

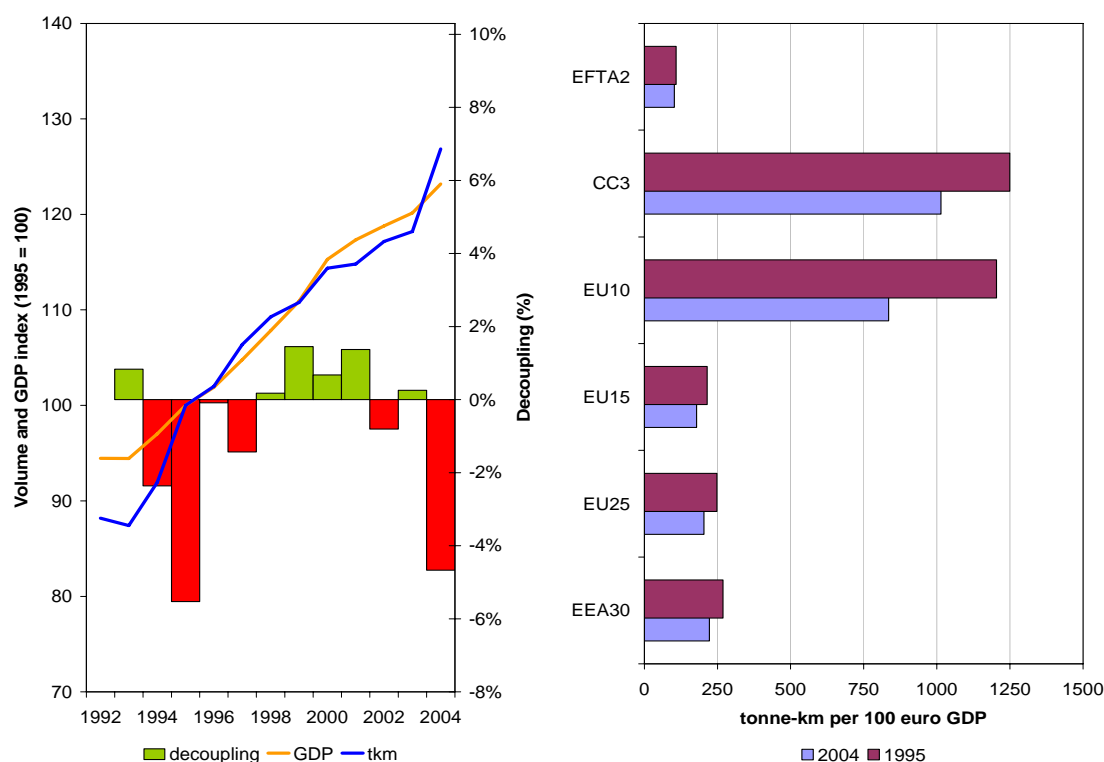
Indicator Fact Sheet

TERM 2006 13a – Freight transport volume by mode and group of goods

Indicator code / ID	
Analysis made on (Assessment date)	June 2006
EEA contact /fact sheet responsible Name Peder Jensen: Email: peder.jensen@eea.europa.eu	Fact Sheet development contact point Name: Arno Schroten, CE Delft Email: schroten@ce.nl

☺ **More goods are transported farther and more frequently. This results in increased CO₂ emissions and slows the decline in air pollutant emissions. The period 1998 – 2001 saw a relative decoupling of growth in freight volumes from economic growth. However, in more recent years this trend was reversed. In the new Member States the period of relative decoupling has come to an end.**

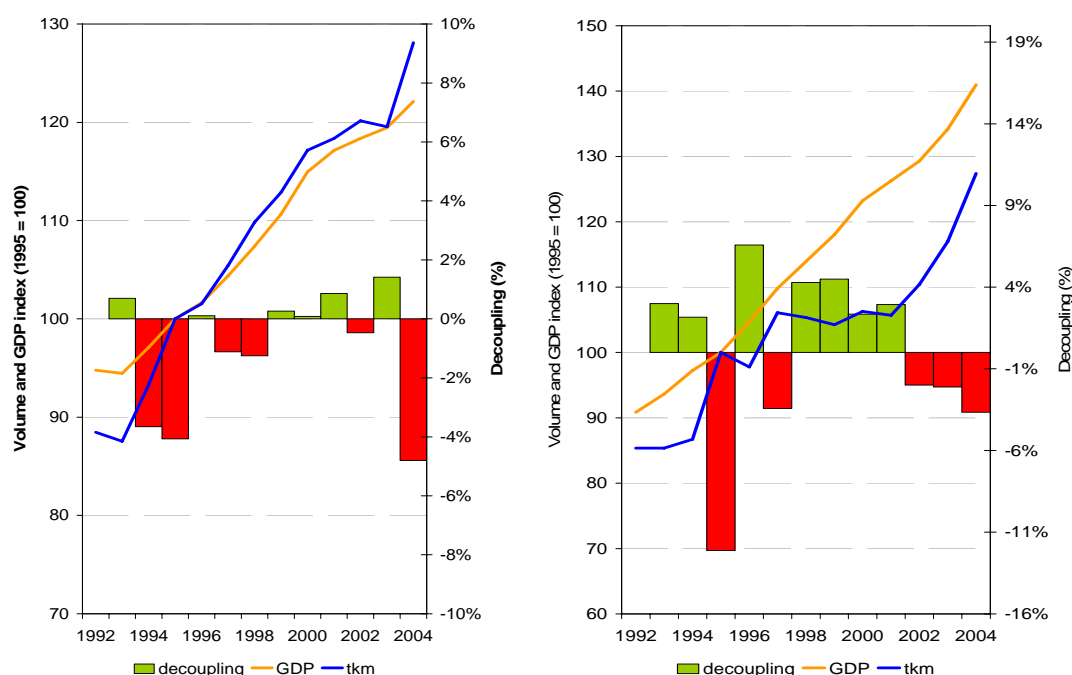
Figure 1: a) Freight transport volume and GDP for the EEA-30 and b) freight transport per unit of GDP by region



Note: Figure a covers the EEA-30 (Switzerland and Liechtenstein are excluded, since no data is available for these countries). GDP in Euro at constant 1995 prices. Freight transport (tonne-km) includes transport by road, rail, and inland waterways. Short-sea shipping and oil pipelines are excluded due to lack of data. The decoupling indicator in figure 1.a is calculated as the annual growth factor of GDP divided by the annual growth factor of freight transport volume. Green bars represent decoupling, whereas red bars indicate a lack of decoupling (transport growth exceeds GDP growth). For more detailed data, see tables 1-3.

Source: Eurostat, 2006

Figure 2: Freight transport volume and GDP in old versus new EU Member States
a) EU-15 **b) EU-10**



Note: GDP in euro at constant 1995 prices. Freight transport (tonne-km) includes transport by road, rail, and inland waterways. Short-sea shipping and oil pipelines are excluded due to lack of data. The decoupling indicator is calculated as the annual growth factor of GDP divided by the annual growth factor of freight transport volume. Green bars represent decoupling, whereas red bars indicate a lack of decoupling (transport growth exceeds GDP growth). For detailed data, see tables 1-3.

Source: Eurostat, 2006

Results and assessment

Policy relevance:

The EU has set itself the objective to disconnect mobility from its negative side effects. The focus of transport policy is moved away from decoupling the economic growth and passenger transport volumes.

Policy context:

Disconnecting mobility from its negative side effects is a central theme in EU transport policy. This objective was introduced in the Mid-term review of the European's Commissions's 2001 Transport White Paper (European Commission, 2006). As a result of this objective, each transport mode must be optimised. All modes must become more environmentally friendly, safe and energy efficient.

By choosing for a policy of disconnecting mobility from its negative side effects, transport policy is moving away from the objective of decoupling transport volumes and economic growth. However, decoupling transport volumes and economic growth will contribute to the disconnection of mobility and its negative side effects. Therefore, monitoring the rate of decoupling will continue to be important. The objective of decoupling freight transport demand from GDP was first mentioned in the Transport & Environment (T&E) integration strategy (European Council, 1999) that was adopted by the Council of ministers in Helsinki. Here, the expected growth in transport demand was named as an area where urgent action was needed. In the sustainable development strategy (European Commission, 2001a) that was adopted by the European Council in Gothenburg, the objective of decoupling is set 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, the Council reaffirmed the objective of reducing the link between the growth of transport and GDP (European Council, 2001; European Council, 2002a).

In the Sixth Community Environmental Action Programme (European Council, 2002b), decoupling of economic growth and transport demand is named as one of the key objectives in order to deal with climate change and to alleviate health impacts from transport in urban areas.

Transport of goods and passengers is part of most economic activities, wherefore policies aimed at increasing economic activity are mostly associated with increasing transport demand. The objective of decoupling is therefore seldom directly linked to concrete actions. An exception is the proposed Marco Polo II programme. Besides its main focus of modal shift, the 'Traffic Avoidance' part of the programme sets a target 10.5 billion tonne-km to be avoided each year without economic disadvantage (ECORYS, 2004).

In general, policies that influence the price of transport will also bear on the coupling, as prices regulate demand while having a limited impact on GDP insofar as transport costs have only very small influence on consumer prices. Fair pricing instruments are frequently considered options to achieve decoupling. Well developed charge structures will also improve the environmental performance of the transport modes, improving the overall eco-efficiency of transport.

Infrastructure investments

The trans-European Network (TEN-T) guidelines were revised in 2004 (884/2004/EC). Currently, the focus is on a limited number of priority projects – generally large infrastructure projects - and includes projects for rail-, water- and road modes. The major focus is on removing bottlenecks and avoiding congestion.

Environmental context:

Transport is one of the main sources of greenhouse gases and also gives rise to significant air pollution, which can seriously damage human health and ecosystems. Reducing demand would consequently reduce freight transport's environmental burden. Decoupling the need for freight transport from GDP growth is only indirectly linked to environmental impact.

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.

Assessment:

Rapidly growing volumes

Freight transport volumes have grown significantly since 1992, thereby making it increasingly difficult to reduce the environmental consequences of transport. Interestingly, for the first time freight transport volume fell in the EU-15 in 2003 before rising sharply in 2004.

The reasons for the growth in freight transport comprise factors on both the demand and supply side of the transport market. The main underlying factors are globalisation and intra-EU liberalisation of the internal market, combined with a declining real price of freight transport in most countries (see TERM 20 EU – Transport prices). The unified European market has provided faster and cheaper transport due to the removal of barriers at border crossings, lower labour costs and the provision of more and better infrastructure, for instance, as part of the TEN-T programme. This situation enabled and facilitated:

- Complex trading networks, exploiting 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, 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).

Development of the transeuropean networks under the TEN-T programme may facilitate further growth in freight volume due to the focus on relieving bottlenecks and expansion of

infrastructure capacity. The revised guidelines have some provisions for environmental issues, namely a call on Member States to perform Strategic Environmental Assessment of national transport programmes and a requirement that funding for TEN-T projects be conditional on compliance with EU environmental legislation. However, environmental concerns are secondary for the selection of projects and the overall environmental impacts have not been assessed

The transport avoidance of the proposed Marco Polo II programme will, if the objective is met, shave off merely 0.5 % of the roughly 2 000 billion tonne-km performed by all modes in the EU25 or the equivalent of three months of typical transport growth. However, the programme's influence on modal split will be more pronounced (see TERM fact sheet 13b).

Division of growth

The growth in freight transport has been far from uniform. In many countries of the ten new members states, freight transport volumes declined in the early nineties following the economic problems experienced in the new market economies and the collapse of the industrial base on which much freight transport depended. For some countries, the freight demand is still below the level in 1991, but is now increasing. Especially since 2001, freight transport has increased greatly in the new Member States. Particularly rail freight transport demand has declined in the EU-10, but the decline appears to be halted. Railways, especially in Central and Eastern Europe have suffered from a number of serious structural problems: a decline in heavy industry, growing competition from the road sector, low productivity, and a spiral of financial decline where lost markets and revenues have lead to underinvestment and lack of maintenance (ECMT, 2001).

Transport modes

The most extensive growth was in road transport with an average annual growth rate of 4 % in the EEA-30¹, and in air freight transport, which has likely grown faster (57 % growth during the nineties for EU-15, Norway and Iceland, or about 4.6 % p.a.). However, the market share of air freight transport remains very low, about 1.8 % of the volume of road, rail, and inland modes in EU-15 in 2000 (Eurostat, 2004).

In terms of transport volumes, sea shipping dominates when international sea transport is also included (see Box 1). Information about sea transport is due to methodological and data reliability problems frequently omitted from transport statistics, but volumes should not be underestimated. The demand for intra-European short-sea transport (Table 3) is roughly on the level of road transport in the EU-15, for which data is available.

The link between economic growth and freight transport

In 2004 the increase in freight transport has greatly overshoot the economic growth. Since 1992, transport volumes have grown at roughly the same rates as GDP in the EEA-30. It is more a general tendency than a fixed relationship between the two, as large differences exist between regions (see figure 2). Between 1996 and 2003, the growth in transport volume in the EU-15 approximately paralleled the growth in GDP. In the EU-10 a significant decoupling has occurred between 1998 and 2001, after which the transport volume grew faster than the economy. However, the transport volumes in both regions have grown during that period.

Freight transport volume and intensity (tonne-km/GDP) are generally closely linked to changes in the volume and structure of economic activity. However, economic growth does not necessarily have to be of a kind that increases freight transport volume, and even within the EU there are countries with similar levels of freight transport volume but very different GDP (see Table 2 and Figure 1b). The economies of the EU-10 show much higher transport intensities. The economies of the old Member States are dominated by the service sector to a much larger extent than in the EU-10 and offers a good explanation why these economies are much less reliant on transport than the economies of the new Member States.

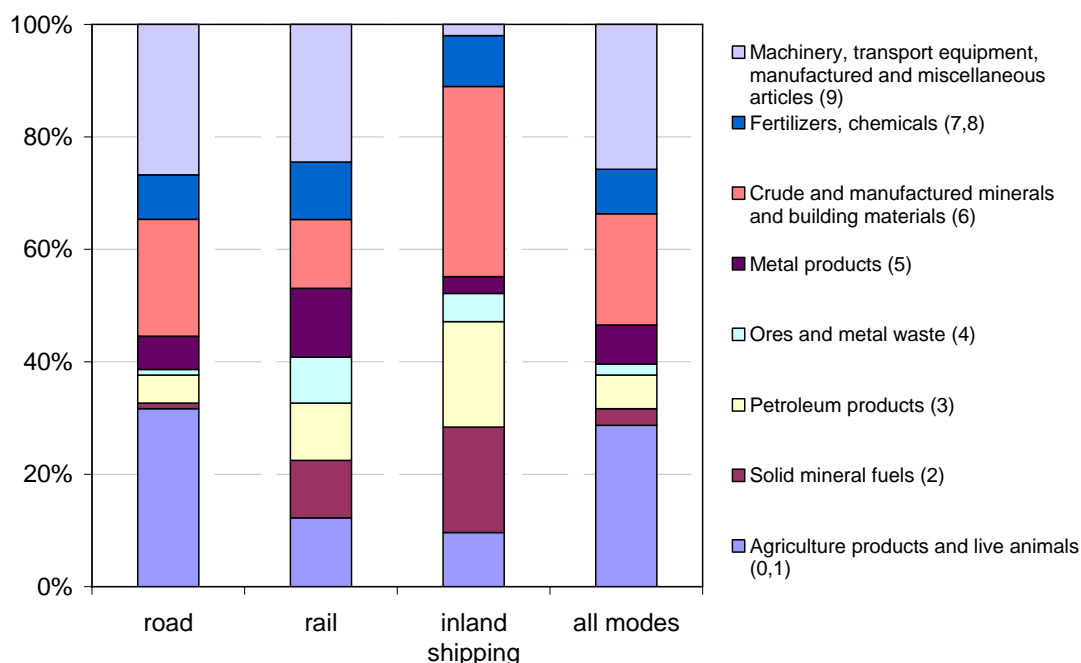
It may be a useful policy to decouple the environmental impacts from GDP (promoting eco-efficiency), rather than transport volumes itself. However, as long as some environmental impacts of freight transport (such as noise, fragmentation and biodiversity decline, and to some extent also CO₂-emissions) are closely linked to transport volume, decoupling will remain a necessary part of a strategy towards sustainable transport.

¹ Data for Switzerland and Liechtenstein are missing

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

- i For the EU-15 for which data is available, agricultural products and live animals, are goods frequently transported. 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 unlikely to be shifted to alternative forms of transport.

Figure 3: Types of goods transported in the EU-15



Note: data refer mainly to the years 1994 – 96 depending on country and mode. For these three modes, the EU-15 in 1995 accounted for 74 % of the tonne-kilometres in the EEA-30. Percentages mentioned are shares in tonne-km. For each type of goods, the chapter number is given between brackets

Source: European Commission, 2002

Assessment for the sub- indicator

Manufactured goods (chapter 9 – see Figure 3) represent a substantial share of goods transported by road, while inland shipping and rail transport play a relatively more important role in the transport of bulk goods, like minerals (chapter 6), solid mineral fuels (chapter 2) and petroleum products (chapter 3). For most categories of goods, the share in *road* transport (in tonnes) in 2000 was very similar to that of 1990 (Eurostat, 2003). 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.

The average value of the goods that are transported varies greatly between the modes. An average road cargo is valued at 1674 €/tonne, compared with 924 €/tonne for rail transport and 86 €/tonne for inland waterway transport (ECMT, 2003). The prices reflect the differences in bulk versus more processed and manufactured materials and goods.

Clearly, road is the preferred mode for long distance transport of high-value goods. However, also perishable goods and/or goods with a regional production character, such as agricultural products, animals and fodder (chapter 1 and 2) are also important categories of goods transported mainly by road. Other factors influencing the choice of transport mode are likely to be transport distance, with road being more flexible for shorter distances, and the vertical organisation of the sector. Agricultural production chains may be fairly tight and for instance be cooperatives owning their own road transport, while in fossil fuel chains it is common for

companies to be active in all the stages in the chain including transport (mostly inland vessels or bulk tankers).

We may thus identify five factors that influence the choice of transport mode : distance, sector organisation, localized or spread-out production, value per tonne and “shelf life” of the goods. This means that e.g. modal shift may be limited to fairly small market segments.

References

ECORYS, 2004. *Ex ante Evaluation Marco Polo II (2007-2013) Final Report-1*, ECORYS Transport, Rotterdam, 15 June 2004

ECMT, 2003. *Managing the fundamental drivers of transport demand*, European conference of ministers of transport, 2003.

ECMT, 2001. *Rail freight transport in a pan-european context*. European Conference of Ministers of Transport (ECMT), November 2001.

<http://www1.oecd.org/cem/online/speeches/JSrail01.pdf>

European Commission, 2001a. *Communication from the Commission – A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development (Commission's proposal to the Gothenburg European Council)*. Commission of the European Communities (COM(2001)264 final). Brussels, 15 May 2001 (http://europa.eu.int/eur-lex/en/com/cnc/2001/com2001_0264en01.pdf)

European Commission, 2002. *EU Transport in figures - statistical pocketbook 2002*. European Commission Directorate General for Energy and Transport in co-operation with Eurostat. Brussels, Belgium.

European Commission, 2006. *Energy and Transport in figures 2005*. European Commission Directorate General for Energy and Transport in co-operation with Eurostat. Brussels, Belgium (http://ec.europa.eu/dgs/energy_transport/figures/pocketbook/doc/2005/etif_2005_whole_en.pdf)

European Commission, 2006. *Keep Europe moving – Sustainable mobility for our continent. Mid-term review of the European Commission's 2001 Transport White Paper*. Brussels, Belgium (http://ec.europa.eu/transport/transport_policy_review/doc/com_2006_0314_transport_policy_review_en.pdf)

European Council, 1999. *Council Strategy on the integration of environment and sustainable development into the transport policy submitted by the 'Transport' Council to the European Council of Helsinki*. Brussels 11 October 1999, Press release nr 11717/99 (<http://ue.eu.int/Newsroom/LoadDoc.asp?MAX=361&BID=75&DID=59794&LANG=1>)

European Council, 2001. *Göteborg European Council - Presidency Conclusions 15-06-2001*. (<http://ue.eu.int/Newsroom/LoadDoc.asp?BID=76&DID=66787&LANG=2>)

European Council, 2002a. 2nd review of the *Council Strategy on the integration of environment and sustainable development into transport policy (draft Council conclusions)*. Brussels, 30 November 2002 (doc 14966/02). <http://register.consilium.eu.int/pdf/en/02/st14/14966en2.pdf>

European Council, 2002b. *Decision no 1600/2002/ec of the European Parliament and of the Council of 22 July 2002 laying down the sixth community environment action programme*. http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_242/l_24220020910en00010015.pdf

Eurostat, 2003. *Trends in road freight transport 1990 – 2001, Theme 7 – 5/2003*. European Communities, 2003.

Eurostat, 2006, Eurostat, free data available on the web site:

<http://www.europa.eu.int/comm/eurostat/>. Assessment based on unpublished electronic update from the Structural Indicators data set. Supplied by Boryana Milusheva (Eurostat), May 2006

Eurostat, 2005. Assessment based on unpublished preliminary estimates by Eurostat's Sea Transport Working group meeting in February 2005. Provided by Boryana Milusheva (Eurostat), March 2005.

FAW, 2000: *Lifestyles, Future Technologies and Sustainable Development*. Schauer, T. FAW - Research Institute for Applied Knowledge Processing. Ulm, Germany, June 2000.

TNO, 1999: *TRILOG-Europe Summary Report*. Demkes, R., Ter Brugge, R., Verduin, T. TNO Inro, Delft, the Netherlands, 1999.

Data

Table 1: Trends in freight transport demand (EEA-30) by mode

Unit: 1000 million tonne-km

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Road	1204	1210	1281	1418	1459	1518	1589	1636	1680	1707	1756	1775	1911
Rail	356	340	349	359	360	380	370	357	374	360	359	368	388
Inland waterways	112	110	118	122	120	128	131	129	134	133	132	123	134

Note: data for Switzerland and Liechtenstein are not available

Source: Eurostat, 2006

Table 2 Trends in transport intensities*Unit: Tonne-km per 1000 euro GDP (1995 prices)*

	1992	1995	2004
Austria	153	228	267
Belgium	238	271	243
Bulgaria	3614	4009	1542
Cyprus	-	154	118
Czech Republic	-	1285	1196
Denmark	166	175	152
Estonia	2154	1877	3151
Finland	348	339	307
France	189	194	180
Germany	178	193	207
Greece	148	151	-
Hungary	-	694	637
Iceland	-	89	99
Ireland	136	119	175
Italy	195	215	225
Latvia	3030	3098	3940
Liechtenstein	-	-	-
Lithuania	2616	2537	2968
Luxembourg	400	404	438
Malta	-	-	-
Netherlands	331	330	341
Norway	-	109	139
Poland	-	1131	1007
Portugal	234	239	395
Romania	1751	1737	1729
Slovenia	524	564	571
Slovakia	-	2810	1332
Spain	230	247	369
Sweden	244	266	237
Switzerland	-	-	-
Turkey	-	934	919
United Kingdom	192	202	170
EEA30	250	268	276
EU25	230	248	259
EU15	200	215	225
EU10	-	1204	1088
CC3	1234	1249	1067
EFTA2	106	108	137

Source: Eurostat, 2006

Table 3 Trends in sea and oil pipeline transport compared to other modes in the EU-15*Unit: 1000 million tonne-km*

	Short sea	Oil pipelines	Road	Rail	Inland waterways	Total
1995	1133	105	1248	358	120	2965
1996	1140	111	1268	360	116	2995
1997	1193	110	1317	380	124	3123
1998	1220	117	1386	370	127	3220
1999	1270	117	1444	358	127	3315
2000	1345	119	1491	374	132	3461
2001	1388	124	1521	359	130	3522
2002	1404	121	1563	358	129	3575
2003	1435	123	1575	364	120	3617
2004	1484	124	1684	379	130	3802

Note: In 2002, the EU15 accounted for 76 % of the total combined transport demand of road, rail, and inland navigation in the EEA-30, so the figures here can give a rough indication of the whole EEA-30. Short sea transport excludes transport between EU and other countries – see Box 1 for more information.

Source: European Commission, 2006

Meta data

Web presentation information

1. Abstract / description / teaser:
Freight transport demand keeps growing and has not been uncoupled from GDP growth, but a closer look at the regions reveals large differences.
2. Policy issue / question:
Are we achieving an uncoupling of transport growth and economic growth?
3. EEA dissemination themes:
Transport
4. DPSIR: D

Technical information

1. Data source: TERM 13 2006 data (sec draft).xls
Freight transport demand and GDP data: Eurostat structural indicator data (Eurostat, 2006)
Data on short sea shipping is from the DG Tren Pocketbook (European Commission, 2006)
2. Description of data: Data contains the number of tonne-km by road, rail, and inland waterways for the EEA-30 countries since 1990 (some gaps exist). Data for short sea shipping and oil pipelines is incomplete. 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). May 2006 dataset: a_gdp_k downloaded from Eurostat website (publicly available).
Original measure units: Tonne-km. Road: domestic and international travels by vehicles registered in that country. Rail and inland waterways: domestic and international travels on national territory (in some cases different definitions are applied).
3. Geographical coverage: EEA-30, consisting of EU-15 (Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the United Kingdom), EU-10 (Czech Republic, Cyprus, Malta, Estonia, Latvia, Lithuania, Hungary, Poland, Slovak Republic, Slovenia), Norway, Iceland, Turkey, Romania, Bulgaria. Also Liechtenstein and Switzerland are member of the EEA, but the specific data needed for this Fact Sheet are not available for these countries.

4. Temporal coverage: Tonne-km: 1990-2004 (but with gaps)
5. Methodology and frequency of data collection: Tonne-km, old-15: annually collected by a Common Questionnaire developed jointly by Eurostat, UNECE and ECMT. Tonne-km, EU-10: Also collected by Eurostat; data previously very incomplete, but now improving.
6. Methodology of data manipulation, including making 'early estimates':
 Road, 1992-1994, Norway, Iceland, Cyprus, Malta: linear extrapolation based on adjoining years.
 Road, 1992, Slovak Republic: extrapolated from adjoining years assuming same trend as in neighbouring Poland.
 Road, 1992, Turkey: linear extrapolation based on adjoining years.
 Rail, 1992, Czech Republic, Slovak Republic: linear extrapolation based on adjoining years.
 Rail, 1992-94, Norway: Assumed equal to 1995 level.
 Inland navigation, Slovak Republic, Hungary, Czech Republic, 1992: linear extrapolation based on adjoining years.
 Inland waterways, 1992, Hungary, Slovak Republic, Czech Republic: linear extrapolation.
 GDP, 1990-1994, Czech Republic and Poland: Old time series (TERM 2003 data) used.
 GDP, 1992, Estonia: linear extrapolation based on adjoining years.
 GDP, Malta 1991-1998: Old time series (TERM 2003 data) used.
 A systematic error of 20 % (arbitrarily chosen) would only lead to a 2 % error in the 1992 estimates for EEA-30, and 7 % in the 1992 estimates for EU-10. Moreover, the base data themselves are occasionally based on estimates from Eurostat or national authorities which reduces reliability.

Quality information

7. Strength and weakness (at data level): data for short sea shipping, air freight transport, and oil pipeline transport is too incomplete to be included in calculation of totals. Availability of reliable data for these modes (particularly sea) would strengthen the analyses.
8. Reliability, accuracy, robustness, uncertainty (at data level): Data is quite reliable for the EU-15, though sometimes the data is based on rough estimations. For the EU-10, there are, particularly for road data, frequent estimations, gaps, or breaks in time series.
9. Overall scoring (give 1 to 3 points: 1=no major problems, 3=major reservations): 2 (unreliable statistics for EU-10)
 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: 2 (New Member States have many data gaps and historically less reliable data)
 Comparability over space: 2 (New Member States have many data gaps and historically less reliable data)

Further work required

Consistent and reliable data from the EU-10 and candidate countries would strengthen the conclusions.

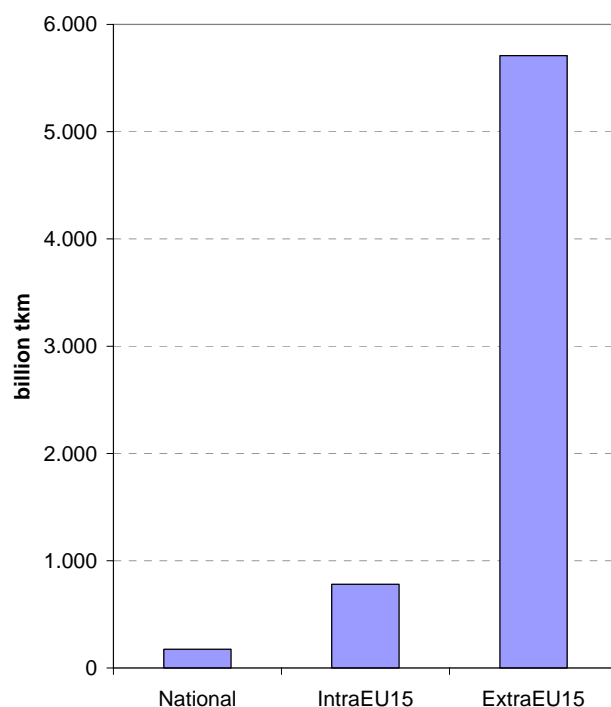
Data is needed on deep-sea shipping in general and short-sea shipping for the EU-10 in particular.

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

Box 1 International sea freight transport dwarfs intra-EU transport

In road transport, most of the transport volume comes from transports within that country, and the most of the rest comes from transports to or from other EU countries. Sea shipping, on the other hand, is dominated by long distance international transport, and ignoring the contribution of transport between EU and non-EU countries seriously underestimates the scale of sea transport (Figure).

Figure 4 The scale of international sea transport in 2003



'ExtraEU15' includes transport between EU-15 and countries outside EU-15. Half of the kilometres are here allocated to EU-15, the other half being allocated to the trading partners. 'IntraEU15' includes transport between EU-15 countries. 'National' includes transport with origin and destination in the same country. Figures should be considered very rough estimates.

Source: Eurostat, 2005.

When international sea transport is included, sea transport volumes dwarf those of all other modes. This is not necessarily reflected in the environmental impacts, as these are also determined by the efficiency of transport and location of emissions. For some information on emissions, see *TERM 02 - transport emissions of greenhouse gases* and *TERM 03 - Transport emissions of air pollutants*. Due to the crude nature of the estimates and lack of data, it is not possible to produce a reliable time series, but the volume is likely increasing steadily as is total energy consumption by maritime vessels (see *TERM 01 –energy consumption*).