

Indicator fact sheet

TERM 2003 13a EEA 17 — Freight transport demand by mode and group of goods

Freight transport demand grew faster than GDP, thereby moving away from the objective of reducing the link between economic growth and freight transport demand. The demand for freight transport per unit of GDP shows an average increase of 11 % between 1991 and 2000 in EU Member States.



Results and assessment

Policy relevance:

The EU has set itself the objective to reduce the link between economic growth and freight transport demand ('decoupling') in order to achieve sustainable transport (European Commission, 2001a; European Commission, 2001b)

Policy context:

The objective of decoupling was first defined in the Transport & Environment (T&E) integration strategy (European Council, 1999) that was adopted by the Council of ministers in Helsinki. Also in the sustainable development strategy (European Commission, 2001a), that was adopted by the European Council in Gothenburg, the objective decoupling is mentioned in order to reduce congestion and other negative side-effects of transport.

In the review of the T&E integration strategy in 2001 and 2002 (European Council 2001; European Council, 2002a), the Council reaffirmed the objective of decoupling.

In the sixth community environmental action programme (European Council, 2002b), decoupling of economic growth and transport demand is mentioned as a key action in order to deal with climate change and to alleviate health impacts from transport in urban areas.

In the White paper on common transport policy (CTP) 'European transport policy for 2010: Time to decide' (European Commission, 2001b), the Commission subsequently proposes 60 or so measures to reach this objective (e.g. fair and efficient pricing).

Environmental context:

Transport is one of the main sources of greenhouse gases and also gives rise to significant air pollution, which can seriously damage man's health and ecosystems. Freight transport (in terms of tonne-km) and passenger transport (in terms of passenger-km; see TERM 2003 12a EU — Passenger transport by mode and purpose) are indicators for total transport volumes.

The indicator helps to understand developments in the freight transport sector (transport's 'magnitude'), which in turn explains observed trends in transport's impact on the environment. For a complete picture of transport demand and the environmental problems that arise from it, it would be valuable to complement the data on the number tonne-kilometres by mode with vehicle-kilometres by mode. However, only very limited and low-quality data is available on the number of vehicle-kilometres by trucks, trains, et cetera.

Assessment (1):

Overall picture for the EU

Between 1991 and 2000 total freight transport demand in the Member States increased by a third from 2 300 to over 3 000 billion tonne-km (see table 1). Over this period, the average EU annual growth rate of freight transport (3.2 % per year) was considerably higher than that of GDP (2.1 % per year). The decrease in freight transport between 1991-1993 reflects the reduction in economic activity of that period. Since 1996, freight transport grew even more rapidly than the average rate, reaching 4 to 5 % growth per year.

All modes in freight transport experienced growth on the European level in the 1991–2000 period. The most extensive growth was in road transport and short sea shipping, with an average yearly growth rate of 4.0 and 3.3 % respectively. Rail freight transport has grown with 0.8 %, inland shipping with 1.7 % and transport through oil pipelines with 1.0 % (2).

Portugal, Luxembourg and Ireland — countries showing high growth in GDP – show the highest increase in freight transport demand between 1991 and 2000 (taken into account road, rail, inland shipping and oil pipelines). North-European countries (Sweden, Finland and Denmark) show the lowest increase in freight transport demand.

Road

During the nineties, all European countries show an increase in road tonne-kilometres. Road transport in Spain and Ireland even more than doubled in this period, as a result of high growth in GDP. Belgium, Germany and the United Kingdom show a significant *decrease* in road freight transport between 1998 and 2000. Possible explanations for this could be improved logistical efficiency (for example with the use of regional distribution centres (³)).

Rail

The EU-15 demand for rail freight transport increased from 232 to 249 billion tonne-kilometres between 1991 and 2000. The most profound growth in rail transport took place in the Netherlands (49 %), followed by Austria, Portugal and Finland (around 30 %). Greece, Ireland and Germany show a decrease in rail freight transport during the nineties.

Inland shipping

Germany and the Netherlands dominate inland shipping within the EU. Their combined contribution is 80 % of the total number of tonne-kilometres by inland waterways in the EU (108 billion tonne-km). Germany and the Netherlands also dominate the growth in absolute terms (16 billion tonne-km). Besides these countries, Belgium and Austria have a relative high contribution to inland shipping (6.6 and 2.4 billion tonne-km respectively).

Short sea shipping and oil pipelines

(²) Numbers on short sea shipping and oil pipelines transport are based upon estimations and therefore not highly reliable.

⁽¹⁾ In the overall assessment, road, rail, inland shipping, short sea shipping and oil pipelines were considered.

^{(&}lt;sup>3</sup>) From personal communication with Chris Overson, principal contact point from the UK.

Data for short sea shipping and oil pipelines is based on estimations. However, in terms of volume, short sea shipping is extremely important in the European Union. Short sea shipping has grown by around a third during the 1991–2000 period to about 1 270 billion tonne-km, which is comparable with road transport demand. Since short sea shipping is of great importance in European freight transport, more accurate statistics are needed.

Oil pipeline transport is relatively unimportant (3 %) in the EU. It has grown with 10 % during the nineties to about 85 billion tonne-km in 2002.

Air Freight transport

Only 1.2 % (in terms of tonne-km) of all goods are transported by air. The market for air transport is, however, growing rapidly (57 % during the 1990s for EU-15, Norway and Iceland).

Traditionally, air freight has been used for high-value commodities, fragile goods and emergency items for aid in accidents or disasters or simply commercial necessity such as legal documents, medical records, financial papers, computer disks and tapes and spare parts for production line breakdowns etc. Now, medium-value perishable commodities such as luxury foods, exotic fruits, chilled meat, fish and flowers, newspapers and fashion garments are growth areas for air transport. This has become possible due to ever decreasing freight transport prices.

Freight intensity

The freight transport intensity has increased by 11 % to about 220 ton-km per 1 000 euro. Iceland has the lowest freight transport intensity, only 88 ton-km per 1 000 euro. If short sea shipping was included, this value would probably be higher. The Netherlands and Luxembourg have high freight intensities, since these countries have relative extensive transport sectors. The large seaport of Rotterdam in the Netherlands and the central position and low fuel prices in Luxembourg are important drivers behind these high freight intensities.

Freight transport demand and intensity is closely linked to changes in the volume and structure of economic activity. The main underlying factors that stimulate the growth in freight transport are globalisation of the economy and liberalisation of the internal market, combined with a price of freight transport that remains relatively low (see TERM 2002 20 EU — Transport prices). This situation enabled and facilitated:

- Complex trading networks to evolve, primarily to exploit differentials in labour cost. Especially within the EU, constraints on cross-border movements have been removed and related 'barrier costs' are reduced (TNO, 1999). Increased distances between material extraction, the manufacture (and recycling) of goods and the final consumer are a logical consequence.
- Preferences of customers have become more specialised, causing additional, and longer freight movements. In Germany, for example, the amount of food consumed has not grown much in the last three decades, but food transport (in tonne-km per capita) almost doubled. Reasons include customer preferences for food from other countries, transport policies, the location and production patterns of the food industry and the policies and location of retailers, such as 'just-in-time' deliveries to supermarkets. (FAW, 2000).

Other

Information and communication technology (ICT) plays an important role in logistics and supplychain planning. Logistics can benefit from ICT through better route planning, which reduces the number of vehicle-km. However Internet and e-commerce may stimulate 'just-in-time' deliveries, since the e-customer wishes to receive his order as soon as possible, and may increase haulage distances, since it creates a more global trade. However, the current statistics do not reveal such a trend (TNO, 1999).

Intermodal freight transport is still a small share of total tonnes of freight carried, although growth was rapid between 1982 and 1998, at an average of 9 % per annum. These findings are based on only four Member States and may therefore not be valid for all the entire EU. The recently started Marco Polo Programme stimulates the development of intermodal transport. It is designed to shift all increases in transport demand to rail, sea shipping and inland waterway shipping, by funding (max one-third) projects that stimulate intermodality (European Commission, 2002a).

Sub-indicator (information): Type of goods transported by mode

i Agricultural products and live animals, and machinery, transport equipment, manufactured and miscellaneous articles are the goods mostly transported when all modes are taken into account. These goods generally require fast delivery due to their limited storage life. As road is one of the fastest modes of transport, these types of goods are increasingly dominating road transport, in particular in terms of tonne-kilometres, pointing out high transport distances within this group of goods.



Figure 2: Types of goods transported in EU-15 (% tonne-kilometre, all modes)

NB: data refer mainly to the years 1994 – 96 depending on country and mode. The modes included are road, rail and inland navigation. Percentages mentioned are expressed in tonne-km. See table 2 for more details about type of goods transported by mode.

Source: European Commission, 2002b





In 1961 a common nomenclature for the classification of goods (NST) came into force, which was revised in 1967 (NST/R). This classification comprises 176 headings, 52 groups and 10 chapters. These chapters are: 0 Agriculture 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 manufactured minerals and building materials; 7 Fertilisers; 8 Chemicals; 9 Machinery, transport equipment, manufactured and miscellaneous articles.

Source: Eurostat, 2003b

Assessment for the sub-indictor (see also table 2)

Agricultural products (chapter 0 and 1) and manufactured goods (*machinery, transport equipment, manufactured and miscellaneous articles* — Chapter 9) dominate total freight transport in EU-15 with respectively 28 and 26 % of all tonne-kms, followed by *crude and manufactured minerals* (Chapter 6) with 20 % (Figure 2).

Road transport

Manufactured goods (Chapter 9) dominate road transport, when expressed in tonne-km. This corresponds with high value goods being transport over long distances throughout the EU. In tonnes lifted, road transport is dominated by the group of goods *crude and manufactured minerals and building materials*, which is partly due to the high weight of this product group. *Agricultural products, animals and fodder* (Chapter 1 and 2) are also important categories of goods transported by road, which is due to the limited storage life (road transport is by far the fastest means of transport) and the regional character of the transport of agricultural products and manufactured goods (road being sometimes the only available mode for pick-up and delivery).

For most categories of goods, the share in road transport (in tonnes) in 1990 was equal to that of 2000. The most significant changes that occurred are the decrease of *crude and manufactured minerals and building materials* and the increase of *agriculture products and live animals, foodstuffs and animal fodder* and *manufactured goods*. This points out that there has been a gradual shift in road transport towards more high value, perishable goods.

Inland shipping and rail transport

Inland shipping plays a relative important role in the transport of bulk goods, like minerals (Chapter 6), solid mineral fuels (Chapter 2) and petroleum products (Chapter 3). There are some differences in transported goods between upstream and downstream navigation: base material is transported upstream, while (semi-) manufactured products are transport downstream (see Box 1).

Rail transport is dominated by Chapter 9, goods (*machinery, transport equipment, manufactured and miscellaneous articles*), followed by bulk goods (Chapters 5 and 6) and agricultural products (Chapter 1).

Value of goods transported

Since the different transport modes dominate more or less in the transport of a number of types of goods, there are considerable differences in the average value of the goods that are transported. An average road cargo is valued at EUR 1 674/tonne, compared with EUR 924/tonne for rail transport and EUR 86/tonne for inland waterway transport (ECMT, 2003).

Domestic and international transport

When all modes (road, rail and inland waterways) are observed, *crude and manufactured minerals and building materials* (Chapter 6) is the most important category of goods nationally transported (45 % of all tonnes forwarded) — this share is strongly influenced by the high weight of these goods.

In international transport, *machinery, transport equipment, manufactured and miscellaneous articles* (Chapter 9) with 26 % of all forwarded tonnes is the most important type of goods transported. Growth in international transport has been most profound in this category of goods. Taken into account large transport distances in international transport, the share of this product group in tonne-kilometres is even probably larger.

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Data

Table 1: Freight transport demand (EU) by mode during the 1991–2000 period

Unit: 1000 million tonnes-km

	All modes	Road	Rail	Inland waterways	Short sea shipping	Oil pipelines
1991	2 267~e	897	232	109	950	79~e
1992	2 289~e	910	220	110	969	80~e
1993	2 256~e	915	205	108	948	81~e
1994	2 402	972	219	117	1 012	82
1995	2 529	1 040	223	115	1 070	81
1996	2 551	1 065	222	112	1 070	82
1997	2 725~e	1 160	239	119	1 124~e	83
1998	2 799~e	1 221	233	118	1 142~e	85
1999	2 922~e	1 282	236	122	1 197~e	86~e
2000	3 014~e	1 281	249	127	1 270~e	86~e

NB: Figures with '~e' are estimated.

Source: Eurostat, 2003a; European Commission, 2002b (oil pipelines data).

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Table 2: Type of goods transported by mode in EU

Unit: % of tkm

NST/R classification ()	Road	Rail	Inland waterways	Total
Agriculture products and live animals (0, 1)	32	12	10	29
Solid mineral fuels (2)	1	10	19	3
Petroleum products (3)	5	10	19	6
Ores and metal waste (4)	1	8	5	2
Metal products (5)	6	12	3	7
Crude and manufactured minerals and building materials (6)	21	12	34	20
Fertilizers, chemicals (7,8)	8	10	9	8
Machinery, transport equipment, manufactured and miscellaneous articles (9)	27	24	2	26
All goods	100	100	100	100

NB: data refer mainly to the years $1994-96\ \text{depending}$ on country and mode.

Source: European Commission, 2002b.

File: TERM 2003 13 EU — Freight transport.xls

Meta data

Technical information

1. Data source: Freight transport demand: Eurostat structural indicator data (Eurostat, 2003a):

http://europa.eu.int/comm/eurostat/Public/datashop/printproduct/EN?catalogue=Eurostat&product=1-structur-EN&mode=download#Emploi)

Data on short sea shipping is from the Energy and Transport DG Pocketbook (European Commission, 2002b)

2. Description of data: Data contains the number of tonne-km by road, rail, inland waterways, short sea shipping and oil pipelines. Tonne-km: unit of measure of goods transport which represents the transport of one tonne by road over one kilometre (the distance to be taken into consideration is the distance actually run).

GDP: gross domestic product in constant 1995 prices (billion euro). File: TERM 2003 00 EU+AC – Basedata.xls

Original measure units: Tonnes-km

- 3. Geographical coverage: EU-15 (Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the United Kingdom), Norway and Iceland
- 4. Temporal coverage: Tonne-km: 1991–2000
- 5. Methodology and frequency of data collection: Tonne-km: annually collected by a Common Questionnaire developed jointly by Eurostat, UNECE and ECMT
- 6. Methodology of data manipulation, including making 'early estimates': the demand for oil pipeline transport in 2000 is estimated based on growth numbers from the Energy and Transport DG Pocketbook (European Commission, 2002b)

Quality information

- 7. Strength and weakness (at data level): data for short sea shipping and oil pipeline transport is lacking. Availability of reliable data for these modes would strengthen the analyses.
- 8. Reliability, accuracy, robustness, uncertainty (at data level): Data is reliable
- 9. Overall scoring (give 1 to 3 points: 1=no major problems, 3=major reservations): 2 (data for short sea shipping is lacking)

Relevancy: 2 (Vehicle-km provides a better unit of measurement, since it is more directly linked to environmental impact of transport movements)

Accuracy: 2 (Tonne-km figures are estimated rather than measured, but are rather consistent between sources)

Comparability over time: 1

Comparability over space: 1

Further work required

Further work is needed to develop reliable and comparable statistics on vehicle-km used for freight transport, since such data is closer connected to the environmental consequences of transport and might reveal evolution of load factors.

More recent data is needed on short-sea shipping, maritime shipping and oil pipeline transport. Some available data should be verified (like, e.g., oil pipeline transport in Denmark).

Box 1: Freight transport at the Rhine: type of goods in upstream and downstream navigation

Germany and the Netherlands dominate Rhine navigation. Considerable differences can be noticed between upstream and downstream navigation. The volume of goods transported upstream is twice as high as the volume downstream (103 million tonnes vs. 52 million tonnes) – showing the importance of the Rhine as connection between the North Sea and the Dutch/German hinterland.

In Figure 4, the transported goods are distributed over the different NST/R product classes. Solid and mineral fuels (e.g. coal), petroleum products and ores and metal waste dominate upstream transport, corresponding with the transportation of these bulk goods from Dutch harbours into Holland and Germany. Crude and manufactured minerals and building materials, machinery, metal products and agricultural products dominate downstream transport. It seems from both graphs that a) in general raw materials are transported in upstream direction and that manufactured products are transported in the downstream direction and b) that minerals are important goods in inland waterway transport.

Figure 4 Distribution of upstream and downstream freight transport passed at Lobith/Emmerich in 2000 by type of goods

