

At EU-15 level, transport performance by car increased by 138% between 1970 and 1999 (see Table 5.44 – outlining the transport performance on the national territory). As could be expected, transport performances developed particularly fast in Greece, Spain and Portugal, 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 in 1999: In Denmark, France, Italy and Luxembourg passenger car use appears to be the highest with an average performance between 11 500 and 12 500 km per person per year whereas the Greek, with an average of 6 930 km, obviously use their cars for shorter distances. In addition, it should be noted that Greece only offers 275 cars per 1 000 inhabitants (EU-average: 460 — see Chapter 3 — Means of transport).

Danish, Greek and Luxembourg citizens use buses double as much as the average EU

Between 1970 and 1999, the average transport by buses and coaches in EU-15 has been increasing by nearly 50%, arriving at a total of 403 billion pkm (see Table 5.45). Most countries present an increase of this mode, especially in the period 1970–90, with the exception of the United Kingdom, where a significant drop was registered. Some countries saw a sharp increase like Italy (+ 182% between 1970 and 1999) and Portugal (+ 164%).

With 90.2 billion pkm in 1999, Italy offers the highest figure in the EU in absolute terms — this corresponds to 4.3 km per person per day. It is however the Danish, Luxembourg and Greek population that travels more on bus and coach

Table 5.44: Transport performed by passenger cars (1 000 million pkm)

	1970	1980	1990	1995	1996	1997	1998	1999	1999 pkm per person per year
Belgium	49.3	65.4	80.7	91.2	92.4	94.0	95.7	98.4	9 620
Denmark	33.3	38.1	47.8	54.3	55.8	57.1	58.5	66.5	12 496
Germany	394.6	513.7	683.1	730.5	730.8	735.3	740.3	749.5	9 129
Greece	8.6	27.6	48.8	58.8	61.7	64.4	68.0	73.0	6 930
Spain	*77.2*	*172.2*	225.0	262.0	272.0	283.0	296.0	325.2	8 250
France	304.7	452.5	585.6	640.1	649.1	659.5	678.6	699.6	11 838
Ireland	*11.0*	*17.6*	*18.1*	*23.2*	*25.1*	*27.1*	*28.5*	*31.0*	8 254
Italy	211.9	324.0	522.6	614.7	627.4	638.8	643.6	661.4	11 467
Luxembourg	*2.1*	*2.7*	*4.0*	*4.7*	*4.8*	*4.9*	*5.0*	*5.0*	11 562
Netherlands	66.3	107.1	62.4	68.1	65.7	67.0	68.5	*69.0*	8 526
Portugal	13.8	29.0	40.5	*62.0*	*66.3*	70.8	75.6	81.6	8 169
Finland	23.7	33.9	51.2	50.1	50.4	51.9	53.3	54.9	10 628
Sweden	55.4	66.7	90.0	85.0	83.0	83.0	84.0	84.2	9 506
United Kingdom	303.5	396.0	600.2	609.0	619.1	627.5	630.0	633.0	10 647
EU-15	**1 588**	**2 294**	**3 196**	**3 500**	**3 550**	**3 616**	**3 676**	**3 784**	**10 066**
index 1970 = 100	**100**	**144**	**201**	**220**	**223**	**228**	**231**	**238**	
Modal share % (1)	**74.0**	**76.2**	**79.1**	**79.5**	**79.3**	**79.3**	**79.1**	**79.0**	

(1) Considered: passenger cars; buses and coaches; tram, metro and rail; air.
Sources: ECMT, national statistics, DG Energy and Transport studies and estimates (in italic).

with 5.8, 5.7 and 5.6 km per day respectively. The high figure for Greece can partly be explained by a restricted rail network. The Danish figure constitutes the double of the EU average (2.9 km).

Slow growth of rail transport

Compared to the other modes, transport performances of rail (on national territory) experienced only a modest increase: + 35% at EU level between 1970 and 1999 (see Table 5.46). Since the early 1990s, growth has been slow in most countries and a certain decrease can be observed in Greece, Italy, Austria and Portugal.

Compared to 1970 however, the number of passenger kilometres by rail progressed in all the Member States with the exception of Belgium, presenting a 6% decrease. Highest growth was achieved in Ireland and the Netherlands (around + 85% for both countries). All the Scandinavian countries as well as France display an increase between 50 and 60%.

It is on average the French who travel most by rail (3.1 km per person per day) in 1999, followed by the Danish (2.8 km) and Austrians (2.7 km). The EU-15 average in 1999 can be established at 2.1 km per person per day, the same average distance as the previous year.

Longest daily distance for Danish and Luxembourg citizens

Graph 5.47 presents the average daily distances travelled in 1999 using the three landborne transport modes. It should be noted that the use of tram and metro has not been considered. Furthermore, the 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, the graph intends to give an impression on the availability and acceptance of the different modal networks.

With an average of 42.8 km per person per day in 1999, the Danes are by far the most mobile in the EU (considering distances travelled in passenger cars, trains and buses/coaches only, excluding cycling and walking). Luxembourg follows with 39.3 km. The population in Greece and Portugal travels least with an average of 25.0 and 26.7 km respectively.The share of rail in Greece is low and can partly be explained by a relatively poor rail network density (Greece: 17.4 km/1 000 km^2, EU-15 average: 47.2 km/ 1 000 km^2 — see Chapter 2.2 — Physical characteristics of transport networks).

Remote islands boost the number of passengers on domestic flights

As mentioned at the first paragraph of this chapter, Eurostat's aviation data collection is relatively recent (since 1993) and does not yet include passenger kilometre (pkm) data. Furthermore, the reference year 2000 is the first year where a near complete set of detailed data on domestic traffic is available.

The total number of passengers carried in domestic air traffic in the various EU countries in 2000 can be estimated at close to 150 million. Table 5.48 indicates that large Member States

Table 5.45: Transport performed by buses and coaches (1000 million pkm)

	1970	1980	1990	1995	1996	1997	1998	1999	1999 pkm per person per year
Belgium	9.3	9.1	10.9	*12.5*	*11.4*	*11.9*	*12.0*	*12.2*	1 193
Denmark	4.6	7.3	9.3	10.6	11.4	11.2	11.1	11.2	2 105
Germany	67.7	90.0	73.1	68.5	68.3	68.0	68.2	68.0	828
Greece	9.4	15.6	17.7	20.2	20.4	20.7	21.2	21.5	2 041
Spain	20.9	28.1	33.4	39.6	44.0	44.0	49.4	50.0	1 268
France	25.2	38.0	41.3	41.6	42.4	42.0	42.7	40.7	689
Ireland	3.3	4.5	3.9	5.2	5.3	5.5	*5.7*	*5.9*	1 571
Italy	32.0	57.8	84.0	87.1	88.7	88.5	90.9	90.2	1 563
Luxembourg	*0.8*	*0.8*	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*	2 081
Netherlands	11.1	13.2	13.0	14.8	15.0	14.7	15.0	15.1	955
Austria	9.1	9.8	8.7	10.5	12.5	*12.5*	*12.7*	*12.9*	1 594
Portugal	4.4	7.6	10.3	11.3	11.1	11.6	11.6	11.5	1 149
Finland	7.0	8.5	8.5	8.0	8.0	8.0	7.8	7.6	1 471
Sweden	5.5	7.3	9.0	8.8	9.3	9.4	10.3	10.6	1 197
United Kingdom	60.2	52.2	46.2	44.3	44.2	44.2	43.0	45.0	757
EU-15	**270.5**	**349.8**	**370.0**	**383.9**	**392.9**	**393.1**	**402.5**	**403.3**	**1 073**
index 1970 = 100	**100**	**129**	**137**	**142**	**145**	**145**	**149**	**149**	
Modal share % (1)	**12.6**	**11.6**	**9.2**	**8.7**	**8.8**	**8.6**	**8.7**	**8.4**	

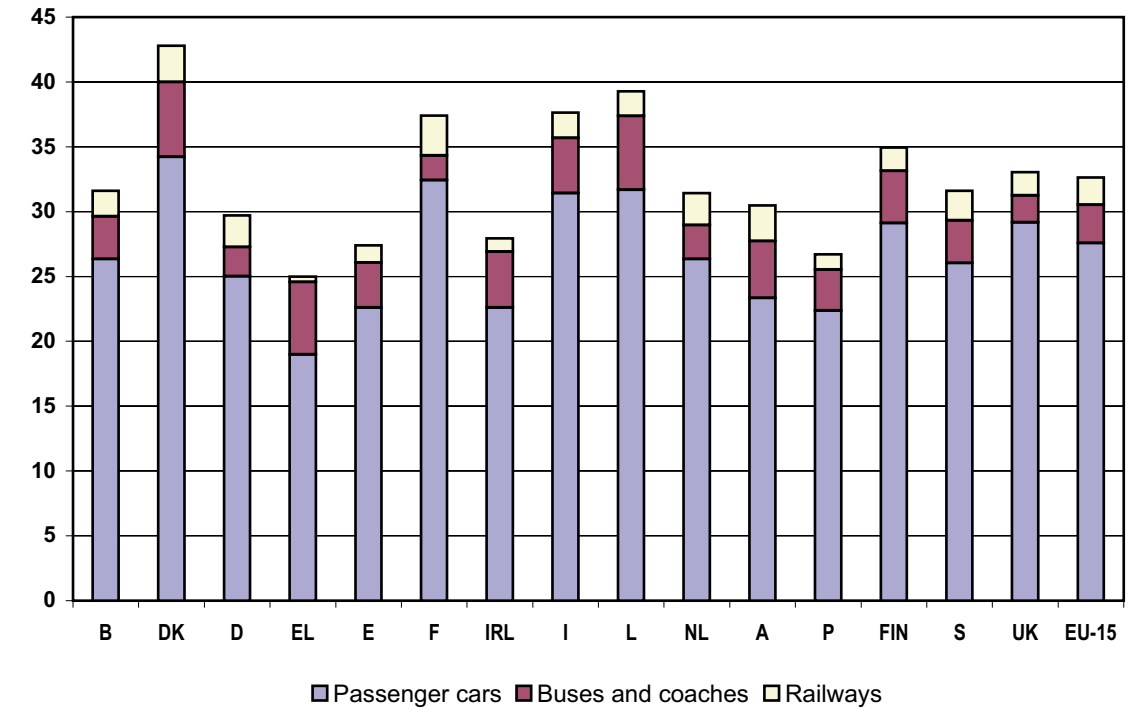
(1) Considered: passenger cars; buses and coaches; tram, metro and rail; air.
Sources: ECMT, Eurostat, national statistics, estimates (italic).

Table 5.46: Transport performed by railways (1 000 million pkm)

	1970	1980	1990	1995	1996	1997	1998	1999	1999 pkm per person per year
Belgium	7.6	7.0	6.5	6.8	6.8	7.0	7.1	7.4	724
Denmark	3.6	4.5	5.1	5.0	4.9	5.2	5.6	5.4	1 015
Germany	56.9	63.0	62.1	69.0	69.2	67.9	66.5	72.8	887
Greece	1.5	1.5	2.0	1.6	1.8	1.9	1.8	1.6	152
Spain	15.0	14.8	16.7	16.6	16.6	17.9	18.9	19.2	487
France	41.0	54.7	63.8	55.6	59.8	61.8	64.3	66.5	1 125
Ireland	0.8	1.0	1.2	1.3	1.3	1.4	1.4	1.4	373
Italy	34.9	42.9	44.7	43.9	44.8	43.6	41.5	41.0	711
Luxembourg	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	694
Netherlands	8.0	8.9	11.1	14.0	14.1	14.4	14.8	14.3	904
Austria	6.4	7.6	8.7	9.8	9.9	8.3	8.2	8.1	1 001
Portugal	3.5	6.1	5.7	4.8	4.5	4.6	4.6	4.3	430
Finland	2.2	3.2	3.3	3.2	3.3	3.4	3.4	3.4	658
Sweden	4.6	7.0	6.0	6.4	6.4	6.4	7.1	7.4	835
United Kingdom	30.6	30.4	33.4	30.2	32.3	34.5	35.4	38.8	653
EU-15	**216.7**	**252.8**	**270.5**	**268.3**	**275.9**	**278.6**	**280.9**	**291.9**	**776**
index 1970 = 100	**100**	**117**	**125**	**124**	**127**	**129**	**130**	**135**	
Modal share % (1)	**10.1**	**8.4**	**6.7**	**6.1**	**6.2**	**6.1**	**6.0**	**6.1**	

(1) Considered: passenger cars; buses and coaches; tram, metro and rail; air.
Sources: UIC and national statistics.

Graph 5.47: Average daily distance travelled per person in 1999 (km)



Source: DG Energy and Transport.

(France, Spain, Italy, Germany and the United Kingdom) obviously account for the highest passenger volumes. Smaller Member States like the Netherlands and Belgium display very low passenger figures or none at all (Luxembourg). It should be noted that certain countries feature islands or island groups that are at considerable distance from the mainland, such as the Canary Islands (Spain) or Madeira and the Açores (Portugal). Also, domestic air passenger transport declared by France includes the traffic with the overseas territories (Réunion, French Guyana, Guadeloupe and Martinique). The relatively high passenger figure for Greece can be explained by the impressive amount of islands offering air connections with the mainland.

Keeping in mind the very different passenger volumes forwarded in domestic air transport, Table 5.49 shows the five most important individual airports handling air passengers on domestic flights. One exception applies to France where authorities have declared for the Paris airport system (composed of Charles-de-Gaulle, Orly and Le Bourget airports). The airports of the respective capitals always take the highest individual share in domestic air transport (except Germany, where Frankfurt-Main comes first) although substantial differences are registered: 59% of all domestic air passengers in Ireland have passed through Dublin airport, but only 19% of United Kingdom domestic passengers used London/Heathrow.

Italian mainland – Sicily is by far the most important national ferry-route

The characteristics of national maritime transport of passengers in the individual Member States appear to be quite heterogeneous. Based on relatively recent EU reporting requirements, a near full set of data on national passenger transport (only Finland did not report national transport) is available for 2000. As outlined in the previous chapter (Graph 5.41) and presented in the second column of Table 5.50, the share of national transport can be substantial: this is notably the case for Greece, Spain, Italy and especially Portugal. As for air transport, the geographical characteristics (islands) often explain the high volumes. The numerous islands of Greece and Denmark, the Baleares and Canary Islands for Spain and the Madeira and Açores archipelago for Portugal explain the relatively high passenger figures. One figure however excels: Italy registered close to 40 million passengers in its ports. A couple of important ferry services are responsible for this impressive number, notably the link Reggio Calabria – Messina (linking the Italian mainland and Sicily) and the ports of Napoli and Capri, also offering frequent connections, mainly during the holiday season. The majority of the 7 million persons registered in German ports were counted in the small port of Norddeich (German North-Sea coast), mainly heading for the island of Norderney, a popular holiday resort.

Table 5.48: Development of domestic air passenger transport 1995-2000 (in 1000 passengers)

	1995	1996	1997	1998	1999	2000
Belgium	1.1	1.1	0.6	2.9	4.0	7.9
Denmark	2 641.1	2 806.4	2 703.8	:	:	:
Germany	17 832.2	17 598.4	18 737.5	19 875.5	20 288.7	22 075.8
Greece	:	:	:	4 390.4	5 165.8	6 111.0
Spain	:	:	:	:	25 148.2	28 884.2
France	:	:	26 592.0	28 517.0	30 413.2	30 813.5
Ireland	439.5	469.3	447.4	:	552.6	656.4
Italy	15 428.4	17 095.2	19 770.7	:	20 601.0	22 935.0
Luxembourg	0	0	0	0	0	0
Netherlands	157.5	185.9	198.7	204.6	180.0	210.9
Austria	384.8	411.7	428.6	475.4	501.4	545.3
Portugal	1 708.9	1 761.8	1 873.8	2 108.4	2 565.3	2 821.4
Finland	:	:	:	2 993.0	2 855.0	3 121.9
Sweden	6 875.7	6 604.4	6 819.6	7 260.6	7 695.8	8 043.0
United Kingdom	14 100.0	15 300.0	16 000.0	16 800.0	17 500.0	19 500.9

Source: Eurostat, national statistics (UK 1995-1999).

Table 5.49: Top 5 airports in domestic air transport, 2000

Country	Airport	Number of passengers (in 1 000)	Share in domestic transport
Belgium[1]	Bruxelles/National	7.9	100%
Germany	Frankfurt-Main	8 681.4	20.2%
	München	8 268.6	19.2%
	Berlin/Tegel	5 972.4	13.9%
	Hamburg	4 270.7	9.9%
	Düsseldorf	3 916.8	9.1%
Greece	Athens	5 087.0	43.7%
	Thessaloniki	1 523.6	13.1%
	Iraklion	989.1	8.5%
	Rhodos	720.5	6.2%
	Chania	515.1	4.4%
Spain	Madrid/Barajas	16 621.8	28.8%
	Barcelona	10 094.0	17.5%
	Palma de Mallorca	4 803.1	8.3%
	Las Palmas	2 891.8	5.0%
	Tenerife - Norte	2 359.5	4.1%
France	Airport System Paris	24 420.2	41.7%
	Nice	4 848.0	8.3%
	Marseille	4 328.5	7.4%
	Toulouse	3 800.1	6.5%
	Lyon/Satolas	2 664.9	4.6%
Ireland	Dublin	660.0	59.4%
	Cork	287.3	25.8%
	Shannon	164.4	14.8%
Italy	Roma/Fiumicino	12 552.8	27.5%
	Milano/Malpensa	5 536.6	12.1%
	Milano/Linate	4 189.4	9.2%
	Catania	3 122.6	6.8%
	Palermo	2 716.6	6.0%
Netherlands	Amsterdam	170.5	44.0%
	Maastricht	110.2	28.4%
	Eindhoven	79.0	20.4%
	Groningen	25.9	6.7%
	Rotterdam	2.2	0.6%
Austria	Wien/Schwechat	505.6	46.6%
	Innsbruck	168.0	15.5%
	Graz	139.1	12.8%
	Klagenfurt	120.1	11.1%
	Linz	76.2	7.0%
Portugal	Lisboa	2 173.2	52.0%
	Porto	780.7	18.7%
	Ponta Delgada	570.3	13.6%
	Faro	264.8	6.3%
	Horta	160.9	3.9%
Finland	Helsinki	3 043.8	48.8%
	Oulu	668.9	10.7%
	Rovaniemi	288.4	4.6%
	Kuopio	279.5	4.5%
	Vaasa	227.4	3.6%
Sweden	Stockholm/Arlanda	6 758.2	44.3%
	Göteborg	1 395.1	9.1%
	Malmö	1 308.7	8.6%
	Stockholm/Bromma	987.0	6.5%
	Luleå	927.0	6.1%
United Kingdom	London/Heathrow	7 403.3	19.1%
	Edinburgh	3 865.3	10.0%
	Glasgow	3 443.3	8.9%
	London/Gatwick	2 911.7	7.5%
	Manchester	2 859.7	7.4%

(1) Belgium reported for Brussels only.
Source : Eurostat.

Table 5.50: Maritime transport: passengers registered in the main ports in national traffic, 2000

	Passengers carried (1000)	Share in total traffic (%)
Belgium	4	0
Denmark	9 140	23
Germany	7 034	36
Greece	12 150	85
Spain	12 994	75
France	4 851	18
Ireland	0	0
Italy	39 896	87
Netherlands	0	0
Portugal	354	99
Finland	:	:
Sweden	1 302	4
United Kingdom	4 043	12

Source: Eurostat.

5.2.3. International passenger transport

Unlike the international transport of goods, data availability on international transport of passengers is not completely covered by various EU legal acts on the statistical returns from the transport sector. This is notably the case for road, inland waterway and rail transport. International transport by inland waterways is anyhow very limited. The previous chapter offered an overview of the amount of passenger kilometres of passenger cars, buses and coaches as well as railways performed on the national territory. It is recalled that these figures include the national lags of international journeys.

Data availability poorer for passenger transport

For statistical returns from the maritime and air transport domain however – covered by relatively recent legal acts – detailed data on passenger transport are available. Subsequently, this chapter will focus on those two transport domains. Data can not yet be expressed in the shape of passenger kilometres performed (which usually offers a good impression of quantity and distance covered) but rather on the basis of the number of passengers carried. Detailed information on the various transport links offer nevertheless quite a good overview of the situation in these sectors.

Double counting for intra-EU transport

For maritime transport, figures will focus on results for the reference year 2000, due to the fact that various derogations in statistical reporting were still applicable for previous years.

It is estimated that close to 160 million passengers have passed through port installations in the EU. Table 5.51 outlines that the numbers in international intra-EU are far higher than those registered in international extra-EU transport. There are basically two reasons for this : double counting in intra-EU transport applies since passengers are counted once by the port authority upon embarkation and another time (by another EU Member State) upon disembarkation. This double counting is avoided in extra-EU transport where EU port authorities register passengers only once (either embarking or disembarking – and referring to different journeys). The second reason is the fact that a very high share of the passengers is registered on the main European ferry routes, which are nearly all intra-EU connections.

Keeping this in mind, it appears that for total transport, Swedish and Danish ports registered the highest number of passengers (well over 30 million) closely followed by the United Kingdom with over 28 million.

By merely looking at the difference in passenger numbers in intra- and extra-EU passenger numbers a rough pattern can be identified. The high intra-EU passenger numbers for Sweden and Denmark for instance go to the account of the various important ferry links (for Denmark these are mainly those with Sweden and Germany, for Sweden those with Denmark, Germany and Finland). The high figures for the United Kingdom and France suggest the intensive (intra-EU) cross-channel traffic.

Table 5.51: International maritime passenger traffic 2000: passengers counted in ports - by country

	International intra-EU transport - Number of passengers (1000)	International extra-EU transport - Number of passengers (1000)	Total international transport - Number of passengers (1000)
Belgium	1 515	0	1 515
Denmark	27 113	4 143	31 256
Germany	10 429	2 202	12 631
Greece	2 040	93	2 133
Spain	333	958	1 291
France	20 627	826	21 453
Ireland	2 797	:	2 797
Italy	4 530	1 509	6 039
Luxembourg	0	0	0
Netherlands	2 002	1	2 003
Austria	0	0	0
Portugal	1	3	4
Finland	9 347	6 375	15 722
Sweden	31 259	2 719	33 978
United Kingdom	28 319	287	28 606

Source: Eurostat.

Port-to/from-Maritime Coastal Area suggest main ferry links

This pattern can be confirmed by looking at the information displayed in Table 5.52, which details the top-20 routes in international maritime passenger transport (both intra- and extra-EU transport). Unlike air transport, detailed information on port-to-port transport cannot be disclosed. Thus, Table 5.52 outlines port-to/from-MCA (Maritime Coastal Area) information. The cross-Channel passenger transport can be found in the two first positions as well as position 10 and the traffic across the Øresund between Denmark and Sweden mainly in positions 3, 4, 12 and 13.

Within the top-20, only two port-to/from-MCA relations refer to extra-EU passenger transport : the relatively short distance between Helsinki and Estonia (rank 6) and Hirtshals (in the very north of Denmark) – Norway relation.

Air transport at EU level: +8% per year since 1993

It has already been outlined in Chapter 5.2.1 (*Passenger transport – General development)* that air transport has been growing extremely fast over the last decades. Detailed data on the development of air transport in the various EU Member States are available at Eurostat since 1993.

Air transport at EU level (both intra- and extra-EU) has been growing at an average pace of 8% every year since 1993 (see Table 5.53). Growth in 2000 compared to the previous year could be established at 8.7%. Growth in Sweden and Ireland has been particularly strong in the 1993-2000 period, registering an average annual growth rate of 17.7% and 16.3% respectively. But even the country with the slowest average growth (Greece) still displays + 5.1%. Short-term growth was highest in Italy, where an increase of 13.7% was recorded in 2000 compared to 1999.

Table 5.53: Total international air passenger transport: development by country

	Change 1999-2000 (%)	Average annual growth 1993-2000 (%)
EU-15	**+ 8.68**	**+ 8.00**
Belgium	+ 7.94	+11.57
Denmark	:	:
Germany	+ 7.26	+ 6.98
Greece	+ 9.70	+ 5.14
Spain	+ 6.44	+ 8.76
France	+ 8.69	+ 7.04
Ireland	+ 9.17	+ 16.34
Italy	+ 13.67	+ 9.37
Luxembourg	+ 5.18	+ 6.69
Netherlands	+ 8.43	+ 9.91
Austria	+ 7.11	+ 7.62
Portugal	+ 8.09	+ 7.26
Finland	+ 9.48	:
Sweden	+ 7.17	+ 17.67
United Kingdom	+ 6.99	+ 7.45

Source: Eurostat.

Highest extra-EU shares for countries with long-haul 'gateways'

Taking into account departures and arrivals, the share of intra-EU transport is high in most countries: in general over 60% except for Germany, France, the Netherlands and the UK (see Graph 5.54). The countries displaying the highest extra-EU shares coincide with those having Europe's major airports considered as gateways for inter-continental and long-haul air traffic, like the Paris airports, Amsterdam-Schiphol, Frankfurt/Main and the London airports.

Table 5.52: Top 20 routes in international maritime passenger transport, 2000 (1000 passengers)

	Between: Port	and: Maritime Coastal Area	Inwards	Out-wards	Total
1	Calais/F	United Kingdom	7 579	7 473	15 052
2	Dover/UK	France: Atlantic and North Sea	7 466	7 584	15 050
3	Helsingborg/S	Denmark	6 740	6 717	13 457
4	Helsingør/DK	Sweden: Baltic	6 659	6 663	13 322
5	Stockholm/S	Finland	3 615	3 622	7 237
6	Helsinki/FIN	Estonia	3 117	3 110	6 227
7	Rødby/DK	Germany: Baltic	2 764	2 666	5 430
8	Puttgarden/D	Denmark	2 666	2 764	5 430
9	Turku/FIN	Sweden: Baltic	1 762	1 752	3 514
10	Portsmouth/UK	France: Atlantic and North Sea	1 482	1 496	2 977
11	Helsinki/FIN	Sweden: Baltic	1 354	1 337	2 691
12	København/DK	Sweden: Baltic	1 326	1 328	2 654
13	Malmö/S	Denmark	1 294	1 270	2 564
14	Holyhead/UK	Ireland	1 273	1 245	2 518
15	Frederikshavn/DK	Sweden: North Sea	1 153	1 156	2 309
16	Göteborg/S	Denmark	1 156	1 153	2 309
17	Mariehamn/FIN	Sweden: Baltic	946	939	1 884
18	Hirtshals/DK	Norway	943	911	1 855
19	Rotterdam/NL	United Kingdom	816	817	1 632
20	Trelleborg/S	Germany: Baltic	730	747	1 477

Source: Eurostat.

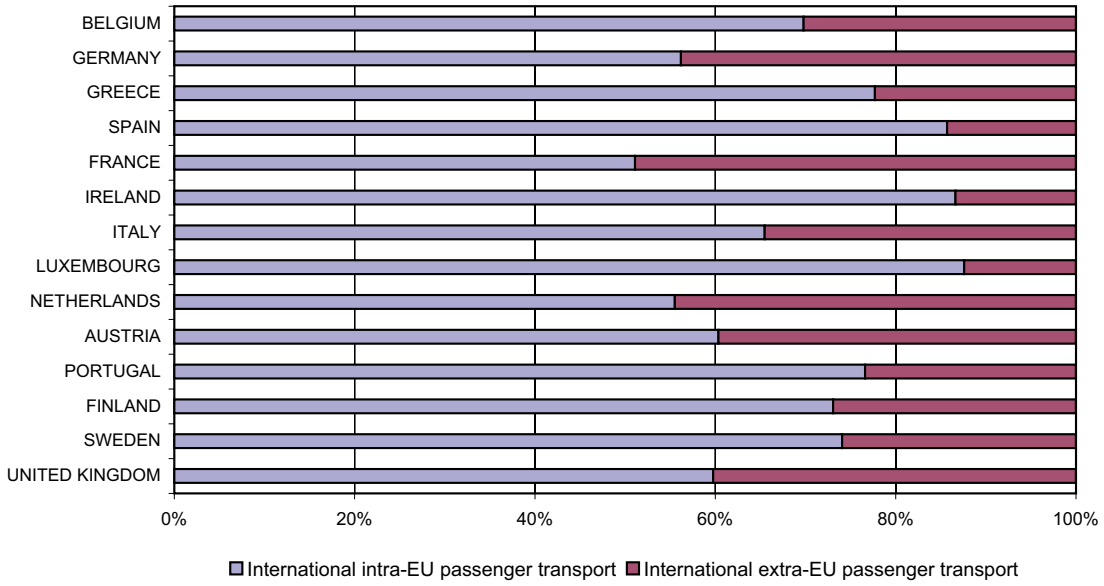
Graph 5.55 visualises the overall growth of international air transport and in the meantime gives an impression of the structure of the main relations. About half (51.7%) of the international passengers registered on the airports of the European Union are travelling on intra-EU flights. Amongst the passengers on extra-EU flights, relations with other European countries than those of the EU (15.8% of the total) as well as North America (13%) dominate.

The shares of the individual countries in the total extra-EU passenger transport vary considerably. The first row of Table 5.56 expresses the total share of the Member States in extra-EU passenger figures. With 27.6%, the UK leads by a substantial margin, followed by Germany and France with 20.9% and 15.5% respectively.

Germany first in traffic with non-EU Europe, France with Africa

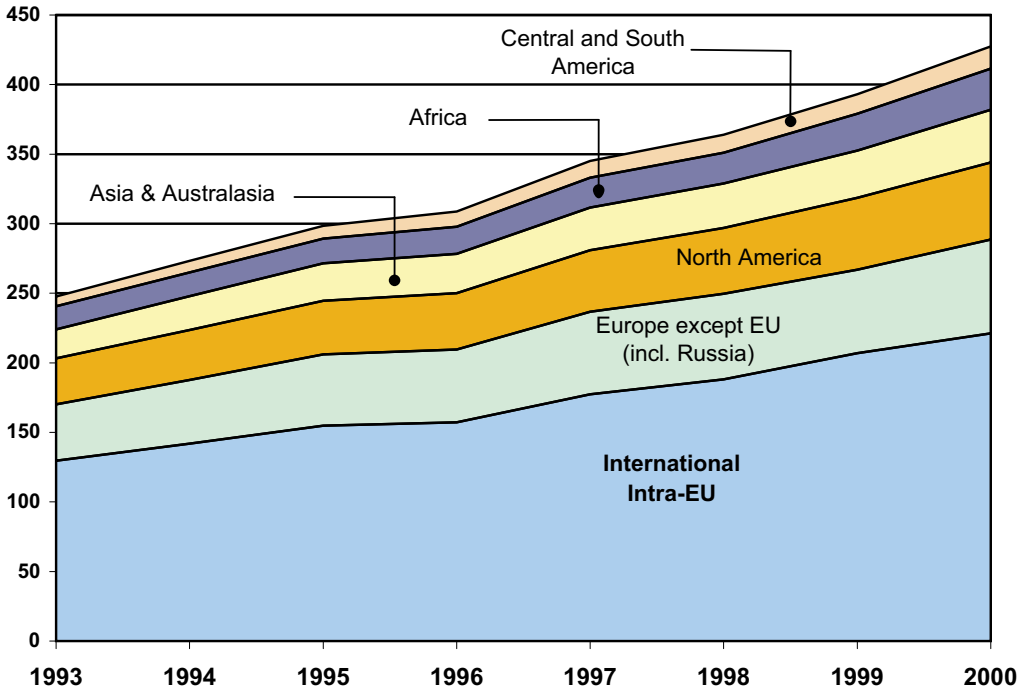
Germany leads in traffic to non-EU European countries with 27.1% of the passenger carried, well in front of the United Kingdom with 20.7%. Instead, the UK has still a clear dominance in traffic with America (36%) although the share slightly dropped compared to 1999 (37.7%). The UK is followed by Germany, France and the Netherlands. The latter three countries together still handle fewer passengers with America as the United Kingdom alone.

Graph 5.54: Distribution between international intra-EU and extra-EU passenger transport by air in 2000



No data available for Denmark.
Source: Eurostat.

Graph 5.55: Development of international passenger air transport by world region between 1993 and 2000 (million passengers)



Source: Eurostat.

The same ranking prevails for traffic with Asia and Australasia, although a slight decline for the United Kingdom can be observed here as well (from 34.7% in 1999 to 33.7% in 2000).

As in previous years, France holds the first position in traffic with Africa. It should however be said that the high share of 34.4% is mainly due to important traffic with North African destinations. If North Africa would be considered separately, the French share would be even higher. Germany comes second with 17.9% followed by the United Kingdom (15%) and Italy (12%).

Strong weight of North Africa

Graph 5.57 turns back to extra-EU transport at the level of the entire EU, with however a more detailed view on 'world destinations'. The main share in extra-EU air transport in 1999 is taken by non-EU European countries (29.1% - European Republics of the ex-USSR not considered) closely followed by North America (26.1%).

The African continent accounts for 13.9% of extra-EU traffic; however, North Africa alone (with popular holiday destinations in Morocco and Tunisia) is responsible for 9.2% of this share. Far-East destinations account for 8.8%, the Near and Middle East for nearly 5.7% of the traffic. All other destinations have a share of well under 5%.

London/Heathrow the busiest, both in intra- and extra-EU passenger volumes

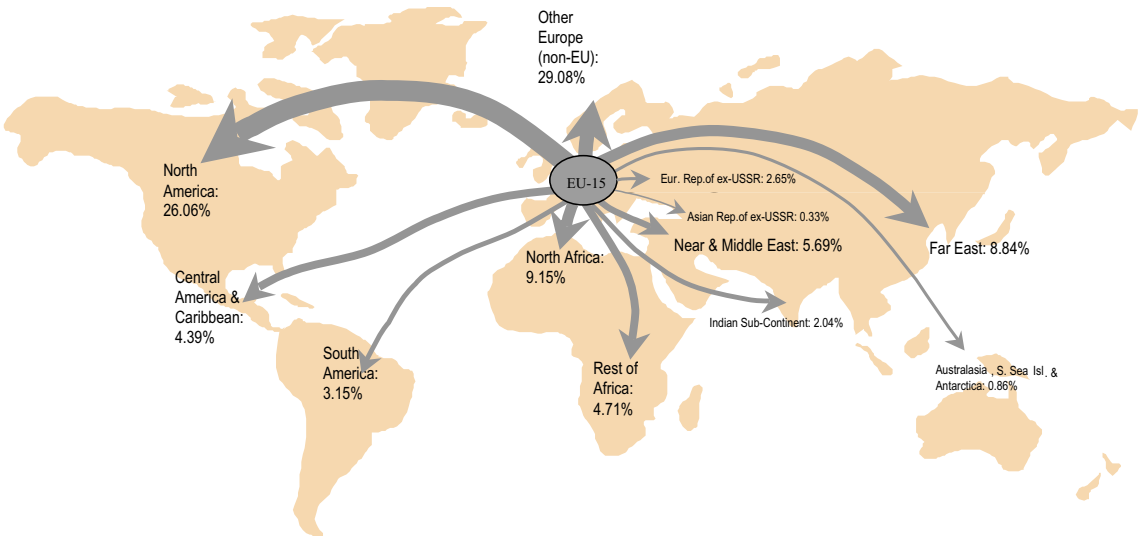
Considering either international intra-EU or international extra-EU passenger transport, the airport of London/Heathrow remains by far the busiest airport.

Table 5.56: Extra-EU passenger air transport to world regions in 2000 : shares of individual Member States (%)

	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK	EU-15
Total	3.1	:	20.9	2.7	5.6	15.5	1.0	7.4	0.1	8.7	2.7	1.5	1.0	2.0	27.6	100
Europe except EU	3.5	:	27.1	5.1	7.5	9.2	0.6	5.8	0.2	7.4	5.2	1.2	2.0	4.4	20.7	100
America	2.7	:	16.5	0.7	7.0	13.9	2.3	6.7	0.0	9.8	0.6	2.5	0.3	0.9	36.0	100
Asia & Australasia	1,3	:	20,7	3,2	1,4	15,2	0,0	7,9	0,0	11,3	3,0	0,0	1,0	1,2	33,7	100
Africa	5.7	:	17.9	0.9	3.5	34.4	0.3	12.0	0.2	5.5	1.9	1.6	0.3	0.7	15.0	100

NB: No data available for Denmark.
Source: Eurostat.

Graph 5.57: Extra-EU passenger air transport 2000: share in world destinations (% of total extra-EU passenger transport)



Source: Eurostat.

Table 5.58: Top-15 airports - Total passengers carried in international intra-EU transport

Rank 2000	Airport	Total pass. carried 2000	Change 1999-2000 (%)	Rank 1999
1	London/Heathrow	24 373 689	+ 1.1	1
2	Airport system/Paris	22 831 619	+ 8.2	2
3	Amsterdam/Schiphol	21 293 303	+ 6.5	3
4	Frankfurt (Main)	16 772 699	+ 6.3	4
5	Brussels/National	15 065 947	+ 5.9	6
6	London/Gatwick	14 913 451	+ 3.7	5
7	Palma de Mallorca	13 738 940	- 0.8	7
8	Dublin	11 593 568	+ 7.2	9
9	Manchester Internat.	10 739 443	+ 4.3	10
10	Madrid/Barajas	9 802 490	+ 19.9	12
11	London/Stansted	9 629 910	+ 33.5	15
12	Munich	9 158 719	+ 6.1	11
13	Stockholm/Arlanda	8 338 570	+ 5.1	14
14	Milano/Malpensa	7 980 770	+ 34.9	22
15	Düsseldorf	7 835 741	- 4.0	13

NB: No data available for Denmark.
Source: Eurostat.

Table 5.59: Top-15 airports - passengers carried in extra-EU transport

Rank 2000	Airport	Total pass. carried 2000	Change 1999-2000 (%)	Rank 1999
1	London/Heathrow	32 511 682	+ 5.8	1
2	Airport system/Paris	26 246 505	+ 13.4	2
3	Frankfurt (Main)	23 509 108	+ 10.2	3
4	Amsterdam/Schiphol	17 805 743	+ 9.5	4
5	London/Gatwick	14 126 816	+ 6.7	5
6	Milano/Malpensa	7 033 394	+ 22	8
7	Brussels/National	6 521 014	+ 13.1	7
8	Madrid/Barajas	6 288 351	+ 8.2	6
9	Rome/Fiumicino	5 813 931	+ 13.4	10
10	Munich	5 441 639	+ 13.8	11
11	Vienna/Schwechat	4 857 120	+ 11.3	13
12	Manchester/Intern.	4 720 259	+ 6.7	12
13	Düsseldorf	4 158 033	+ 7.3	14
14	Stockholm/Arlanda	3 506 174	+ 8.8	15
15	Athens	3 375 802	+ 29.2	16

NB: No data available for Denmark.
Source: Eurostat.

Table 5.58 displays the 15 busiest airports in intra-EU passenger transport in 2000. The ranking is based on the total number of passengers at arrival and departure within the EU, both in scheduled and non-scheduled traffic. Compared to 1999, the 2000 ranking of the first 10 airports did not change much. In positions 10 to 15 however, the growth of the airports Madrid/Barajas (+ 19.9%), London/Stansted (+ 33.5%) and Milano/Malpensa (+ 34.9%) is substantial. Best climber in the ranking was Milano/Malpensa, which was still in 22nd position in 1999 and finds itself on 14th position in 2000. London/Stansted was 21st in 1998, 15th in 1999 and 11th in 2000.

As mentioned earlier, London/Heathrow is the busiest airport for international extra-EU passenger transport too – and this by a very comfortable margin (32.5 million passengers – see Table 5.59). The Paris airport system (composed of Charles-de-Gaulle, Orly and Le Bourget airports) comes second, followed by Frankfurt-Main and Amsterdam. The airports of Athens and Milano/Malpensa display the most impressive growth in 2000, with 29.2% and 22.0% respectively compared to 1999.

6. Transport safety

Traffic accidents (considering road, rail, air and maritime traffic) claimed about 42 200 lives in the EU in 1999. More than forty times as much were injured.

The vast majority (97%) of fatal accidents occurred in road traffic. For the age category of under 45 years old, road accidents continue to be the first cause of mortality. Still, despite the fact that road transport at Community level more than doubled between 1970 and 1999, the number of fatal casualties decreased by 44% (see Graph 6.1). It should however be noted that in the development over time, important differences between the individual Member States remain.

The number of fatalities in rail accidents is relatively low. At Community level, the absolute number of fatal casualties fluctuate around 1 000 since the mid-1980s. A slight tendency towards a further decline can be recorded but figures continue to vary from year to year (see Graph 6.2). A single major accident can seriously influence the statistics.

The following paragraphs highlight the situations in the individual Member States. Due to the diverging definitions of 'injured persons', the analysis is limited to the number of deaths (see note of Table 6.3).

Downward trend since the 1970s – but not everywhere

A large number of measures for increased road safety have been taken in the past — both at Community, national and local level: improved road design, more motorways (for the same distance travelled, motorways are much safer than any other roads) higher safety standards, better monitoring of the roadworthiness of the vehicle fleet and a stricter legislation on drink-driving are only a few examples.

Since the beginning of the 1970s, a general downward trend has been predominant in the EU. Only in Greece, Spain and Portugal, where the number of cars has been rapidly increasing, was this tendency not followed. A significant decline was registered in Spain from the early 1990s, in Portugal from the mid-1990s onwards.

Still over 40 000 deaths each year

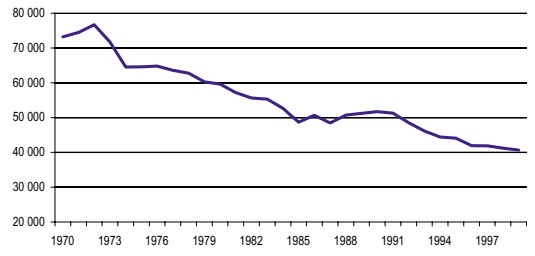
Table 6.3 shows that the total number of road accident fatalities at Community level decreased from 56 414 in 1990 to 42 122 in 1999. This is a decrease of more than 25% in less than a decade. Greece is the only country where the number of road fatalities does not show a downward trend during the last decade.

Fatalities per inhabitant: UK lowest

Table 6.4 outlines that in 1999, the United Kingdom recorded the lowest number of deaths per million inhabitants (60), followed by Sweden (65) and the Netherlands (69). On the other extreme, Portugal's rate is three times higher (221). Austria and Italy display figures close to the EU-15 average (112). In 1990, the EU average stood at 155.

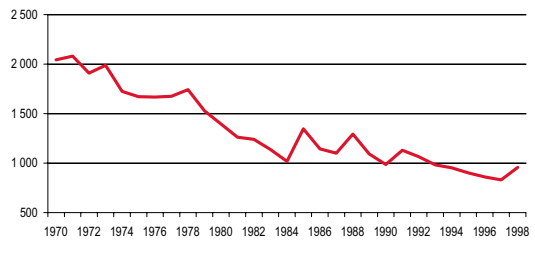
Graph 6.5 (EU-15) and Table 6.6 (by Member State) show the number of deadly victims per 1 000 million passenger kilometres travelled. The United Kingdom, Sweden, Denmark, Finland and the Netherlands display the lowest number of deaths per 1 000 million passenger kilometres. The risk of being killed in a car accident in

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



Source: Eurostat.

Graph 6.2: Number of persons killed in acci-mdents involving railways - EU-15



Source: UIC.

Portugal and in Greece is nearly 4 times higher. On average, the risk of being killed in a road accident is 1% per million kilometres travelled.

Some 15% of all road accident deaths are pedestrians

In 1998, 58% of all road accident fatalities were the drivers and passengers of passenger cars, 21% cyclists and drivers and passengers of powered two-wheelers (see Graph 6.7). Pedestrians hurt in car accidents account for 15% of the fatalities. Among the pedestrians, the age group of 65 and over continues to be the most at risk.

Rail accidents: most fatal casualties are not train passengers

The situation differs for accidents linked to railways. Graph 6.5 displays how the number of deaths per 1 000 million passenger kilometres travelled have been decreasing at Community level since 1970. Tables 6.8 and 6.9 show the same information at Member States level for the period 1990 – 98.

Graph 6.5 and Table 6.9 indicate that only a minority of rail accident fatalities is actually passengers travelling in trains. Most fatalities have been recorded in accidents occurring at railway level crossings and in shunting procedures as well as track maintenance works where no passengers travelling in the trains died. This should be taken into account when looking at Graph 6.2 and Table 6.8.

Expressed in passenger kilometres travelled, it then appears that at Community level, rail transport is 15 times safer for the passengers than road transport (1998). A single major accident, like the one involving a high-speed train in Germany in 1998 and mainly responsible for the upward turn of the curve in Graph 6.2, can however considerably influence the general image.

Table 6.3: Number of persons killed in road accidents (harmonised)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Belgium	1 976	1 873	1 672	1 660	1 692	1 449	1 356	1 364	1 500	1 397
Denmark	634	606	577	559	546	582	514	489	499	514
Germany	11 046	11 300	10 631	9 949	9 814	9 454	8 758	8 549	7 792	7 772
Greece	2 050	2 112	2 158	2 159	2 253	2 411	2 058	2 199	2 226	2 131
Spain	9 032	8 836	7 818	6 378	5 615	5 751	5 483	5 604	5 957	5 738
France	11 215	10 483	9 900	9 867	9 019	8 891	8 541	8 444	8 918	8 487
Ireland	478	445	415	431	404	437	453	472	458	417
Italy	7 137	8 083	8 014	7 163	7 091	7 020	6 676	6 712	6 314	6 633
Luxembourg	71	80	73	76	74	68	72	60	57	58
Netherlands	1 376	1 281	1 253	1 235	1 298	1 334	1 180	1 163	1 066	1 090
Austria	1 558	1 551	1 403	1 283	1 338	1 210	1 027	1 105	963	1 079
Portugal	3 017	3 218	3 084	2 700	2 504	2 711	2 730	2 521	2 425	2 231
Finland	649	632	601	484	480	441	404	438	400	431
Sweden	772	745	759	632	589	572	537	541	531	580
United Kingdom	5 402	4 753	4 379	3 957	3 807	3 765	3 740	3 743	3 581	3 564
EU-15	**56 414**	**55 997**	**52 737**	**48 533**	**46 524**	**46 096**	**43 529**	**43 404**	**42 686**	**42 122**
index 1990 = 100	**100**	**99**	**94**	**86**	**82**	**82**	**77**	**77**	**76**	**75**

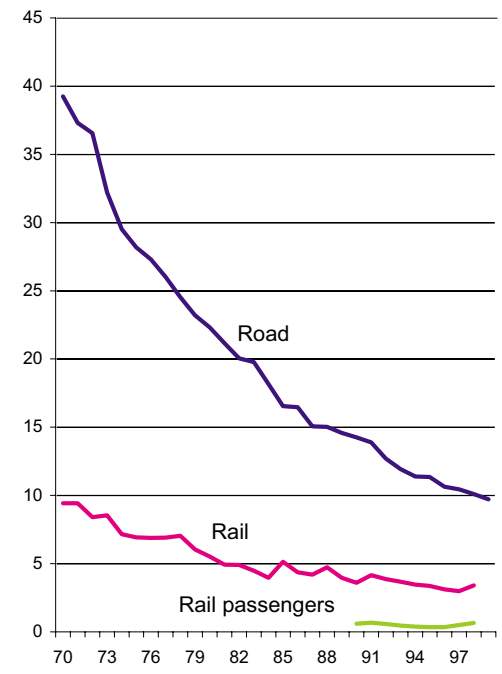
NB: Persons dying within 30 days following the accident. For countries that do not follow this definition (Greece: 3 days (until 1996) - Spain: 1 day (until 1992) ; France: 6 days ; Italy: 7 days ; Austria: 3 days (until 1991) and Portugal: 1 day), correction factors have been applied: Greece: 1.18, Spain: 1.3, France: 1.09 until 1993 and 1.057 from 1994 onwards, Italy: 1.078, Austria 1.12 and Portugal: 1.3.
Source: Eurostat.

Table 6.4: Number of persons killed in road accidents per million inhabitants

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Belgium	198	187	166	165	167	143	134	134	147	137
Denmark	123	118	112	108	105	111	98	93	94	97
Germany	139	141	132	123	121	116	107	104	95	95
Greece	202	206	209	208	216	231	196	209	212	202
Spain	232	227	200	163	143	147	140	142	151	145
France	198	184	173	172	156	154	147	145	153	145
Ireland	136	126	117	121	113	121	125	129	123	111
Italy	126	142	141	126	124	123	116	117	110	115
Luxembourg	186	207	186	191	183	166	173	143	134	134
Netherlands	92	85	83	81	84	86	76	75	68	69
Austria	202	198	177	161	167	150	127	137	119	133
Portugal	305	326	313	273	253	273	275	253	243	221
Finland	130	126	119	96	94	86	79	85	78	83
Sweden	90	86	88	72	67	65	61	61	60	65
United Kingdom[1]	94	82	76	68	65	64	64	63	61	60
EU-15	**155**	**153**	**143**	**131**	**125**	**124**	**117**	**116**	**114**	**112**
index 1990 = 100	**100**	**99**	**93**	**85**	**81**	**80**	**75**	**75**	**74**	**72**

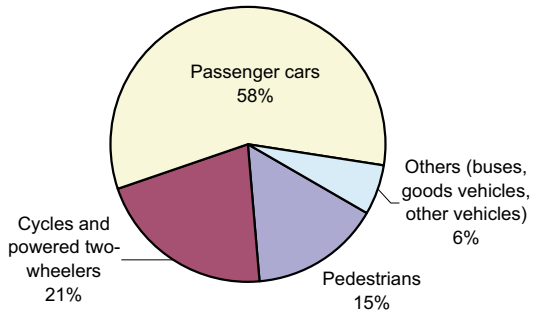
(1) Data refer to Great Britain only.
Source: Eurostat.

Graph 6.5: Number of killed persons in EU 15 (per 1000 million pkm)



Source: Eurostat, UIC.

Graph 6.7 : EU-15: Fatalities in road accidents in 1998 : share by type of user



Source: UN-ECE.

Table 6.6: Deaths in road accidents (per 1 000 million pkm)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Belgium	22	20	17	17	17	14	13	13	14	13
Denmark	11	10	10	9	9	9	8	7	7	7
Germany	14	15	13	12	12	12	11	11	10	10
Greece	31	31	31	30	30	31	25	26	25	23
Spain	31	29	24	19	16	19	17	17	17	15
France	17	16	15	14	13	13	12	12	12	11
Ireland	22	19	17	17	15	15	15	14	13	11
Italy	12	13	12	10	10	10	9	9	9	9
Luxembourg	16	18	16	16	15	12	13	10	10	10
Netherlands	9	9	8	8	8	8	7	7	6	7
Austria	22	20	18	16	17	15	13	14	12	13
Portugal	59	58	51	41	36	37	35	31	28	24
Finland	11	11	10	8	8	8	7	7	7	7
Sweden	8	7	8	6	6	6	6	6	6	6
United Kingdom	8	7	7	6	6	6	6	6	5	5
EU-15	**16**	**15**	**14**	**13**	**12**	**12**	**11**	**11**	**10**	**10**

Source: Eurostat.

Table 6.8: Number of persons killed in accidents involving railways (per 1 000 million pkm)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1998 absolute number of persons killed
Belgium	3.1	2.7	3.2	3.4	4.5	3.0	3.8	2.6	4.2	30
Denmark	1.2	2.6	3.3	1.7	1.8	2.0	1.8	1.7	1.7	9
Germany	4.0	5.3	5.7	4.8	4.4	4.3	3.9	3.7	5.5	325
Greece	17.2	25.0	14.0	35.3	30.0	31.2	24.0	22.6	29.4	47
Spain	1.8	1.8	1.7	1.9	1.9	1.4	1.3	2.1	0.7	13
France	2.9	3.6	3.2	2.9	2.6	2.3	2.3	1.9	2.1	138
Ireland	11.4	8.5	9.0	2.4	8.7	5.4	6.2	10.0	10.0	14
Italy	1.7	2.0	2.3	1.7	1.6	2.3	2.0	1.9	2.3	97
Luxembourg	9.6	17.4	3.9	15.3	17.3	10.5	10.6	10.0	3.3	1
Netherlands	3.9	2.6	2.2	2.3	2.4	3.5	2.6	2.4	2.3	35
Austria	6.2	8.1	3.2	6.9	5.5	6.9	4.8	2.8	4.4	35
Portugal	23.1	24.4	26.0	24.5	29.2	19.8	27.1	25.9	21.1	97
Finland	10.8	10.5	10.1	6.7	9.9	5.3	3.7	6.2	7.1	24
Sweden	3.0	4.7	5.4	3.3	1.9	1.5	2.5	1.7	3.6	25
United Kingdom	2.3	2.1	1.2	1.3	1.4	0.9	0.8	1.4	1.9	67
EU-15	**3.6**	**4.2**	**3.9**	**3.7**	**3.5**	**3.3**	**3.1**	**2.9**	**3.5**	**957**

Source: Eurostat, UIC.

Table 6.9: Number of railway passengers killed in accidents involving railways (per 1 000 million pkm)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Belgium	0.0	0.3	0.0	0.1	0.5	0.4	0.9	0.1	0.4
Denmark	0.2	0.8	0.8	0.2	0.4	0.0	0.0	0.0	0.0
Germany	0.8	0.7	0.9	0.6	0.4	0.5	0.4	0.4	1.9
Greece	0.0	0.5	1.0	1.2	4.3	1.9	0.0	1.1	0.0
Spain	0.2	0.0	0.0	0.1	0.0	0.0	0.0	1.2	0.1
France	0.5	0.8	0.6	0.6	0.3	0.4	0.2	0.4	0.2
Ireland	0.8	0.8	0.0	0.0	0.8	0.0	0.0	0.7	0.0
Italy	0.2	0.5	0.2	0.0	0.0	0.1	0.3	0.3	0.4
Luxembourg	0.0	0.0	0.0	7.6	3.5	0.0	0.0	0.0	0.0
Netherlands	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Austria	0.7	0.9	1.0	1.2	0.6	0.7	0.3	0.1	0.5
Portugal	3.9	2.6	4.6	3.5	3.7	2.5	2.2	3.0	1.7
Finland	0.0	2.8	0.3	0.0	1.0	0.3	0.9	0.3	2.9
Sweden	0.5	0.2	0.0	0.0	0.0	0.0	0.0	1.1	0.0
United Kingdom	1.1	1.0	0.6	0.5	0.6	0.3	0.5	0.8	0.5
EU-15	**0.6**	**0.7**	**0.6**	**0.5**	**0.4**	**0.4**	**0.3**	**0.5**	**0.7**

Source: Eurostat, UIC.

Fatalities in air transport accidents

Since 1993, Eurostat has been collecting and processing various aviation data at EU level. The collection of these data is on voluntary base.

Various definition problems have to be agreed upon in the forefield: should accidents involving EU carriers have been taken into account or rather accidents on EU-15 territory regardless of the nationality of the carrier? How should accidents that happen outside territorial waters have been dealt with?

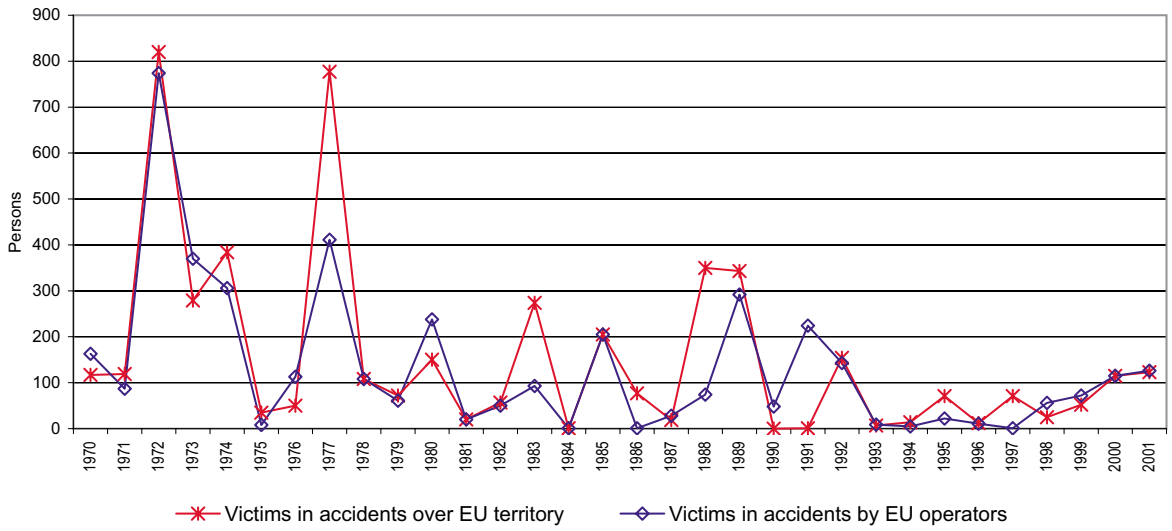
Graph 6.10 displays two curves for the period 1970 to 1999 (included): one curve expresses the number of fatal casualties in accidents on or over EU territory (accidents happening over international waters are excluded), the other curve represents the number of fatalities in accidents involving carriers registered in EU Member States. Please note that the figures include only passengers and crew members and exclude deaths on the ground.

Despite the very important increase in air traffic, both curves show a general decline over the last 30 years, although particularly strong fluctuations characterise the first decade observed. 1972 was a year marked by 15 accidents, 5 of which caused the death of more than 100 persons. Another particularly tragic year was 1977 when a single accident (collision between two large aircraft) claimed 583 lives. The fact that one aircraft was operated by a EU company and the other by a non-EU operator explains the strong difference between the two curves for that year. 1988 was marked by the Lockerbie disaster (259 fatalities — fatalities on the ground not included). These fatalities are included in the 'EU territory' curve but are excluded from the 'EU-operator' curve since the aircraft was operated by a North American company.

For the year 2000 and 2001, the number of fatalities for both curves would have been close to zero without the tragic accidents involving a Concorde in Paris (109 deaths, in 2000) and a Scandinavian aircraft in Milan (110 deaths, in 2001).

Comparisons with safety in road and rail transport are difficult. Reliable statistics on the passenger kilometres performed in air traffic are scarce. But even with reliable pkm figures, the image would be distorted since only few accidents happen en route. The vast majority of accidents happen either at take-off/initial climb or during final approach/landing. According to the independent and non-profit *Flight Safety Foundation* and based on a long-term study, only 4.7% of the accidents occur during the cruise phase although this phase constitutes 57% of the flight time (based on an average total flight time of 1.5 hours). Some 24% of the accidents happen during take-off and initial climb (2% of the flight time), 45% during final approach and landing (4% of the flight time). Long-haul flights are thus not particularly more dangerous than short-haul flights. The establishment of the 'fatalities per 1 000 million passenger kilometre'-ratio has therefore only very limited value. The same would apply for the establishment of the ratio 'deaths per flying hours'.

Graph 6.10 : Number of deaths in air accidents* 1970-2001



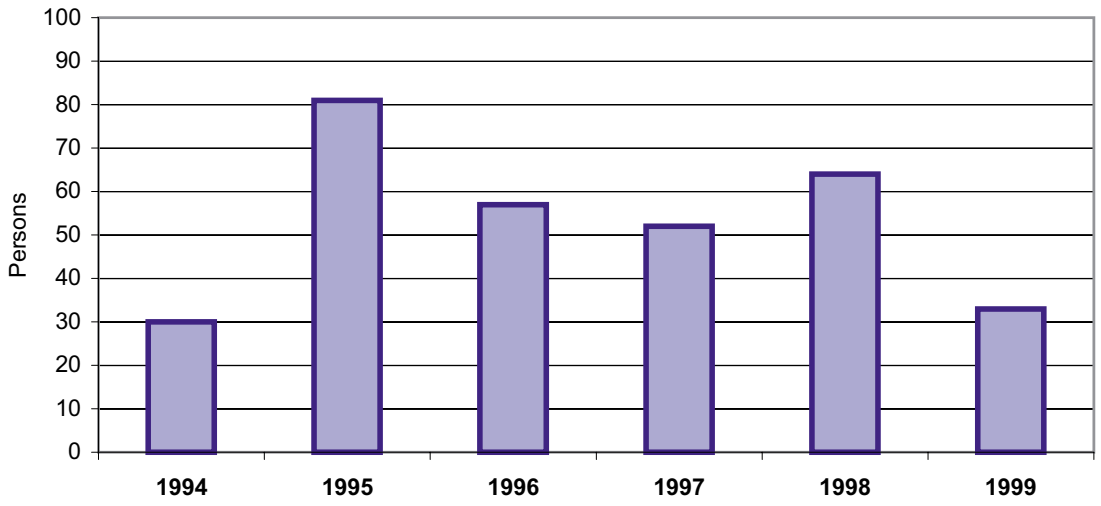
* Accidents during training and test flights, accidents involving aircrafts of armed forces and accidents in business flying excluded. In-flight accidents due to sabotage, terrorist attacks and war risks included.
Sources: Airclaims CASE2 database.

Deaths in maritime transport accidents

Reliable figures on the number of deaths occurring in maritime transport operations are not easy to obtain. With regards to the information displayed in Graph 6.11, only accidents involving vessels registered (flagged) in the various registers of the European Union (please refer to the note of Graph 6.11) have been taken into account, irrespective of the location of the accident. Persons who are considered as missing have been included. For the time range available (1994-1999), the absolute number of deaths fluctuates between 30 and 80 per year. One of the worst accidents that occurred in Europe in recent years was the sinking of the ferry *Estonia* on 28 September 1994, en route from Tallinn to Stockholm. The accident made 852 deaths. Since the Estonia is not registered in one of the ship registers as specified under Graph 6.11, the victims of this disaster are not included in the 1994 column.

The number of deaths as shown in the graph are however most likely to be underestimated since an increasing number of EU ship operators tend, for economic reasons, to register maritime vessels in non-EU Registers (the so-called «flags of convenience»). The share of the fleet of a Member State sailing under a «flag of convenience» can be substantial (see in particular Table 3.8 in Chapter 3, Means of transport and related comments).

Graph 6.11: Number of persons killed in maritime accidents* 1994-1999



* Ships from the following registers have been taken into account: Austria, Belgium, Danish International Register, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Madeira, Netherlands, Portugal, Spain, Sweden, United Kingdom.
Source: International Underwriters Association (IUA).

7. Environment and energy

7.1. General development

It has been recognised for many years that the transport sector is one of the main sources of pressure on the environment, particularly in relation to air pollution and noise. Numerous measures have been taken in the past; it is true that notably road vehicles today are substantially more energy-efficient and pollute less than they did 10 or 20 years ago. In most countries however, environmental measures failed to keep pace with growing transport volumes.

CO_2: continuous increase from transport, substantial decrease in other sectors

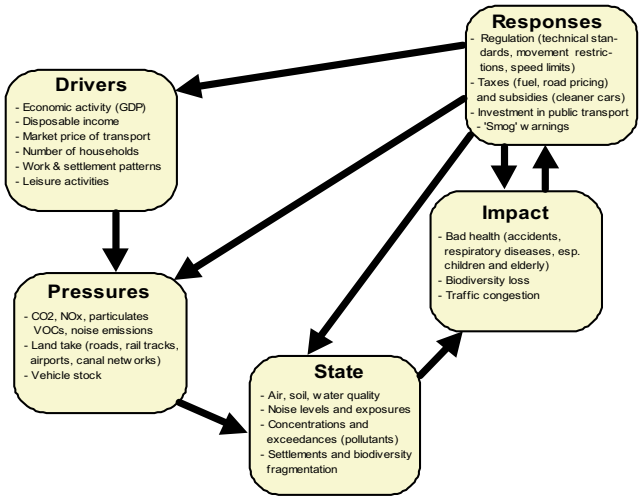
The transport sector (excluding maritime transport) accounted for 32% of the total energy consumption in the EU in 2000. With regards to CO_2 emissions, it is responsible for a volume of 904 million tonnes (29% of the total CO_2 emissions at EU-level in 1999). This represents an increase of over 54% since 1985 and a rise of nearly 23% over the 1990-2000 decade, even though the overall CO_2 emissions (i.e. all sectors) increased by only 4% between 1985 and 1999. In fact, the other economic sectors have noticeably decreased their emissions: the industry sector by 14% and the sector of households, services, etc. by 13% (both sectors between 1985 and 1999).

Improving the sustainability of the transport sector clearly requires a more comprehensive and integrated transport and environment policy approach, combining legislation and economic instruments in a transparent way across all transport modes. An integration implies a change in policy-making focus from 'end-of-pipe' actions to a greater focus on preventative actions.

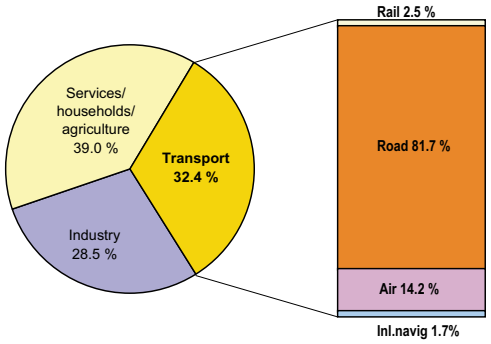
Preventative and integrated

More than ever, there is a need for better integration of environmental concerns into transport policies and decision-making. This integration has been given a high political priority following the Treaty of Amsterdam. As part of this process, a transport and environment reporting mechanism (TERM) for the EU was initiated by the Commission and the European Environmental Agency (EEA), generating an indicator-based report. The report will include a set of indicators most relevant to EU policy needs and decision-making. It should allow for the evaluation of whether trans-

Graph 7.1: The DPSIR framework for reporting in the environmental impact of transport

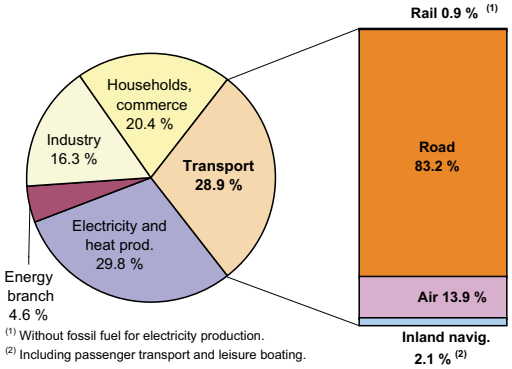


Graph 7.2: Share of transport in final energy consumption - 2000 (% of mioTOE)



Source: Eurostat.

Graph 7.3: CO_2 emissions from fossil fuels in EU-15 - share of transport in 1999



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

port develops in line with the objectives of sustainable mobility (EU's fifth environmental action programme).

Graph 7.1 outlines the DPSIR approach (driving forces, pressures, state, impact and responses), a generic tool to support understanding of the complex relationships across the whole range of environmental issues.

It is not the aim of this introductory chapter to go into detail of the TERM project. However Eurostat would like to outline the integrated approach of TERM, where most facets of the transport sector are covered. The TERM indicator list not only covers transport demand and intensity, but also aspects like landuse, access to basic transport services and expenditure on personal mobility, topics not covered by the present publication.

Consumption and emissions closely linked

With regards to fossil fuels, less consumption in general means less CO_2 emissions. Graph 7.2 shows the transport share in final energy consumption. Within the transport sector, road transport has a share of close to 82%, followed by air transport with 14%. Graph 7.3 outlines a similar picture with regard to the shares of the various transport modes in CO_2 emissions from fossil fuels.

Reformulated fuels

Although CO_2 emissions are often in the focus of public discussion (carbon dioxides are not harmful as such but are generally made responsible for the «greenhouse effect»), it should be noted that substantial efforts are made to reduce other pollutants as well.

In road traffic, lead emissions have been drastically reduced following the introduction of unleaded petrol. Catalyst technology has brought a constant reduction in the quantities of nitrogen oxides (NO_x), carbonmonoxides (CO) and volatile organic compounds (HC) emitted per vehicle. Improved motor vehicle engine technology (direct petrol injection, particulate filters on diesel-engined cars), the gradual introduction of fuels with a considerably reduced content of sulphur (less than 50 parts per million) and the coming into force of new EU emission standards had and will continue to have positive effects.

The situation in certain Member States is now such that a small percentage of old vehicles emit a proportionally large amount of noxious substances. Various national scrappage schemes have contributed in getting these old vehicles off the road.

Electricity for traction in rail transport is constantly increasing in most Member States (see Chapter 3 — Means of transport). It should however be noted that emissions corresponding to electricity used in transport appear under electricity production and not transport.

Scrappage schemes also for vessels

Although transport by inland waterways is of minor importance compared to the other modes, it should be mentioned that the fleet of vessels has undergone substantial changes over the last

20 years: scrappage schemes in various countries have eliminated smaller and less efficient vessels from the fleet. From the environmental point of view, inland navigation is of considerable interest and still has potential for further development at EU level. Quite remarkably, the transport performance over inland waterways has not decreased despite a considerable reduction of the fleet.

Research needed for high-altitude emissions

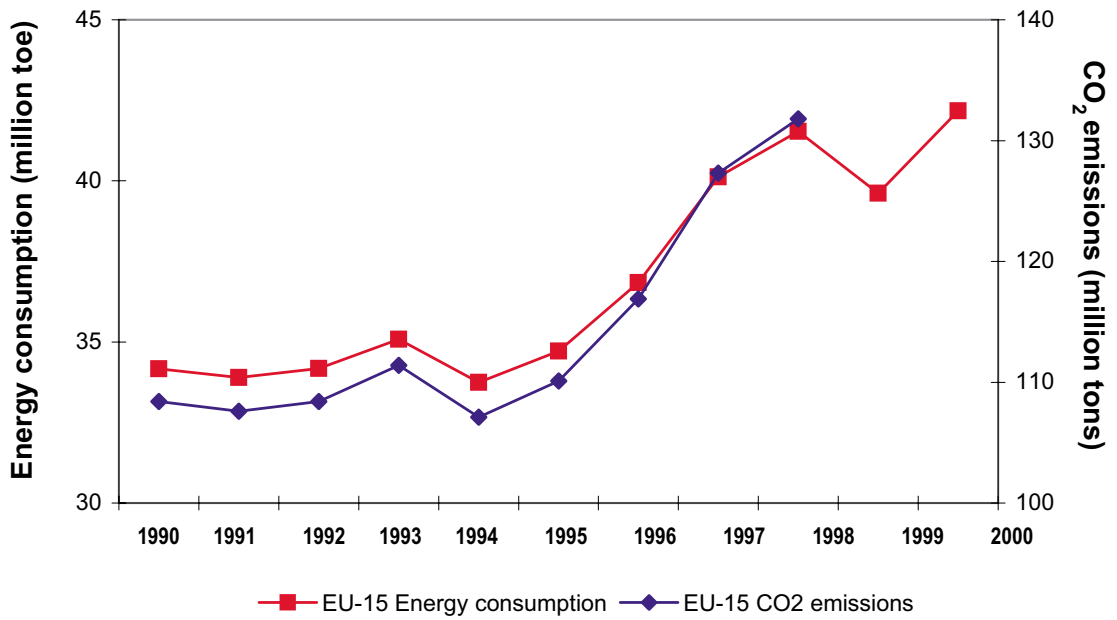
Liberalisation of air traffic has certainly brought further positive effects with regard to the 'democratisation' of air travel, but it is increasing rapidly, at rates outperforming the impact of technological improvements reducing engine emissions. Aircraft emissions are small compared to other man-made emissions, but within the transport sector, its share is rapidly increasing. The main difference with other transport modes is the fact that a substantial part of aircraft emissions occur in the critical altitude region below and above the tropopause, between 9 and 14 km altitude. This could significantly affect atmospheric ozone and cloud coverage. Substantial research is needed to sufficiently understand how aircraft perturb the atmosphere. Unless new, less-polluting engines and significantly more fuel-efficient aircraft technologies are introduced, the relative contribution of aviation to environmental changes will become more significant.

Serious ecological impacts from oil spills

The overall environmental impact of maritime transport is low compared to the other transport modes. However, major accidents of sea-going vessels can result in large oil spills or have other important ecological impacts. This is particularly true in the waters around the European Union featuring a relatively dense maritime traffic.

It remains however difficult to attribute both energy consumption and emissions to individual countries. As for the other transport modes, fossil fuel consumption and CO_2 emissions are closely linked. Graph 7.4 outlines this link at EU-15 level.

Graph 7.4: Evolution of energy consumption and CO_2 emissions of maritime transport (EU-15)



Source: Eurostat.

7.2. Energy consumption

More than a quarter of the total final energy consumption for road transport alone

Since 1960 the share of transport (road, rail, inland navigation and aviation) in the total final energy consumption has been constantly increasing. In the beginning of the early 1990s, it overtook that of industry and stood at 32% in 2000 (1960: 17%). As can be seen in Table 7.5 road transport alone accounts for over 250 million 'tonne of oil equivalent' at EU level, corresponding to 26.5% of the total final energy consumption in the EU.

Within the transport sector (not considering international maritime transport and pipelines), the share of road transport is nearly 82% (1960: 57%). Rail transport stands at 2.5% (1960: 31%) and transport via inland waterways at 1.7% (1960: 5%). The remaining 14% are attributed to air transport.

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 mobility, the trend towards larger engines as well as a growing share of goods transport by road offset the general tendency of lower consumption through more fuel-efficient vehicles.

Table 7.6 displays the consumption of main fuels by country and by transport mode. It considers the main fuels used for propulsion and does not include lubricants. Indications for road include liquefied petroleum gas (LPG), leaded and unleaded motor spirits as well as diesel fuel. LPG plays a very limited role in most Member States. Exceptions are the Netherlands and Italy, where LPG contributes 8% and 5% respectively. Given the small amounts actually consumed at EU level, compressed natural gas (CNG) has been disregarded. Coal used for rail traction has not been taken into account 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 that do not dispose of a significant inland waterway network.

Road share of over 75% for all countries, except the Netherlands

All countries show a high road transport share. At EU-15 level, the consumption of road transport in 2000 increased by 0.4% compared to 1999 (all products, see Table 7.5). The highest increase was recorded for Luxembourg (+13.9%) and Portugal (+8%). A decrease was registered for the United Kingdom (-2.8%) and Germany (-2.3%). Italy's consumption remained virtually the same.

Due to the growing share of electrified lines, the consumption of electricity for rail traction is increasing to the detriment of diesel fuel. The modal share for inland navigation is relatively high in Greece, Spain and the Netherlands and can partly be explained by the importance of the tourism sector in these Mediterranean countries and the relative weight of the inland waterways transport mode for the Netherlands. It further appears

Table 7.5: Final energy consumption (all products) of the transport sector - EU-15 (million toe)

	1985	1990	1995	1996	1997	1998	1999	2000	Share 2000 (%)
Final energy consumption	823.9	862.7	898.6	936	927.8	943.6	952.4	952.3	100
	of which:								
Industry	264.9	266.0	259.4	260.9	263.1	261.8 p	263.0 p	271.7 p	28.5
Services, households	356.3	343.4	363.6	391.9	376.1	382.4	381.9 p	371.5 p	39.0
TRANSPORT	**202.6**	**253.3**	**275.6**	**283.2**	**288.7**	**299.4**	**307.5**	**309.1 p**	**32.5**
	of which:								
Rail	7.0	6.9	7.5	7.6	7.6	7.5	8.0	7.6	2.5
Road	170.2	212.3	229.0	234.5	238.5	246.0	251.3	252.3 p	81.6
Air	21.1	27.8	32.5	34.2	36.0	39.5	42.1	43.8	14.2
Inland navigation	4.4	6.4	6.7	6.9	6.5	6.5	6.1	5.3	1.7

p : Provisional figure.
Source: Eurostat.

Table 7.6: Energy consumption of main fuels by transport mode (1 000 toe)

		1985	1990	1995	1996	1997	1998	1999	2000	change 1985-2000 (%)	share in consump. 2000 (%)
Belgium	road	5 119	6 442	7 084	7 211	7 211	7 504	7 596	7 819	53	81
	rail - diesel	113	70	77	74	61	63	64	60	-47	1
	rail - electric	102	107	125	109	108	117	120	124	21	1
	inl.navigation	214	129	134	173	143	79	85	73	-66	1
	aviation	558	952	945	1 070	1 340	1 589	1 552	1 521	173	16
Denmark	road	2 791	3 053	3 470	3 527	3 527	3 665	3 711	3 680	32	79
	rail - diesel	115	95	97	96	94	79	74	73	-37	2
	rail - electric	12	18	21	22	23	28	29	30	140	1
	inl.navigation	72	66	143	160	139	97	81	80	11	2
	aviation	570	645	674	711	726	769	807	820	44	18
Germany	road	40 666	50 418	54 196	53 770	53 770	55 753	57 521	56 177	38	85
	rail - diesel	1167	922	727	732	677	624	586	571	-51	1
	rail - electric	1 131	1 175	1 392	1 423	1 450	1 383	1 362	1 368	21	2
	inl.navigation	724	656	554	509	402	369	301	279	-62	0
	aviation	4 161	5 627	5 961	6 096	6 394	6 608	6 986	7 335	76	11
Greece	road	3 057	3 903	4 584	4 805	4 805	5 164	5 256	5 320	74	76
	rail - diesel	53	64	43	45	42	42	40	40	-23	1
	rail - electric	3	11	13	14	14	15	17	20	631	0
	inl.navigation	238	339	288	231	238	356	292	266	11	4
	aviation	1 179	1 264	1 226	1 230	1 187	1 201	1 284	1 325	12	19
Spain	road	11 811	17 676	20 466	21 713	21 713	24 029	25 297	26 061	121	80
	rail - diesel	182	212	288	354	404	455	485	489	169	2
	rail - electric	242	315	339	298	310	322	307	358	48	1
	inl.navigation	487	1 273	1 481	1 617	1 414	1 458	1 364	1 166	139	4
	aviation	1 963	2 456	3 105	3 378	3 639	3 962	4 198	4 486	129	14
France	road	29 385	36 171	37 300	38 851	38 851	41 021	40 886	42 409	44	83
	rail - diesel	488	384	384	338	417	454	372	367	-25	1
	rail - electric	656	764	834	918	934	955	968	1 004	53	2
	inl.navigation	79	497	478	469	472	587	490	489	521	1
	aviation	2 657	3 836	4 688	4 998	5 128	6 047	6 448	6 683	152	13
Ireland	road	1 430	1 546	1 730	2 171	2 171	2 706	2 991	3 155	121	81
	rail - diesel	43	46	49	77	87	102	115	124	186	3
	rail - electric	1	1	2	2	2	2	2	2	87	0
	inl.navigation	5	7	7	12	13	15	18	18	260	0
	aviation	206	365	375	415	433	448	529	574	178	15
Italy	road	24 751	30 185	33 702	33 834	33 834	36 382	36 544	36 403	47	89
	rail - diesel	192	198	194	174	194	192	140	138	-28	0
	rail - electric	418	540	625	658	664	676	678	695	66	2
	inl.navigation	192	198	227	218	227	213	225	202	5	0
	aviation	1 759	1 872	2 418	2 618	2 710	3 173	3 555	3 491	98	9
Luxembourg	road	512	863	1 109	1 140	1 140	1 204	1 353	1 541	201	82
	rail - diesel	9	8	2	2	5	5	8	7	-22	0
	rail - electric	4	5	7	9	7	7	8	8	116	0
	inl.navigation	0	0	0	0	0	0	0	0	0	0
	aviation	74	131	189	205	251	282	332	320	333	17
Netherlands	road	6 771	8 038	8 949	9 522	9 631	9 515	9 535	9 629	42	70
	rail - diesel	40	37	35	31	32	30	30	35	-12	0
	rail - electric	95	109	127	135	135	140	141	140	47	1
	inl.navigation	697	556	697	657	687	657	667	667	:	5
	aviation	1 233	1 608	2 589	2 768	2 997	3 261	3 388	3 343	171	24
Austria	road	4 017	4 754	5 369	5 462	5 477	5 241	5 618	5 846	46	86
	rail - diesel	54	58	70	78	81	41	42	47	-11	1
	rail - electric	190	229	269	275	246	188	272	279	47	4
	inl.navigation	0	0	0	0	0	4	7	7	:	0
	aviation	217	324	459	507	525	553	542	587	171	9
Portugal	road	2 059	3 026	4 104	4 363	4 363	4 929	5 179	5 592	172	86
	rail - diesel	58	56	55	50	54	47	51	57	-2	1
	rail - electric	23	27	26	28	29	31	31	31	33	0
	inl.navigation	53	43	46	46	44	46	38	43	-17	1
	aviation	465	574	620	623	602	647	740	790	70	12
Finland	road	2 896	3 631	3 505	3 416	3 416	3 635	3 699	3 670	27	85
	rail - diesel	72	63	62	54	55	54	52	47	-34	1
	rail - electric	31	37	43	40	43	44	45	46	47	1
	inl.navigation	65	30	42	38	34	42	77	70	8	2
	aviation	252	459	408	436	460	480	506	505	101	12
Sweden	road	5 371	6 074	6 432	6 385	6 385	6 510	6 409	6 330	18	83
	rail - diesel	83	39	39	39	35	16	8	24	-71	0
	rail - electric	225	213	234	264	254	241	259	266	18	3
	inl.navigation	82	87	67	69	71	94	104	94	15	1
	aviation	545	760	849	845	871	879	939	928	70	12
United Kingdom	road	28 621	36 312	36 687	38 063	38 063	38 264	39 424	38 310	34	75
	rail - diesel	725	607	596	572	476	477	962	433	-40	1
	rail - electric	254	454	636	638	667	720	736	747	194	1
	inl.navigation	913	1 193	915	1 053	1 047	992	906	921	1	2
	aviation	5 143	6 767	7 810	8 214	8 611	9 444	10 174	10 958	113	21
EU-15	**road**	**169 258**	**212 092**	**228 688**	**234 233**	**234 357**	**245 521**	**251 019**	**251 943**	**49**	**82**
	rail - diesel	**3 393**	**2 859**	**2 718**	**2 716**	**2 714**	**2 681**	**3 029**	**2 514**	**-26**	**1**
	rail - electric	**3 388**	**4 004**	**4 692**	**4 831**	**4 886**	**4 871**	**4 975**	**5 119**	**51**	**2**
	inl.navigation	**3 821**	**5 075**	**5 081**	**5 252**	**4 933**	**5 009**	**4 656**	**4 375**	**14**	**1**
	aviation	**20 982**	**27 641**	**32 316**	**34 116**	**35 874**	**39 342**	**41 979**	**43 668**	**108**	**14**
EU-15index (1985 = 100)	**road**	**100**	**125**	**135**	**138**	**138**	**145**	**148**	**149**		
	rail - diesel	**100**	**84**	**80**	**80**	**80**	**79**	**89**	**74**		
	rail - electric	**100**	**118**	**138**	**143**	**144**	**144**	**147**	**151**		
	inl.navigation	**100**	**133**	**133**	**137**	**129**	**131**	**122**	**114**		
	aviation	**100**	**132**	**154**	**163**	**171**	**187**	**200**	**208**		

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 maritime bunkers. Germany: series affected by German re-unification

Source: Eurostat.

that at EU-15 level, aviation recorded the highest increase in fuel consumption between 1985 and 2000: + 108% (and a 4% increase compared to 1999). In aviation, the limits of a correct attribution of the consumption to a country are reached: the figures express the volume of aviation fuel delivered in the respective country but this fuel is not necessarily burned in, or better: over that country.

Price influences fuel mix

The price of road transport fuels influence consumers choice, both in terms of the quantities and the type of fuel purchased. The basic fuel price is set by 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 7.7 indicates the share in fuels delivered in 1998 and 2001 and gives an insight on how this fuel mix differs between the countries and that in all countries, there is a gradual shift towards a higher share of diesel sales. This shift is particularly noticeable for Spain, France and Italy. It should be noted that the information in Table 7.7 includes fuel used by goods transport, which is almost entirely diesel fuel.

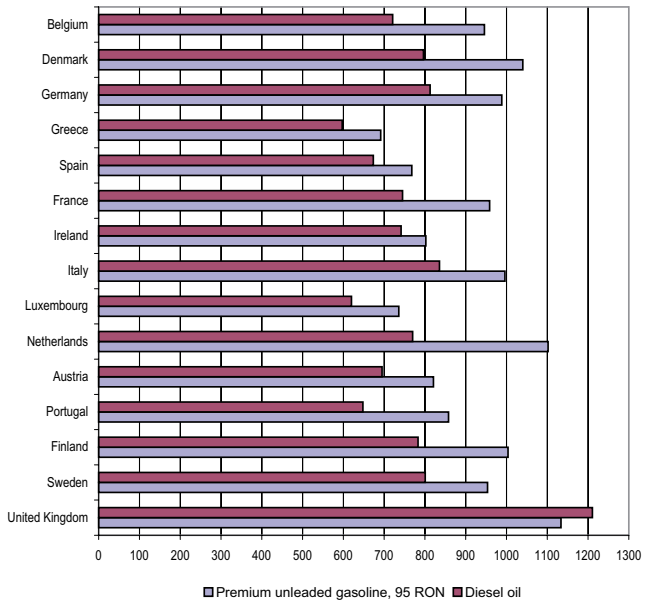
Table 7.7: Share of fuel in sales (%)

	1998 (Second quarter)		2001 (First quarter)	
	Diesel	Petrol (leaded & unleaded)	Diesel	Petrol
EU-15	**49.8**	**50.2**	**57.2**	**42.8**
Belgium	65.9	34.1	69.8	30.2
Denmark	49.5	50.5	55.7	44.3
Germany	41.5	58.5	47.3	52.7
Greece	45.5	54.5	48.4	51.6
Spain	57.3	42.7	71.7	28.3
France	63.0	37.0	70.7	29.3
Ireland	42.6	57.4	48.0	52.0
Italy	48.0	52.0	63.5	36.5
Luxembourg	56.3	43.7	66.4	33.6
Netherlands	56.0	44.0	57.8	42.2
Austria	62.7	37.3	67.2	32.8
Portugal	57.1	42.9	62.4	37.6
Finland	47.2	52.8	51.8	48.2
Sweden	34.3	65.7	36.7	63.3
United Kingdom	40.3	59.7	43.3	56.7

Source: Eurostat.

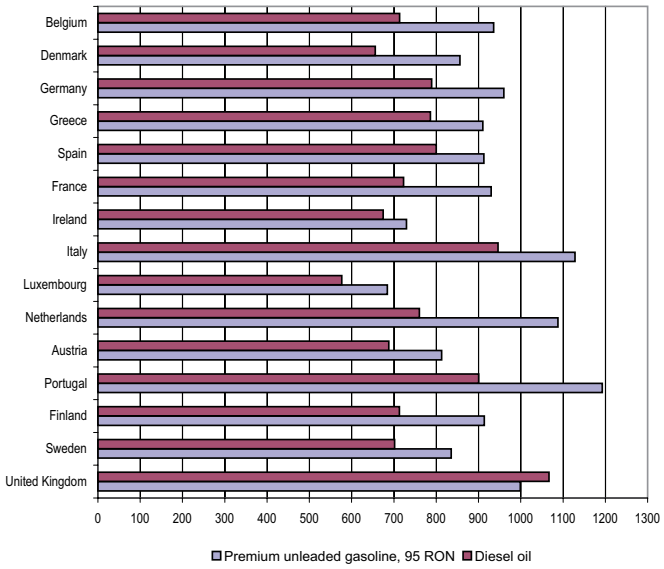
At EU level, 57% of the inland deliveries consist of diesel oil (2001). In 10 out of 15 Member States, diesel oil has the majority in sales. The highest shares are recorded in Spain, France and Belgium (around 70%), the lowest in Sweden (37%).

Graph 7.8: Sales price (all taxes included) of unleaded petrol and diesel fuel - First half of 2002 (Euro per 1 000 litres)



Source: Eurostat.

Graph 7.9: Sales price (all taxes included) of unleaded petrol and diesel fuel - First half of 2002 (Purchasing power standard per 1 000 litres)



Source: Eurostat.

Luxembourg: low in euro, lower in PPS

Graph 7.8 outlines the sales price (first half of 2002) of unleaded petrol and diesel fuel in the individual Member States. It should be noted that the indications include all taxes. For both fuel types and in absolute terms, the highest prices are recorded in the United Kingdom, while the lowest are paid in Greece.

The most substantial price differences between unleaded petrol and diesel fuel exist in the Netherlands and Denmark. The lowest differences can be found in Ireland, Greece and Spain. The only country where petrol is cheaper than diesel is the United Kingdom.

If one looks at the sales price of fuels (including all taxes) expressed in purchase power standards (Graph 7.9 — indicating the price of fuels relative to other products) it appears that in Luxembourg, prices are even lower than those expressed in euro, whereas in Greece and Spain, they were far higher. Unleaded petrol in Portugal displays the highest prices in purchasing power standard, yet relatively low in euro prices.

Energy consumption in maritime transport

At an even larger extent than the consumption of fuel in aviation, the attribution of fuel consumption to a country is somewhat problematic. A large vessel might for instance bunker fuel in the port of Antwerp, but its next journey will carry it quickly out of Belgian territorial waters.

When looking at energy balances, it appears that unlike the other transport modes (including aviation), the position 'marine bunkers' is not included in the category 'available for final consumption', but stands as a separate position suggesting that it could be considered as an 'export'.

These remarks should be taken into account when looking at Table 7.10. The figures express, in million TOE, the quantities delivered from the marine bunkers of the individual countries. The energy consumed in the maritime transport consists entirely of hydrocarbons. The main types of fuels used are 'residual fuel oil' and 'gas/diesel oil'.

It appears that at EU-15 level, more than 42 million TOE have been delivered in 2000, a 51% increase compared to 1985. The highest relative increase was registered for Ireland, Denmark, Greece and Sweden. Considerable fluctuations can be noticed for many Member States throughout the period observed. In absolute terms, the Netherlands alone - with Rotterdam as the world's largest port – accounts for nearly 32% of the EU deliveries in 2000 (13.3 million TOE). Spain and Belgium follow with 5.9 million TOE and 5.3 million TOE respectively.

Table 7.10: Energy consumption in maritime transport: marine bunkers (in million TOE)

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Change 1985-2000 (%)
Belgium	2.31	4.09	4.19	4.15	4.27	4.10	3.90	4.50	5.06	5.40	4.36	5.34	132
Denmark	0.41	0.95	0.86	0.90	1.33	1.50	1.57	1.49	1.37	1.38	1.29	1.32	223
Germany	3.44	2.47	2.09	1.76	2.20	2.04	2.05	2.03	2.15	2.03	2.07	2.18	-37
Greece	1.10	2.53	2.32	2.67	3.10	3.29	3.54	3.11	3.12	3.47	3.09	3.56	223
Spain	2.63	3.81	3.83	3.89	3.38	3.06	3.15	4.60	5.68	5.97	5.82	5.93	126
France	2.38	2.52	2.62	2.53	2.38	2.12	2.48	2.68	2.92	2.85	2.88	2.98	25
Ireland	0.03	0.02	0.03	0.02	0.05	0.04	0.12	0.16	0.15	0.16	0.17	0.15	406
Italy	3.40	2.65	2.52	2.43	2.42	2.34	2.42	2.29	2.38	2.63	2.42	2.71	-20
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	8.67	10.82	11.08	11.18	11.58	11.07	11.21	11.41	12.09	12.19	12.60	13.29	53
Austria	-	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	0.47	0.60	0.61	0.60	0.51	0.48	0.48	0.50	0.49	0.38	0.58	0.66	40
Finland	0.46	0.56	0.53	0.67	0.53	0.41	0.33	0.37	0.40	0.51	0.55	0.66	45
Sweden	0.55	0.66	0.78	0.89	0.89	1.05	1.04	1.10	1.30	1.55	1.50	1.34	143
United Kingdom	2.12	2.49	2.44	2.50	2.43	2.28	2.42	2.61	2.89	3.02	2.29	2.05	-3
EU-15	**27.96**	**34.16**	**33.91**	**34.18**	**35.08**	**33.77**	**34.69**	**36.84**	**40.01**	**41.54**	**39.62**	**42.17**	**51**

Source: Eurostat.

7.3. Emissions

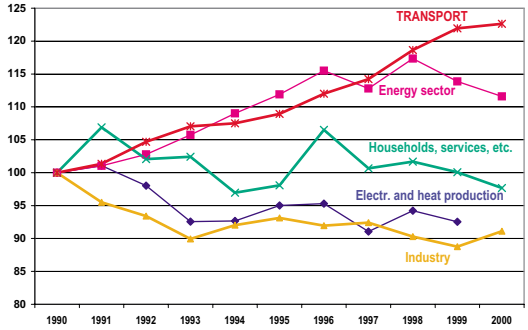
The transport share (not including maritime and pipeline transport) of total final energy consumption in the EU reached 32% in 2000 (see Table 7.5 in the previous chapter). Nearly the entire consumption of this sector consists of fossil fuels.

Fossil fuel combustion produces carbon dioxide (CO_2) and other emissions, many of them harmful to human health. 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, catalytic converters) and other factors such as speed, loading factor, temperature and state of maintenance of engines.

Transport continues with steady increase

Due to their role in global warming, CO_2 emissions are the most significant product of the use of fossil fuels. In absolute terms, electricity and heat production is the sector producing the highest CO_2 emissions, but the quantities have remained stable over recent years. This sector is followed by transport, which continues to increase steadily. Whereas CO_2 emissions from electricity and heat production were at the same level in 1999 as in 1985, the transport sector showed an increase of 53% (see Table 7.11). The indexed evolution between 1990 and 2000 (Graph 7.12) shows how the various sectors 'behaved' compared to the steady increase of transport. Within the transport sector, road transport takes the lion's share (see Table 7.13).

Graph 7.12: Evolution of CO_2 emissions from fossil fuels – EU-15 (1990=100)



Source: Eurostat.

Table 7.11: EU-15: total internal emissions of CO_2 by sector (million t of CO_2)

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Change 1985-2000 (%)
Total internal emissions	2 988	3 082	3 118	3 070	3 016	3 002	3 052	3 135	3 062	3 117	3 103	:	:
Electr. and heat production	927	998	1 009	978	924	925	948	951	909	940	924	:	:
Energy sector	127	130	132	134	138	142	146	151	147	153	148	145	+ 15
Final energy consumption	2 085	2 100	2 132	2 108	2 107	2 083	2 109	2 186	2 162	2 189	2 192	2 194	+ 5
Industry	670	629	601	588	566	579	586	579	582	568	559	573	-14
Households, services, etc.	827	734	784	749	752	711	720	782	739	746	734	717	-13
Transport	**587**	**737**	**747**	**772**	**789**	**792**	**803**	**825**	**842**	**874**	**899**	**904**	+ 54
	of which:												
Belgium	18	23	23	24	25	25	25	26	27	28	28	29	+ 60
Denmark	11	12	12	12	12	13	13	13	14	14	14	14	+ 30
Germany	138	170	171	177	182	179	182	181	184	188	194	191	+ 38
Greece	14	17	18	18	19	19	19	19	20	22	22	21	+ 53
Spain	44	66	71	73	72	75	77	82	83	90	95	97	+ 121
France	97	122	121	124	130	127	129	134	137	145	145	151	+ 56
Ireland	5	6	6	6	6	7	6	8	9	10	11	12	+ 133
Italy	81	97	100	104	106	106	109	110	112	119	120	120	+ 49
Luxembourg	2	3	4	4	4	4	4	4	4	5	5	6	+ 218
Netherlands	25	30	31	33	34	34	36	38	40	40	40	41	+ 59
Austria	13	15	17	17	17	17	18	18	18	17	19	19	+ 52
Portugal	8	11	12	13	13	14	14	15	16	17	18	19	+ 146
Finland	10	13	12	12	12	12	12	12	12	13	13	13	+ 31
Sweden	18	21	20	21	21	22	22	22	22	22	22	22	+ 20
United Kingdom	104	132	130	133	136	137	137	142	144	146	153	150	+ 44

Source: Eurostat.

Table 7.13: EU-15: total emissions of CO_2: share by transport mode (million t of CO_2)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Change 1985-2000 (%)
Total transport sector	587	620	641	682	713	737	747	772	789	792	803	825	842	874	899	904	54
	of which:																
rail transport[1]	11.1	10.8	10.2	9.8	9.4	8.9	8.8	8.8	8.8	8.3	8.5	8.5	8.5	8.1	9.3	7.8	-30
road transport	500.4	526.7	546.4	581.8	605.6	626.3	635.4	656.3	670.2	670.1	677.5	694.2	706.5	729.1	745.7	749.5	50
air transport	62.5	65.4	68.9	75.4	79.5	82.3	82.4	85.3	88.7	92.4	96.2	101.5	106.6	117.0	124.8	129.9	108
inland navigation	13.4	17.0	15.5	15.4	18.7	19.5	20.2	21.2	21.2	21.4	20.5	21.2	20.1	20.0	18.7	16.4	23

(1) Without fossil fuel for electricity production.
Source: Eurostat.

CO_2 from aviation doubled

Due to the increasing share of electrified tracks (and thus the gradual increase in electric traction), CO_2 emissions from rail transport decreased by 30% between 1985 and 2000. Emissions generated in power plants for the electricity production used as tractive power is however excluded here.

On the other hand, and in line with its energy consumption, air transport showed the highest increase in CO_2 emissions (108% growth over the period 1985-2000), albeit at a lower level in absolute terms. With the very strong growth in traffic, the environmental impacts of air transport are growing as well. Air transport has its corresponding share in the greenhouse effect and the depletion of the ozone layer, where high altitude emissions might be a specific problem. At local level, in the immediate vicinity of airports, concerns focus on the potential health and environmental effects of noise and air pollution, especially from oxides of nitrogen (NO_x), volatile organic compounds and particulates.

Secondary pollutants cause smog

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

Emission standards already set for 2008

Progress has been made in reducing the emissions from road vehicles. This not only concerns the level of CO_2 emitted (the reduction of which is mainly linked to the use of more fuel-efficient vehicles) but also the levels of noxious substances. Table 7.14 summarises the various emission standards applying to serial production vehicles in the European Union. Standards applicable for the year 2005 (passenger cars and lorries) and even 2008 (lorries) have been set. The early establishment of these standards is important for the automotive industry, since it allows the preparation of production lines. From the year 2005 onwards, new models of cars should pollute about 70% less than they do today.

Certain Member States have begun to make fuels available with a sulphur content reduced to less than 50 ppm (parts per million), about one tenth of the values generally common at the end of the 1990s. The widespread availability of low-sulphur gasoline is important for the introduction of cars equipped with direct gasoline injection (already widely introduced for diesel engines), offering considerable potential for fuel efficiency and allowing a further reduction of NO_x emissions. Fuels with reduced sulphur content will be mandatory in the EU by 2005. Hence, the oil industry is currently investing substantially in the adaptation of its refineries.

Since 2000 new models of petrol-engined cars have been fitted with on-board diagnostics (OBD), constantly checking for proper functioning of the catalytic converter. OBD will become compulsory for diesel-engined cars from 2003, and for heavy commercial vehicles from 2005. In case of a deterioration of the vehicle's emission performance, OBD alerts the driver who should then have the vehicle repaired, ensuring emissions are minimised throughout the vehicle's operating life.

Emissions of lead to zero

In 2000, leaded petrol was phased out in 12 of the EU Member States. Italy, Greece and Spain obtained derogations, and in those countries leaded petrol disappeared roughly one year later. Over the past 15 years, lead emissions from road traffic have fallen in proportion to the increase in the share of unleaded petrol, and are now virtually at zero.

In certain countries, the share of diesel fuel sales clearly exceeds those of unleaded gasoline (Table 7.7 in Chapter 7.2 — Energy consumption). The burning of diesel fuel raises the question of particulate emissions. Vehicle emission standards have regulated the mass of particulates emitted, and these have been, and will continue to be

Table 7.14: European emission standards (applying to vehicles of serial production)

Cars							
Petrol engine		g/km					
	as from:	CO [1]	NO_x [1]	VOCs [1]			
EURO I	01.07.1992	4.05	0.49	0.66			
EURO II	01.01.1996	3.28	0.25	0.34			
EURO III	01.01.2000	2.30	0.15	0.20			
EURO IV	01.01.2005	1.00	0.08	0.10			
Diesel engine		g/km					
	as from:	CO [1]	NO_x [1]	VOCs [1]	PM [1]		
EURO I	01.07.1992	2.88	0.78	0.2	0.14		
EURO II	01.01.1996	1.06	0.73	0.19	0.10		
EURO III	01.01.2000	0.64	0.50	0.06	0.05		
EURO IV	01.01.2005	0.50	0.25	0.05	0.025		
Heavy duty vehicles (lorries)			g per kW/h				
		Test cycle	CO [1]	VOCs [1]	NO_x [1]	Particulate matter	
	as from:					‹ 85 kW	› 85 kW
EURO I	01.10.1993	13-mode [2]	4.5	1.1	8	0.612	0.36
EURO II	01.10.1996	13-mode [2]	4.0	1.1	7	0.15	
EURO III	01.01.2000	ESC [2]	2.1	0.66	5	0.10	
EURO III	01.01.2000	ETC [2]	5.5	0.78	5	0.16	
EURO IV	01.10.2005	ESC [2]	1.5	0.46	3.5	0.02	
EURO IV	01.10.2005	ETC [2]	4.0	0.55	3.5	0.03	
EURO V	01.10.2008	ESC [2]	1.5	0.46	2	0.02	
EURO V	01.10.2008	ETC [2]	4.0	0.55	2	0.03	

(1) CO = carbonmonoxide; NO_x = nitrogenoxide; VOCs = volatile organic compounds; PM = particulate matter.
(2) 13-mode = according to 88/77/EEC - engine mounted at test stand and measured in 13 stationary modes; ESC = European steady cycle; ETC = European transient cycle.
Source: Eurostat.

reduced. However, there is the suspicion that human health is particularly susceptible to the very smallest sizes of particle (nano-particles). Ironically, a consequence of reducing the mass of total particulate emissions has been that greater numbers of these nano-particle are emitted. Particulate filters (or traps) can reduce the mass and number of particles emitted and several manufacturers have already begun to fit them to their diesel vehicles.

Manufacturers anticipate standard

In the aviation industry, ICAO (International Civil Aviation Organisation) continues to play a leading role in developing policy guidance on the application of regulatory and economic measures related to aviation environmental protection. In the past, standards recommended at ICAO level have been used as benchmarks for Community legislation. The Committee on Aviation Environmental Protection (CAEP) reached a compromise in 1998 for a new recommendation ('CAEP/4') on the limits of oxides of nitrogen (NO_x). Without going into details, this compromise means a reduction in NO_x emissions of 5 to 16% depending on the operating conditions. A similar proposal had already been made in 1995, but at that time it was not agreed upon. The lack of consensus in 1995 is explained by doubts over technical feasibility and environmental benefit, together with a fear that the value of the existing aircraft fleet would be affected by the introduction of restrictive operating rules when new proposals would come into effect. The fact that a consensus was reached in 1998 was influenced by various factors: if no widespread consensus were reached, the EU would have opted for 'regional action'; furthermore, some aircraft engine manufacturers have taken action in anticipation of more stringent NO_x standards. The new requirements apply to new engine designs only. Since future production of existing engines is not immediately subject to the new standard, it is believed that the value of the existing fleet is protected. Existing engines must comply with the new standards by 2008.

New parameters necessary

In recent years, research has been carried out on aircraft emissions at high altitude. However, all standards so far, including the recent 'CAEP/4' standard, are based on landing and take-off (LTO) cycle-based parameters. The development of new parameters for the assessment of an aircraft's emissions to replace the existing LTO parameters and to establish climb and cruise parameters is a

high priority in the frame of the 'CAEP/5' work programme, in which the Commission actively participates.

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 7.15 outlines the European Union's efforts to reduce noise emissions by setting production standards for various types of vehicle. It should be noted that an increase of 3 dB(A) corresponds to a doubling of sound intensity; 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 efficiency) and the use of noise-absorbing tarmac as well as mitigation measures like the construction of noise barriers along roads through or near residential areas. Measures taken by the railway industry are divided between infrastructure operators (acoustic grinding of rails, noise barriers, speed limits at night) and train operators (replacement of cast-iron brakes with low-noise composite materials). Newly constructed high-speed train tracks are mostly planned and built with noise barriers along sensitive areas.

Noise 'footprints' reduced

In the three decades since aviation and the environment first rose as an issue, there has been much change. The noise levels of modern aircraft are 10 to 15 decibels lower than previous generations of aircraft. As an example, a modern Airbus A320 has an 80% smaller noise 'footprint' (noise area contour measured on the ground) than the older Boeing 727.

Lately, many European States have expressed the need for more stringent noise emission standards for their airports. Since the first of April 2002, the EU enforced the use of aircraft that at least comply with the 'Chapter 3' noise emission standards. The United States already phased out the previous 'Chapter 2' standard in 1999.

Awaiting aircraft according to 'Chapter 4'

In June 2001, the ICAO Council adopted a new noise certification standard, to become 'Chapter 4'. The new standard will be obligatory applicable to new aircraft types submitted for certification after 1 January 2006 and voluntarily for aircraft originally certified according to 'Chapter 3' standards. The new noise standard is established for certification purposes and not as a basis for restrictions on operation of aeroplanes.

Avoid economic hardship for developing nations

The adoption of the new standard should be considered as an important step towards the improvement of the noise performance of air transport activities. However, since most of the current production aircraft already comply with the Chapter 4 standard, the impact of the adoption of 'Chapter 4' will only materialise over a longer period as fleets are modernised and renewed. Accompanying measures are therefore required to further improve the noise situation: apart from the fact that it is now widely recognised that certain operating restrictions can be imposed on an airport-by-airport basis (mainly for so-called 'city-airports'), measures will include the withdrawal of aircraft that only marginally comply with 'Chapter 3' noise emissions standards (so-called hush-kitted aircraft, i.e. modified aircraft to comply with 'Chapter 3' noise standards, but originally certified according to 'Chapter 2'). The Council of Ministers, with the support of the European Parliament, had adopted a non-addition regime preventing the further registration in the EU of such aircraft. Table 7.16

Table 7.15: Noise emission limits - EU standards - dB(A) [1]

Vehicle category	1972	1980	1982	1989-90	1995-96	1997
Passenger car[2]	82	.	80	77	74	.
Urban bus[2]	89	.	82	80	78	.
Heavy lorry[2]	91	.	88	84	80	.
Motorcycles <	.	78	.	77	.	75
Motorcycles >80 - <175cm³	.	80-83	.	79	.	77
Motorcycles > 175cm³	.	83-86	.	82	.	80
Motor assisted cycle <25 km/h	.	.	.	.	.	66
Motor assisted cycle >25 km/h	.	.	.	.	.	71

(1) db (A): A-weighted decibels: logarithmic scale, +3db(A) = doubling of sound intensity.
(2) Method of measurement described in Council Directive 92/97/EEC of 10 November 1992, Official Journal L371 of 19/12/1992.
(3) Directive 97/24/EC of 17 June 1997, Official Journal L226 of 18/8/1997.
Source: DG Energy and Transport.

Table 7.16: Aircraft equipped with 'hushkits' (aircrafts in service only - situation: end 2001)

	Total n° of aircraft in operation	of which certified Chapter 3 with hushkit	
		number	% of total
EU-15	**4 872**	**84**	**2**
Belgium	131	11	**8**
Denmark	191	2	**1**
Germany	899	1	-
Greece	88	-	-
Spain	438	11	**3**
France	664	6	**1**
Ireland	119	29	**24**
Italy	439	4	**1**
Luxembourg	56	-	-
Netherlands	233	-	-
Austria	163	-	-
Portugal	116	-	-
Finland	82	8	**10**
Sweden	178	-	-
United Kingdom	1075	12	**1**

Source: Airclaims CASE2 database.

outlines that 84 'hush-kitted' aircraft (2% of the EU-15 fleet) were still in service by the end of 2001.

Despite all regulatory measures taken at EU-level, undue economic hardship for operators from developing nations should be avoided. The Commission has taken steps allowing for the granting of exemptions where appropriate. Overall, a further improvement in the reduction of noise pressure can be expected in the long term, it remains however to be seen if these improvements are not offset by a further increase of the air traffic intensity.

Better air space management

Another area that offers potential for reducing the environmental impact of aviation concerns the improvement of air space management and air traffic control. Air traffic management delays and inefficient routings increase aircraft noise and gaseous emissions. There is a broad consensus that there is potential for improvement, not only with regard to fuel savings but also in increased safety, reliability and efficiency. Based on previous studies, the Association of European Airlines (AEA) estimates that the elimination of these inefficiencies in Europe could result in a CO_2 reduction of 6 to 12%. Eurocontrol, the European Organisation for the Safety of Air Navigation, estimated fuel savings of 7 to 8% for gate-to-gate direct routes (less if applied within en route airspace only). The European Commission is aware of this and supports the strengthening of the existing body Eurocontrol, which has 28 European members, 14 of them in EU Member States.

It is however not known to what extent the introduction of capacity and efficiency enhancing measures may result in attracting additional air traffic ('rebound effect').

Efficiency of use

A key to a further reduction of pollutant emissions is the efficiency of use of all transport modes. The more vehicles are efficiently used

Table 7.17: Total internal emissions of CO_2 by maritime vessels (in million t)

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	Change 1985-1998 (%)
Belgium	7.3	13	13.3	13.2	13.6	13	12.4	14.3	16.1	17.2	136
Denmark	1.3	3	2.7	2.8	4.2	4.6	5	4.7	4.6	4.3	231
Germany	10.9	7.8	6.6	5.6	7	6.5	6.5	6.4	6.8	6.4	-41
Greece	3.5	8	7.4	8.5	9.8	10.4	11.2	9.9	9.9	11	214
Spain	8.3	12	12.1	12.3	10.7	9.7	10	14.6	18	18.9	128
France	7.6	8	8.3	8.1	7.6	6.7	7.9	8.5	9.3	9	18
Ireland	0.1	0.1	0.1	0	0.2	0.1	0.4	0.5	0.5	0.5	400
Italy	10.8	8.4	8	7.7	7.7	7.4	7.7	7.3	7.5	8.3	-23
Luxembourg	-	-	-	-	-	-	-	-	-	-	-
Netherlands	27.5	34.4	35.2	35.6	36.9	35.2	35.6	36.3	38.5	38.8	41
Austria	-	-	-	-	-	-	-	-	-	-	-
Portugal	1.5	1.9	1.9	1.9	1.6	1.5	1.5	1.6	1.6	1.2	-20
Finland	1.5	1.8	1.7	2.1	1.7	1.3	1	1.2	1.3	1.6	7
Sweden	1.8	2.1	2.5	2.8	2.8	3.3	3.3	3.5	4.1	4.9	172
United Kingdom	6.6	7.8	7.7	7.8	7.6	7.1	7.6	8.2	9.1	9.5	44
EU-15	**88.6**	**108.4**	**107.6**	**108.4**	**111.4**	**107.1**	**110.1**	**116.9**	**127.3**	**131.8**	**49**

Source: Eurostat.

(higher occupancy rate, eco-driving style), the less pollutant emissions per person per kilometre travelled are generated. Occupancy rates have tended to decrease for more than a decade in Europe both for passenger cars and for buses and coaches. The opposite trend appears in air transport, where a steady increase in the occupancy rate has taken place over the last 25 years (57% utilisation of available passengers-kilometres in 1975 against 71% in 1999). Occupancy rates for rail transport, at the level of the European Union, have remained more or less constant over the last 30 years. Regarding freight transport, efficiency has been increased in road transport, also due to a further liberalisation of this sector (cross-trade, cabotage – see Chapter 5.1), but especially for rail and air transport during the last two decades, even if it seems that the efficiency of the latter mode has – since 1994 – come to a limit which is difficult to improve.

Emissions of maritime transport

As for energy consumption, a clear allocation to individual Member States and even EU-15 of CO_2 emitted by international maritime vessels is not possible. It should be recalled that the combustion of marine fuel takes place largely in territories/waters other than those where the fuel has been bunkered. This shows the limits of a territorial allocation of emissions. Bearing this in mind, Table 7.17 shows the emissions of CO_2 of the individual countries, calculated on the basis of fuel sales. On the basis of EU-wide sales, it appears that throughout a large period of the 1990s, emissions have remained stable. Only for 1997 and 1998, a noticeable increase has been registered. Compared to 1985, total emissions in 1998 stood nearly 50% higher.

Statistical sources

1. *Main 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)

- Regulation (EC) No 91/2003 of the European Parliament and of the Council of 16 December 2002 on rail transport statistics (OJ L 14, 21.01.2003)

- Council Regulation (EC) No 1172/98 of 25 May 1998 on statistical returns in respect of carriage of goods by road (OJ L 163, 6.6.1998 replaces Council Directive 78/546/EEC of 12 June 1978 and Council Directive 89/462/EEC of 18 July 1989).

- Regulation (EC) No 437/2003 of the European Parliament and of the Council of 27 February 2003 on statistical returns in respect of the carriage of passengers, freight and mail by air (OJ L 66, 11.3.2003).

- Council Directive 95/64/EC of 8 December 1995 on statistical returns in respect od carriage of goods and passengers by sea (OJ L 320, 30.12.1995)

2. *European Commission*

- **Eurostat**

  Statistical Office of the European Communities
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  Contact points: Eurostat data shops (see list at the end of this publication)
  http://europa.eu.int/comm/eurostat/

3. *International statistical sources*

- **United Nations — Economic Commission For Europe (UN-ECE)**

  Palais des Nations, CH-1200 Geneva
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  Fax: (41-22) 917 00 39
  http://www.unece.org/

- **European Conference of Ministers of Transport (ECMT)**

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4. *National statistical sources*

- **Belgique/Belgie**

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