European Environment Agency

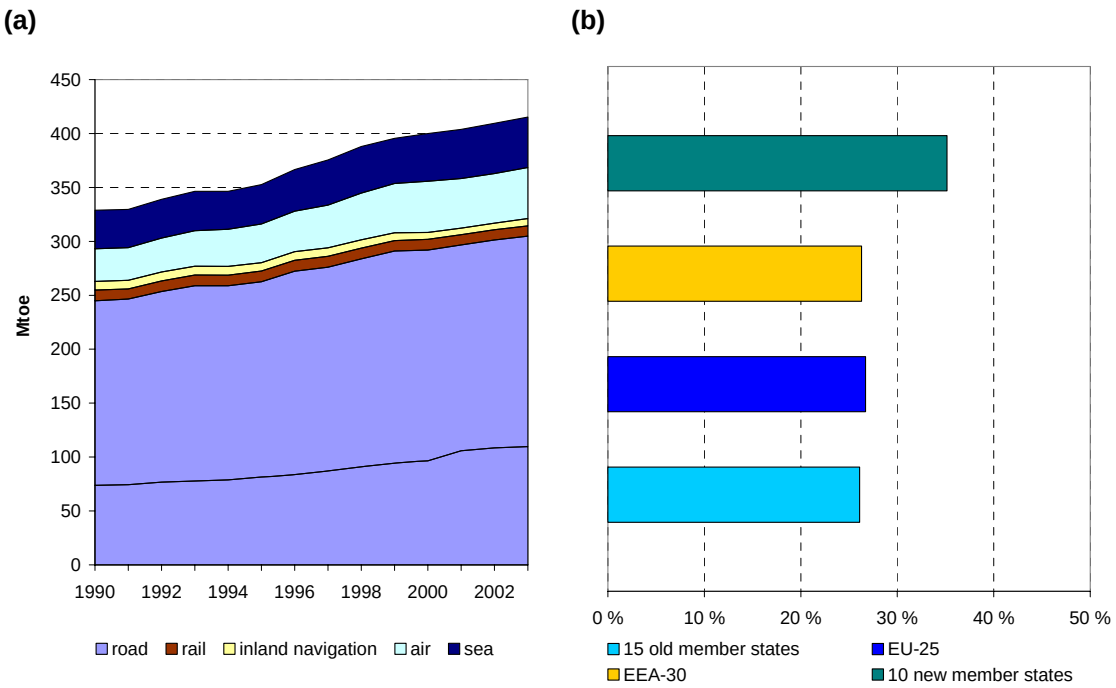
Indicator fact sheet

TERM 2005 01 — Transport final energy consumption by mode

Indicator code / ID	
Analysis made on (Assessment date)	15 September 2005
EEA contact /fact sheet responsible Name: Peder Jensen Email: peder.jensen@eea.eu.int	Fact sheet development contact point Name: Eelco den Boer, CE Delft Email: boer@ce.nl

☹ **Transport energy consumption increased by 26 % between 1990 and 2003. It is one of the major energy-consuming sectors, being responsible for about 34 % of total energy consumption in 2003. Aviation is the sector's fastest growing energy consumer and road transport is the biggest, consuming around 73 %[1] of transport energy consumption. The continued growth in energy consumption threatens compliance with the Kyoto targets.**

Figure 1: (a) Total energy consumption in transport (EEA-30), 1990–2003 (Mtoe) and (b) growth in transport energy consumption by region between 1990–2003



Note: Inland navigation includes transport on inland waterways and coastal transport. The line dividing road transport distinguishes the share of freight (*lower part*) from passenger (*upper* part) transport. The division is based on information from the 25 EU countries. Box 1 further elaborates on this. Transport by pipelines is excluded, as its contribution is far less than 1 % of total energy consumption by transport. EU-25 refers to the 25 EU member states as of May 2004. EEA-30 refers to EU-25 plus Norway, Iceland, Bulgaria, Romania, and Turkey. The modes included in figure 1a are also included in figure 1b. Detailed data can be found in Table 1 and 2.

Source: Eurostat, 2005.

Results and assessment

[1] The modes taken into account are: road, rail, aviation, inland navigation and maritime shipping.

Policy relevance

Transport is one of the largest energy-consuming sectors, accounting for one third of final energy consumption (Eurostat, 2005) and transport energy consumption still rises year-by-year. Transport relies almost exclusively on fossil fuels (98%) wherefore greenhouse gas emissions grow roughly parallel to energy consumption. To reduce the impact of greenhouse gas emissions, all EEA-30 countries with the exception of Turkey, Malta and Cyprus have committed to greenhouse gas targets agreed upon in the Kyoto Protocol. However, no specific targets have been set for the transport sector to address and reduce energy consumption.

Policy context

Reduction of the impacts of fossil fuel consumption by transport can be achieved by reducing transport demand, the energy use per transport movement or by increasing the share of sustainable means of propulsion that are less dependent on fossil fuels (e.g. fuel cell or electric vehicles, or by using biofuels).

The EU and its new Member States committed themselves to meet the targets set in the Kyoto Protocol, which for the old EU-15 and most of the new Member States is an 8 % reduction of greenhouse gas emissions by 2008–12 compared to 1990 levels. The European Sustainable Development Strategy, which is the EU's long-term strategy for economically, socially and environmentally sustainable development confirms this objective and also foresees in a goal after 2012 to reduce atmospheric greenhouse gas emissions by an average of 1 % per year up to 2020 (European Commission, 2001). Unfortunately, the latest projections from the EEA show that existing domestic policies and measures will reduce the EU's total emissions in 2010 to only 0.5 % below 1990 levels (European Environment Agency, 2003).

In addition to the domestic targets, it is also agreed in the Kyoto Protocol that bunkered fuels do not count for national CO_2 emission reduction. The aviation and maritime shipping organisations are responsible for action on CO_2 emission reduction in their international industries. The ICAO recently explored introducing emissions trading in the aviation sector. However, the recently held triennial ICAO assembly gives –under United States' pressure- Europe only little room to develop economic schemes to tackle aviation climate emissions. According to specialists and environmental groups the coming years will be essential for the development of economic instruments, as the United States will probably lock the door at the next assembly.

The above mentioned Sustainable Development Strategy envisages the following measures at the EU level to achieve sustainability in transport:

1. *Energy taxation*: the Commission´s proposal for a framework Directive to restructure and harmonise the Member States´ national systems of energy taxation was adopted by the Council in October 2003. The new Directive leads to an increase in minimum tax rates on mineral oil products and a widening of the scope of the EU system of excise taxation beyond mineral oils to include competing sources of energy. It will thus help reduce emissions, prevent distortions of competition in the internal market and contribute to the internalisation of external costs of energy use.

2. *CO_2 emission reduction measures*: The Community's strategy to reduce CO_2 emissions from passenger cars and improve fuel economy was endorsed by the Council in 1996 (European Commission, 2000b). It aims at achieving an average CO_2 emission figure for new passenger cars of 140 g CO_2/km by 2008/09 by covenants with the car manufacturers' associations ACEA, JAMA and KAMA. This year a review is to be held on the potential for further cuts in average new car CO_2 emissions between 2008 and 2012, aiming towards the EU's overall target of 120 g/km. According to the latest progress report, considering all measures at EU and national level, the average specific CO_2 emission from new passenger cars in the EU decreased in the period 1995 to 2002 from 186 g CO_2/km to 166 g CO_2/km, corresponding to a decrease of about 1.5 % per year. However, significantly stronger reductions of 3.5 % per year will have to be achieved to reach the 140 g CO_2/km by 2008/09 (European Commission, 2004). In a recent resolution, the European parliament urgently asks the Commission for additional

measures to reach the Community goals. With passenger car taxation changes that favour low carbon emitting cars (European Parliament, 2004).[2]

3. *Introduction of alternative fuels*: in order to promote the use of bio-fuels in transport and pave the way for gradually increasing the capacity of bio-fuel production, while securing the energy supply and rural employment, a Directive (2003/30/EC[3]) has been adopted that aims at a biofuel penetration of 2 % in 2005 and 5.75 % in 2010. Member States are not subjected to any binding target, however, their progress has to be reported annually with respect to the projected goals. Member States are generally allowed to reduce excise duties for biofuels by up to 100 % (Directive (2003/96/EC) in order to stimulate their use[4].

4. *Improve energy efficiency*: The long-term EU target as expressed in the 5th Framework Programme is a 50 % reduction in CO_2 emissions per passenger-kilometre and per payload-kilometre. In the shorter term the aim is 5 to 10 % energy savings in order to achieve aggregate reductions in CO_2 emissions (European Commission, 2000c). In 2003, the European Commission came with a proposal for a Directive on the improvement of energy efficiency. The Directive sets indicative targets for Member States to achieve 1 % annual savings in energy efficiency. Each country would then decide how to distribute this target among their different sectors. The Commission envisages covering also all distribution sectors, from electricity and gas to district heating and transport fuels[5]. As to not put a disadvantage on countries that already have undertaken measures in energy saving, countries may take into account their efficiency gains as from 1991 (European Commission, 2003a).

5. *Research, development and promotion*: The European Commission is working on the following “clean transport” fields with respect to energy and transport:

– Promoting and developing clean urban transport (e.g. CUTE and CIVITAS[6]);

– Hydrogen application; “European Hydrogen and Fuel Cell Technology" Platform. The new platform is to promote and smoothen the EU's transitions from a fossil fuel based economy to a 'hydrogen economy' while gaining worldwide leadership in this new technology.

– The ‘Intelligent energy for Europe’ multi-annual research programme 2003–2006 (European Commission, 2002). This programme – with a total budget of € 215 million for the four-year period – is structured around specific fields: this includes the STEER programme, which concerns research on alternative vehicle propulsion, support for initiatives relating to the energy aspects of transport, the diversification of fuels and the promotion of renewable fuels. It also includes the preparation of legislative measures and their application.

The legislation and decisions outlined in this section should in principle apply to the ten countries joining the EU in 2004. However, in some cases they have negotiated so-called transition periods, giving them more time for implementation of specific provisions of EU environmental Directives.

Environmental context

Transport is nearly fully dependent on fossil fuels (98 % of transport consumption, representing 67 % of final oil consumption in the 15 old member states, for EU-25 the case is more or less

[2] It should however be stated here that the CO_2-emission factors reported by ACEA/JAMA/KAMA are based on the standard ECE-testing procedure and the EUDC (Extra Urban Driving Cycle). During this test all electronic devices and air-conditioning are turned off. It is therefore likely that real-world CO_2-emission factors are higher than presented by ACEA/JAMA/KAMA.
[3] Official Journal L 123, 17/05/2003 P. 0042 - 0046
[4] In the Netherlands, discussions are being held in the government on how the Directive should be implemented in the Netherlands. A study by CE namely indicated that co-combustion of biomass is more cost-effective and brings about more environmental benefits. The Directive leaves room for such an approach (CE, 2003). Germany is an example of a country opting for full de-taxation of biofuels.
[5] Energy intensive industries falling under the Emissions Trading Directive or IPPC Directive are excluded from the scope of the Directive.
[6] CUTE stands for Clean Urban Transport for Europe and CIVITAS for CIty VITAlity Sustainability.

the same) and thereby contributes heavily to the emission of CO_2 and other air pollutants (European Commission, 2000a). Additionally it contributes to the depletion of oil sources.

Assessment

Transport energy consumption in EEA-30 area has grown by 1.6 % per year during the 1990 – 2003 period, and equalled 416 Mtoe (million tonnes oil equivalents) in 2001 (some 34 % of all energy use). There have been improvements in energy efficiency, such as for passenger cars, where new vehicles have increased energy efficiency by 1.5 % per year since 1995, but they have fallen far short of offsetting the growth in transport demand. Moreover, the continuing shift of transport demand towards the more energy intensive road and air modes have also contributed to the increase.

All in all, the growth in energy consumption in the transport sector is projected to continue at on average 1 % a year in the EU-25 from 2000-2030.[7] However, transport demand is projected to grow faster. The energy intensity of transport is thus expected to decrease (European Commission, 2003a).

While the growth figures for the regions listed in figure 1b are roughly equal, it covers over some heterogeneity. While in the 15 old Member States the energy consumption has been steadily growing since 1990, in many of the ten new members there has been an absolute decline during some years. Countries like Lithuania and Estonia have lower energy consumption today than in 1990, but it has nevertheless grown or remained stable since about 1992. Indeed, many of the new member states saw a decline in the early nineties reflecting the economic difficulties experienced in the transition to market economies. However, since the middle of the nineties, the 10 new countries have showed strong growth of more than 3 % per year.

Additional policies that reduce the (need for) demand for travel and energy consumption (energy efficiency improvements, improved spatial planning and logistics) are needed to comply with the Kyoto protocol. However, it must be kept in mind that policies that increase the efficiency of the transport system reduce the costs of transport movements and hence cause increased demand, via the so-called rebound effect. This counterbalances part of the improvements.

Fair transport charging is also an effective policy to reduce the negative effects (e.g. fuel consumption) of transport and generate optimal transport demand for the society as a whole.

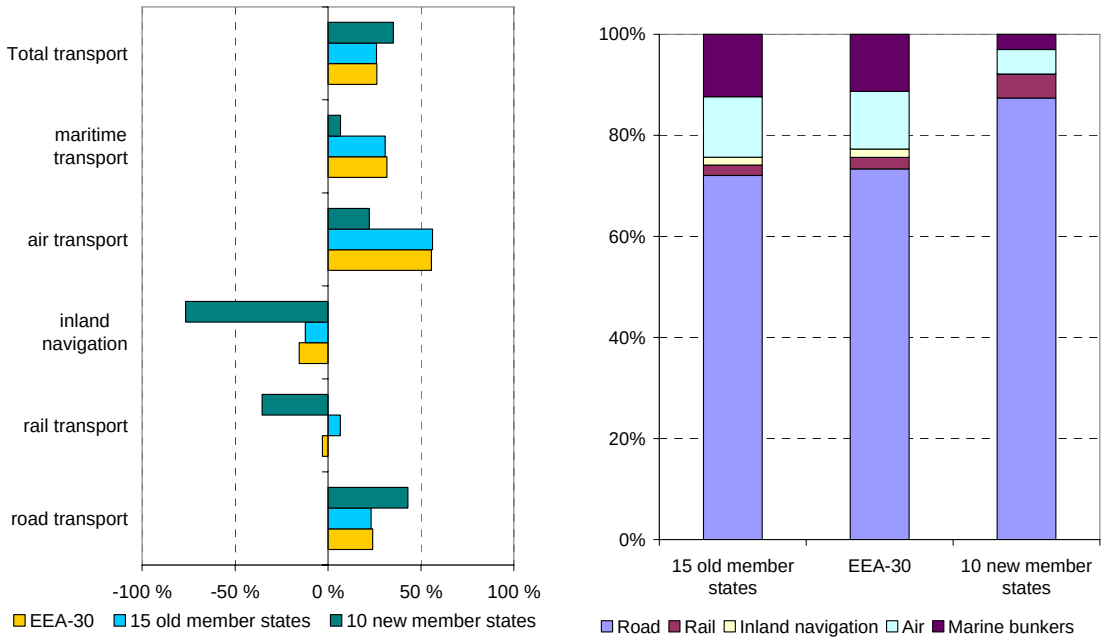
Sub-indicator: Energy consumption by mode

☹ **Road and air transport consume most transport energy in all Member States. These modes account for 85 % of total transport energy consumption in the EEA-30. Air transport shows the highest growth in energy consumption of all modes.**

Figure 2: a) Change in final energy consumption from 1990 to 2003 by transport mode and b) distribution of final energy consumption over transport modes in 2003

a) **b)**

[7] This is a baseline projection based on the PRIMES model that assumes business as usual. It does not include the effect of any new policies (the energy services directive, emissions trading, alternative fuels policy (in the projection biofuels reach only 3 % in 2020), post-Kyoto, etc. The projections were made as a framework for future policy making.



Notes: EU-25 is not included in the charts as it differs minimally with the EEA-30 bars. The energy consumption is allocated based on amount of fuel (energy) tanked in a specific country - this does in some cases not accurately reflect how much is *used* in or by that country or region. See text for discussion. The share of pipelines is very low (0.15 % for the EEA-30) and is therefore not visible on the chart. However the growth was threefold during the nineties in the EEA-30 area, mainly due to growth in Austria.

Source: Eurostat, 2005

Assessment

Road transport energy consumption has increased in both the old and new member states. This is partly (at least old EU-15 states) because real consumer fuel prices have remained more or less on the level of 1990 through the 1990's (see TERM 2005 21 EU – Fuel prices), while incomes have increased in the same period. As a result of this, driving has become more affordable. Substantial increases in fuel prices since 1999 have slowed, but not reversed the growth in recent years. In the new member states, west-European transport patterns have replaced the historical ones, increasing the demand for road fuel. Reasons for this are:

- The private car is seen as a symbol of belonging to the west.
- The reconfiguration of trading patterns from eastward oriented (Russia) to westward oriented (Europe) and from bulk materials to manufactured goods. This increased the importance of road transport, because road transport is flexible and the easiest mode to access European markets. In turn, rail transport could not keep pace and lost its historical high share.

The share of road transport is higher in the 10 new member states, as a result of the small share of air and sea shipping in transport energy consumption. However, the total energy consumption is still lower. This in turn can be explained by less disposable income in the new member states and the geography of the new member states.

Air transport shows the strongest growth in energy consumption of all modes over the last decade (56 % in EEA-30), linked to the strong increase in demand. However, energy consumption declined in 2001 and 2002, likely a consequence of the terrorist attack on World Trade Centre in New York City and the SARS epidemic. EU projections from 2003, however, foresee an average 1.6 % annual growth in aviation energy demand from 2000-2030. However, this is without calculating the effect of possible future measures, e.g. emissions trading, en-route charging or fuel taxes (European Commission, 2003a).

The low share of rail is partly due to a relatively small share in demand, but also because rail transport in most situations is less energy-intensive than the main competitors. The large absolute decline in the ten new member states follow a decline in demand, much of which is

explained by an increase in car ownership of 58 % in the ten new member states since 1990 and reconfiguration of trading patterns.

Maritime transport covers fuels delivered to sea-going ships, except those navigating in coastal and inland waters. This category includes mainly international freight transport. Much of this fuel is tanked in countries such as the Netherlands (Rotterdam) that serve as international hubs. The energy consumption is allocated to countries based on amount of fuel (energy) tanked in a specific country (Table 1). This does, however, in some cases not accurately reflect how much is *used* in that country, or *by* that country, nor is this necessarily the most appropriate way of allocating consumption. The question of how to allocate consumption is a very difficult one when taking into account international transport. Each method has flaws. This is a difficulty in reducing emissions from the modes serving international transport, since discussions about allocation may continue. For reasons of simplicity and readily available data, allocation to countries is based on the amount of fuel tanked in a specific country in this factsheet.

Inland navigation includes water transport in coastal waters and on inland waterways and is only significant in countries with these geographical features. The energy consumption by inland navigation remained more or less constant during the 1990s followed by a decline that is now reversing. Energy consumption is nevertheless still 15 % below the 1990 level in the EEA-30.

For individual countries, there is considerable variation although road in nearly all cases dominates energy consumption. Differences are mainly caused by geographical constraints such as direct access to sea, and to a limited extent by political choices.

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Data

Table 1: Energy consumption for the main modes in 2003 in the EEA-30

Unit: 1 000 tonnes of oil equivalents (ktoe)

	Road	Rail	Inland navigation	Air	Sea	Pipelines
Austria	6552	313	8	507		223
Belgium	8162	174	260	1546	6864	0
Bulgaria	2034	66	0	183	138	92

Cyprus	618	3		332	121	
Czech Republic	5284	269	3	261		28
Germany	52874	1896	234	7157	2573	
Denmark	3905	100	134	763	973	
Estonia	560	54	9	18	111	0
Spain	29720	993	1489	4517	6920	
Finland	3866	96	158	512	630	24
France	42717	1272	758	6514	2801	0
Greece	5981	61	596	1162	3180	2
Hungary	3244	162	9	203		
Ireland	3601	42	17	765	169	
Iceland	203		6	110	67	3
Italy	38189	907	285	3612	3203	41
Lithuania	1090	71	4	34	108	3
Luxembourg	1922	10		390		
Latvia	775	91	0	36	186	2
Malta	193			93	22	
Netherlands	10881	176	277	3338	13451	
Norway	3147	155	848	523	556	
Poland	9353	541	1	291	281	159
Portugal	6173	68	64	782	573	
Romania	3817	326	21	91		22
Sweden	6952	273	172	705	1595	
Slovenia	1281	28		28		
Slovak Republic	1613	62		34		462
Turkey	10315	240	275	1740	615	50
United Kingdom	38941	1051	1144	11069	1735	0
10 new member states	24013	1280	26	1330	829	654
15 old member states	260438	7431	5596	43339	44667	290
EU-25	284451	8711	5622	44669	45495	944
EEA-30	303967	9498	6772	47316	46871	1111

Note: For comparison, the total energy consumption for all sectors was 12.4 billion toe for the EEA-30

Source: Eurostat, 2005

Table 2 Trends in total transport energy consumption by country and region

Unit: 1 000 tonnes of oil equivalents (ktoe)

	1991	1993	1995	1997	1999	2001
Austria	5118	5175	5295	5511	5978	6607
Belgium	12028	12622	12383	14258	13962	14682
Bulgaria	1791	2521	2242	1939	2032	2160
Cyprus	627	730	817	867	981	1114
Czech Republic	2420	3045	2859	3766	4693	5043
Germany	61316	65000	64957	65918	68975	66793
Denmark	4940	5522	6019	5979	6029	5863
Estonia	982	568	578	783	742	750
Spain	27999	27948	29215	33694	37713	40800
Finland	4673	4556	4445	4663	4969	5068
France	44174	46945	46609	50057	52609	54463
Greece	8296	9556	9969	9845	10541	10824
Hungary	2676	2591	2653	2784	3257	3399
Ireland	2069	2324	2458	2988	3849	4435

Iceland	292	309	320	340	383	377
Italy	36875	39061	40095	41089	43896	44742
Lithuania	2363	1224	1176	1313	1244	1244
Luxembourg	1185	1287	1307	1467	1701	1986
Latvia	1395	1182	1086	989	903	1087
Malta	289	308	335	424	382	245
Netherlands	21625	23150	23613	25580	26365	28827
Norway	4246	4722	4898	5534	5709	5390
Poland	7720	7690	8454	9797	11088	9533
Portugal	4597	4983	5333	5758	6625	7018
Romania	3774	3181	3057	4147	3158	4097
Sweden	7949	8198	8701	8995	9496	9939
Slovenia	856	1069	1326	1562	1311	1372
Slovak Republic	1391	1240	1509	1583	1602	1960
Turkey	9121	11085	12104	12067	11869	11940
United Kingdom	47274	49176	49283	52338	54111	53282
10 new member states	20475	19410	20570	23655	25996	25747
15 old member states	290120	305503	309681	328136	346821	355329
EU-25	310594	324913	330250	351792	372817	381077
EEA-30	329818	346731	352871	375819	395968	405041

Source: Eurostat, 2005

Metadata

Technical information

1. Data sources: Eurostat, 2005, Main data set *es_100a available from the website of Eurostat. Downloaded August 2005.*
2. Description of data: Data concerns the energy finally consumed in transport.
   Original measure units: 1000 tonnes of oil equivalent, an energy unit equivalent to 4.19 TJ

   File: TERM 2005 01 EEA-30 Transport energy consumption by mode.xls
3. Geographical coverage: EU-25 (consisting of Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden, United Kingdom, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia), and Norway, Iceland, Bulgaria, Romania, Turkey, and Croatia.

   EEA-30 is all these countries combined except Croatia
4. Temporal coverage: 1990–2003.
5. Methodology and frequency of data collection: Frequency: Annually. Energy consumption is based on fuel sales, reported through a common questionnaire. Energy consumed by electric trains is included too, as is energy consumption from diesel trains.
6. Methodology of data manipulation, including making 'early estimates': Latvia: sea shipping data are only available for 2001. The entire series from 1990-2000 was estimated assuming that bunkering followed the same linear trend as the non-bunker energy consumption statistics for Latvia.

Quality information

1. Strength and weakness (at data level): Trends in individual countries are difficult to ascertain. Energy consumption data often show unexpected variability from year to year.
2. Reliability, accuracy, robustness, uncertainty (at data level): The data for the old member states can be qualified as good, except data for pipelines, for which data lacks for many countries. Occasionally, data for older time series may change due to occasional revisions of methodology. These have previously resulted in changes of a few percent. For the ten new members and the three candidate countries the data are generally much less reliable. Gaps are frequent, as are conspicuous jumps in consumption (e.g. by a doubling or more). The most troublesome data are from the early nineties and data from the three Baltic States.
3. Overall scoring (give 1 to 3 points: 1 = no major problems, 3 = major reservations): 2

   Relevancy: 1
   Accuracy: 2 (Allocation of international consumption may be contentious)
   Comparability over time: 2 (good for groups of countries, but problematic for many individual countries where particularly data from the early nineties are less reliable)
   Comparability over space: 2 (the ten new member states have less systematic data, but group comparisons are quite safe)

Further work required

Allocation to individual countries for consumption on international travels may be contentious. This is particularly relevant for aviation and sea shipping. Data for inland navigation include not only river navigation, but also coastal shipping which would be useful to distinguish. Efforts are needed to improve methodologies and data to improve the statistics in this respect.

Box 1: Energy consumption in road transport by passenger and freight vehicles

The available European statistics cannot distinguish between energy consumption in road transport by passenger and freight vehicles, since passenger and freight vehicles are both fuelled by diesel. However, road transport consumes the major portion of total transport energy demand, as is depicted in figure 1. Therefore, it is illustrative to divide road energy consumption into freight and passenger transport, on the basis of bottom-up calculation. Such a division also gives information about the shares of passenger and freight transport in total transport CO_2 emission, since carbon content of the various fuels is roughly the same.

Figure 3 presents the energy consumption of passenger and freight transport on roads in comparison with the other modes. Figure 4 in turn zooms at the distribution of energy consumption within transport on roads.

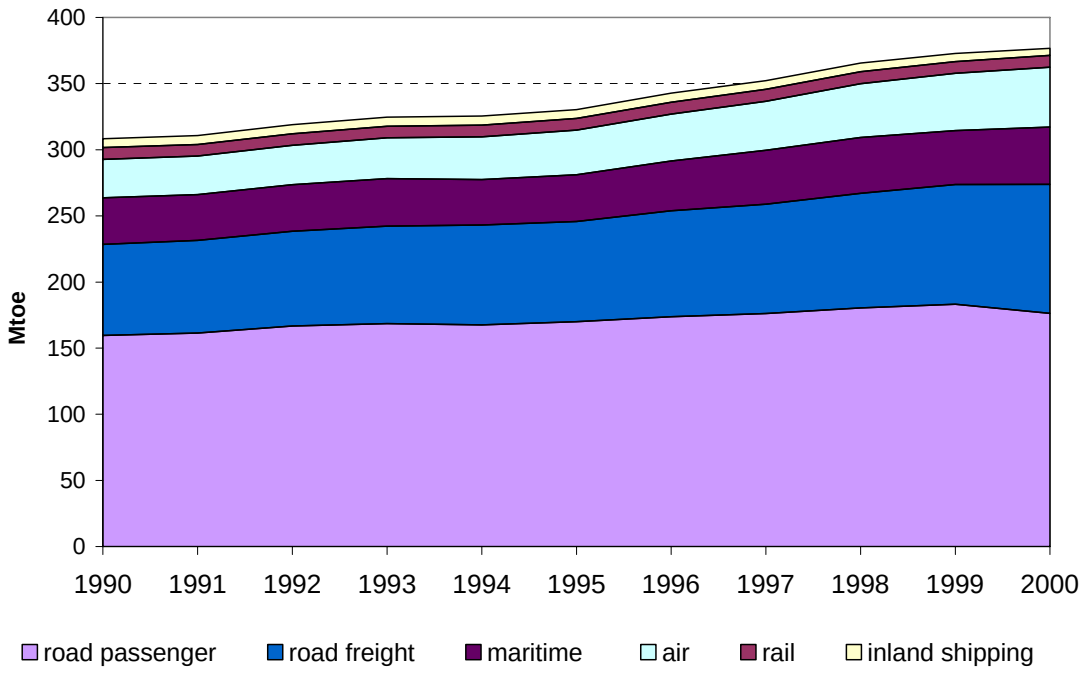
Private cars consume most energy in transport in the EU-25. These vehicles consume about half of the total transport energy demand. However, its share is declining, mainly because freight transport grew stronger than passenger transport during the last decade. For the future, energy consumption in freight transport is expected to remain growing stronger than in passenger transport. This is because people generally do not travel longer than 1.5 hours a day, independent of the mode used (horse and carriage or by car or high-speed train). Passenger transport may therefore reach a level of saturation, while freight transport is expected to continue growing since it is -to some extent- linked to economic growth. Another reason for the decline of passenger car energy consumption is the sharp rise of air passenger transport during the last decade, reducing the number of long distance road trips.

Private passenger vehicles are mostly fuelled by petrol. However, the share of diesel has grown during the nineties, reflecting the increased popularity of diesel cars. This is at least partly because of the improved driving properties of these vehicles. Since modern diesel vehicles have higher emissions of NO_X and PM_{10} than gasoline vehicles, the increased sale of diesel fuel creates problems with respect to human health and European air quality legislation at main transport routes and in cities.

Private vehicle fuel consumption -both gasoline and diesel- shows a downward trend in 2000. An explanation for this may be the high increased fuel prices at that time. Despite the decrease in passenger transport energy consumption, road freight energy consumption continued growing during this year, even at the strongest pace between 1990 and 2000.

LPG has a small market share but its share has remained more or less constant during the nineties. This may be caused by the limited availability of refuelling points, higher maintenance cots and sensitivity to interruptions.

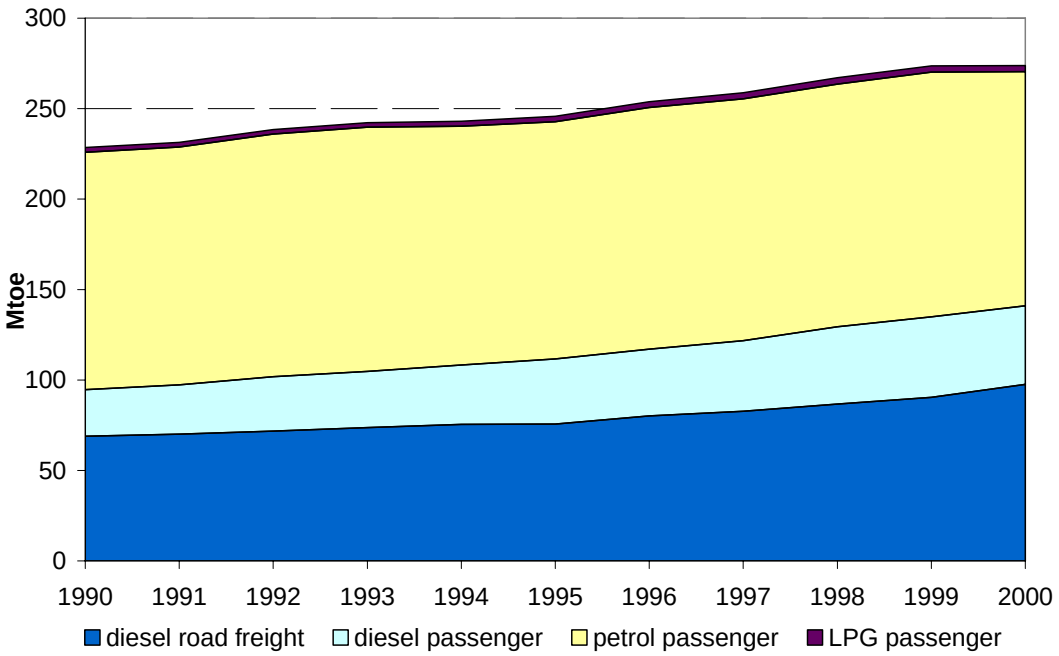
Figure 3: Distribution of EU-25 transport energy consumption over modes



Note : Road freight energy consumption represents heavy duty energy consumption, which includes bus energy consumption.

Source: Eurostat, 2005; JRC,2004

Figure 4: Distribution of EU-25 road transport energy consumption over passenger and freight transport.



Source: Eurostat, 2005; JRC,2004

Box 2 Energy use from other life cycle aspects than fuel use

The energy content of the fuel consumed does not reveal all the energy consumed during the entire life cycle of transport vehicles. The major phases of energy consumption apart from fuel use by the vehicle during operation include vehicle production (mainly energy for steel production), refining of fuels, maintenance of vehicles and finally even maintenance and construction of infrastructure.

Life cycle analyses have cast some light on these issues by generalizing from analyses of particular vehicles. Table 3 offers indicative values for various life cycle components for the modes covered. All values there derive from particular instances of life cycle analyses, and may not correctly represent the situation for the 'average' European mode in question. Different life cycle analyses of passenger cars, for example have suggested that anywhere from 15 % to 35 % of total life cycle energy consumption occurs outside of the fuel use phase (the main data used in this fact sheet). Below we have shown different estimates to give an indication of the values.

It is clear that while in all cases the majority of the life-cycle energy consumption occurs in the fuel-use phase, neglecting all other sources would lead to underestimates of the totals – often by 25 % or more. While energy use is not a proper indicator of all other costs, it suggest that other environmental costs such as greenhouse gas emissions, air pollutant emissions, and a host of other environmental problems may be significant outside the fuel use phase.

Table 3 Various estimates of 'extra' energy costs of all vehicle life cycle processes, relative to fuel use alone

Unit: % of energy for fuel use alone	Vehicle production, maintenance & scrapping	Infrastructure	Refining (R) and other precombustion processes (P)
Passenger car	10 % [1] 14 % [2] 29 % [4]	10 % [1] 15 % [2]	19 % (P+R) [1] 25 % [4] (P+R) 10 % [3] (R, petrol) 3 % [3] (R, diesel)
Lorry, 32t	10.2 % [2] 20 % [5 (HGV)]	8 % [5 (HGV)]	3 % (R) [3] 6 % [5] (P+R)
Train	18 % [2 Swiss regional train] 10 % [2 German ICE] 17 % [6 (freight)]	6 % [2] 26 % [6]	0 % for electric trains (R)
Inland vessel (barge)	10 % [2]	8 % [2]	5 % (R) [3]
Airplane, short distance	0 % [1]	1 % [1] 18 % [2]	13 % (P+R) [1] 3 % (R) [3]
Sea ship	12 % [5 (container ship)]	21 % [2 (tanker)] 23 % [5 (container ship)]	5 % (R) [3]
Oil pipeline	Low [2]	24 % [2]	5 % (R) [3]

Note: All values here derive from particular instances of life cycle analyses, and may not correctly represent the situation for the 'average' European transport mode in question. 'Other precombustion processes' include oil extraction, transport by tanker, and the like, but not refining (P+R includes both). Infrastructure includes energy required for building and maintenance of infrastructure (roads, rails, ports, etc.). Data from source 1,4,5, 6 is shares in greenhouse gas emissions, but is indicative of shares in energy use as well.

Sources: [1] Maibach, 2005; [2] Simapro, 2005; [3] Jungbluth, 2003 and European commission, 2003b; [4] ExternE, 1999; [5] Mayeres, 2001; [6] Spielmann, 2003