TERM 2001

Indicators tracking transport and environment integration in the European Union

European Environment Agency

NOTE

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European Environment Agency
Kongens Nytorv 6
DK-1050 Copenhagen K
Denmark
Tel. (45) 33 36 71 00
Fax (45) 33 36 71 99
E-mail: eea@eea.eu.int
Internet: http://www.eea.eu.int

Foreword

Progress towards a more sustainable transport system has become an imperative in the European Union (EU), as in many other parts of the world. The Gothenburg European Council has singled out the transport sector as one of the four priority areas where sustainability policy development has to be put on a faster track. Achieving such progress requires better integration of environmental considerations into transport policy and a clear and quantitative picture of the sector and the way in which it is developing.

This is the second European Environment Agency (EEA) indicator-based report on transport and the environment. The key messages of this year's report confirm many of the trends, problems and challenges highlighted in TERM 2000. Overall, the report shows that transport is becoming less and not more environmentally sustainable, and integration efforts have to be redoubled.

The majority of the key messages have 'sad faces', indicating an unfavourable trend or a large distance from the policy objective. Inexorable growth in road transport and aviation is resulting in increasing threats to the environment and human health. The growth in greenhouse gases, in particular, is worrying. To reach the Kyoto targets and beyond (as further reductions of greenhouse gas emissions will be needed) it is essential to reduce substantially the use of fossil fuels in transport. Efforts are also needed to improve the environmental performance of rail transport and shipping, although these remain the least environmentally damaging motorised modes overall. Internalisation of external costs, generally recognised as an essential integration tool, is still facing many barriers.

However, the picture we present is not entirely gloomy. A few key messages carry 'smiley faces', indicating a positive trend. These mainly relate to the technological and fuel improvements that have resulted in vehicles becoming less polluting per transport unit. A significant improvement in air quality in many cities is the result. And there are several 'neutral faces', indicating some positive development, though not enough to meet the relevant objective.

The European Council at its summit in Gothenburg stressed the need to improve internal policy coordination between different sectors. TERM 2001 shows that to restrain the growth in transport, efforts are indeed needed in various other sectors. The transport sector's dependency on fossil fuel clearly runs counter to the objectives of the European strategy for the security of energy supply. Action is also required in the tourism sector; tourism travel is the fastest growing category of passenger transport. Industry has an essential role in the development of more transport-efficient production and distribution systems and in the improvement of freight logistics; 'just-in-time' deliveries continue to have significant transport implications.

Meanwhile, I am pleased to note that the TERM model is increasingly being adopted by other sectors. In our *Environmental signals 2001* indicator report, published recently, we already use some key indicators to give a comparable picture of the development in the various sectors. Together with its partners, EEA is also developing indicator-based reporting systems on energy and agriculture. A good coordination between sectoral reports is needed; EEA is developing a common reporting framework for sectors.

Developing clear targets for the transport sector is essential. Decoupling transport from economic growth and stabilising the modal split — the share of the transport market taken by the different transport modes — at 1998 levels are the two transport objectives included in the Sustainable Development Strategy and the revised Common Transport Policy. It will be a challenge for TERM to monitor progress towards these targets and, most importantly, to assess whether these objectives are sufficient to result in significant environmental improvements.

The sustainable development strategy establishes the link between the Sixth Environment Action programme, the Cardiff process for integrating environmental concerns into sector policies and the Lisbon process, which integrates employment, economic reform and social cohesion. To monitor these processes, it is necessary to complement the TERM indicators with a system of socio-economic indicators. Together with the Commission services we are investigating how to concretise this.

Although the assessment in TERM 2001 focuses mainly on the EU level, it is our intention to develop TERM into a tool for country benchmarking. This will help countries to compare their performances and to learn lessons from their success stories and failures.

The extent to which TERM information is actually used by policy-makers in the formulation of their integration policies is as yet unclear. It is, however, encouraging that the Transport Council has requested the Commission to ensure the long-term continuity of TERM. It is equally important to evaluate the relevance of the TERM approach for policy use needs regularly, so as to match TERM closely to emerging policy information needs. We would therefore greatly appreciate readers' feedback on this report.

Domingo Jiménez-Beltrán
Executive Director

TERM 2001 content and key messages

New in TERM 2001: data improvements, some new indicators and projections

TERM 2001 is the second indicator-based report developed under the transport and environment reporting mechanism (TERM). While building on the same conceptual framework (see Box 1), it differs from TERM 2000 in a number of respects:

- More recent data: improvements in data availability (resulting from efforts by Eurostat, EEA and its European Topic Centres (ETCs), and the Members States) allow us to present more recent data and information for a number of indicators.

- Stocktaking of recent developments in integration strategies and objectives (the 'post-Cardiff process'), both at EU level and in the Member States, was done to ensure that TERM develops in line with these strategies and objectives.

- New and revised indicators: some environmental indicators have been added (e.g. waste from road transport, oil spills from tankers). Particular attention has been paid to improving the indicators dealing with transport externalities and internalisation, which have been revised following recommendations from the international workshop organised by EEA in November 2000.

- Improved assessment methods:

  The findings and recommendations of several recent authoritative studies have been used to develop a more comprehensive and detailed analysis. First steps have also been taken in assessing the effectiveness of existing and new policies, measures and instruments.

  A workshop organised in cooperation between the EEA and the Dutch Ministry of Transport resulted in a number of methodological recommendations, which have helped to improve the methods used for comparing countries ('benchmarking').

- Projections have been included for a number of indicators, using the findings of recent scenario studies done by (or on behalf of) the European Commission and the EEA (supported by the European Topic Centre/Air Emissions).

- To support the improvement of the emissions indicators, a technical study has been made by the European Topic Centre/ Air Emissions that compared transport emission estimates from central (EU) sources with national estimates (EEA-ETC/ AE, 2001).

This report summarises the findings of the in-depth indicator assessments that can be found in the TERM indicator fact sheets, which are available at EEA's internet site *(http://themes.eea.eu.int/theme.php/activities/transport)*. The fact sheets also contain a description of the data and studies used for the projections.

TERM statistics are published by Eurostat in: *Transport and environment: statistics for the transport and environment reporting mechanism (TERM) for the European Union, 2001.* http://www.europa. eu.int/comm/eurostat/

Box 1: The TERM policy context and concept

Article 6 of the Amsterdam Treaty states that environmental protection requirements must be integrated into the definition and implementation of Community policies and activities. The Treaty also identifies integration of environmental and sectoral policies as the way forward to sustainable development.

The European Council, at its Summit in Cardiff in 1998, requested the Commission and the Transport Ministers to focus their efforts on developing integrated transport and environment strategies. At the same time, and following initial work by the EEA on transport and environment indicators, the joint Transport and Environment Council invited the Commission and the EEA to set up a transport and environment reporting mechanism (TERM), which should enable policy-makers to gauge the progress of their integration policies.

The sixth environmental action programme (6EAP) (European Commission, 2001c) and the Commission's proposal for an EU strategy for sustainable development (European Commission, 2001a) re-emphasise the need for integration strategies and for monitoring environmental themes as well as sectoral integration.

The main output of TERM is a regular indicator-based report through which the effectiveness of transport and environment integration strategies can be monitored. The first indicator report — TERM 2000 — was published in 2000 (EEA, 2000a).

The TERM indicators were selected and grouped to address seven key questions:

1. Is the environmental performance of the transport sector improving?

2. Are we getting better at managing transport demand and at improving the modal split?

3. Are spatial and transport planning becoming better coordinated so as to match transport demand to the needs of access?

4. Are we optimising the use of existing transport infrastructure capacity and moving towards a better balanced intermodal transport system?

5. Are we moving towards a fairer and more efficient pricing system, which ensures that external costs are internalised?

6. How rapidly are improved technologies being implemented and how efficiently are vehicles being used?

7. How effectively are environmental management and monitoring tools being used to support policy- and decision-making?

An overview of the indicators that form the core of TERM, including the few new indicators that are presented in TERM 2001, is included in Table 1. The list was developed after consultation with various Commission services, national experts, other international organisations and researchers. The indicators cover the most important aspects of the transport and environment system (**D**riving forces, **P**ressures, **S**tate of the environment, **I**mpacts, and societal **R**esponses — the so-called DPSIR framework) and include eco-efficiency indicators.

The current list is a long-term vision of an 'ideal' list and some of the proposed indicators could not at this stage be quantified. Where data availability has prevented an EU-15 analysis, national examples or proxy indicators are used.

The TERM process is steered jointly by the Commission (DG TREN, DG ENV, Eurostat) and the EEA. The Member States and other international organisations are consulted regularly.

Sources: EEA, 1999; EEA, 2000a

Envisaged TERM indicator list (key indicators in blue) Table 1

Group	Indicators	Position in DPSIR	Page	Status since TERM 2000
	Transport and environment performance			
Environmental consequences of transport	Transport final energy consumption and primary energy consumption, and share in total by mode and by fuel	D	14	Updated
	Transport emissions of greenhouse gases (CO_2 and N_2O) by mode	P	14	Updated
	Transport emissions of air pollutants (NO_x, NMVOCs, PM_{10}, SO_x, total ozone precursors) by mode	P	15	Updated
	Exceedances of EU air quality standards for PM_{10}, NO_2, benzene, ozone, lead and CO	S	16	No data update
	Population exposed to exceedances of EU urban air quality standards	I		
	% of population exposed to and annoyed by traffic noise, by noise category and by mode	S and I	16	No data update
	Fragmentation of ecosystems and habitats	P and S	18	No data update
	Proximity of transport infrastructure to designated areas			
	Land take by transport infrastructure by mode	P	17	Updated
	Waste from road transport: number of end-of-life vehicles, number of used tyres	P	20	New
	Accidental and illegal discharges of oil by ships at sea	P	19	New
	Number of transport accidents, fatalities, injured, and polluting accidents (land, air and maritime)	I	21	Updated
Transport demand and intensity	**Passenger transport (by mode and purpose):** • vehicle kilometre • total passengers • total passenger-km • passenger-km per capita • passenger-km per GDP	D	23	Updated
	Freight transport (by mode and group of goods) • vehicle kilometre • total passengers • total passenger-km • passenger-km per capita • passenger-km per GDP	D	24	Updated
	Determinants of the transport/environment system			
Spatial planning and accessibility	Regional access to markets: the ease (time and money) of reaching economically important assets (e.g. consumers, jobs), by various modes (road, rail, aviation)	D	28	New
	Access to basic services: average passenger journey time and length per mode, purpose (commuting, shopping, leisure) and location (urban/rural)	D	27	Updated
	Access to transport services, e.g.: • vehicle ownership and number of motor vehicles per household • % of persons in a location having access to a public transport node within 500 metres	D	28	Updated
Supply of transport infrastructure and services	Capacity of transport infrastructure networks, by mode and by type of infrastructure (motorway, national road, municipal road, etc.)	D	32	Updated
	Investments in transport infrastructure/capita and by mode	D and R	31	Updated

Group	Indicators	Position in DPSIR	Page	Status since TERM 2000
Transport costs and prices	**Real change in passenger transport price by mode**	R	34	Updated
	Total amount of external costs by transport mode (freight and passenger); average external cost per p-km and t-km by transport mode		35	New
	Implementation of internalisation instruments i.e. economic policy tools with a direct link with the marginal external costs of the use of different transport modes	R	33,37	New
	Fuel prices and taxes	D	37	Updated
	Subsidies	R		Data lacking
	Expenditure on personal mobility per person by income group	D		Not updated
Technology and utilisation efficiency	**Overall energy efficiency for passenger and freight transport (per passenger-km and per tonne-km and by mode)**	P/D	39,40	Updated
	Emissions per passenger-km and emissions per tonne-km for CO_2, NO_x, NMVOCs, PM_{10}, SO_x by mode	P/D	41	Updated
	Occupancy rates of passenger vehicles	D	43	Updated
	Load factors for road freight transport (LDV, HDV)	D	43	Updated
	Uptake of cleaner fuels (unleaded petrol, electric, alternative fuels) and numbers of alternative-fuelled vehicles	D	43	Updated
	Average age of the vehicle fleet	D	42	Updated
	Proportion of vehicle fleet meeting certain air and noise emission standards (by mode)	D	42	Updated
Management integration	**Number of Member States that implement an integrated transport strategy**	R	47	Updated
	Number of Member States with national transport and environment monitoring system	R	47	Updated
	Uptake of strategic environmental assessment in the transport sector	R	48	Updated
	Uptake of environmental management systems by transport companies	R		No data update
	Public awareness and behaviour	R	49	No data update
	Number of Member States with a formalised coorperation between the transport, environment and spatial planning ministries	R	48	New

D = Driver, P = Pressure (environmental), S = State of the environment, I = Impact, R = Response

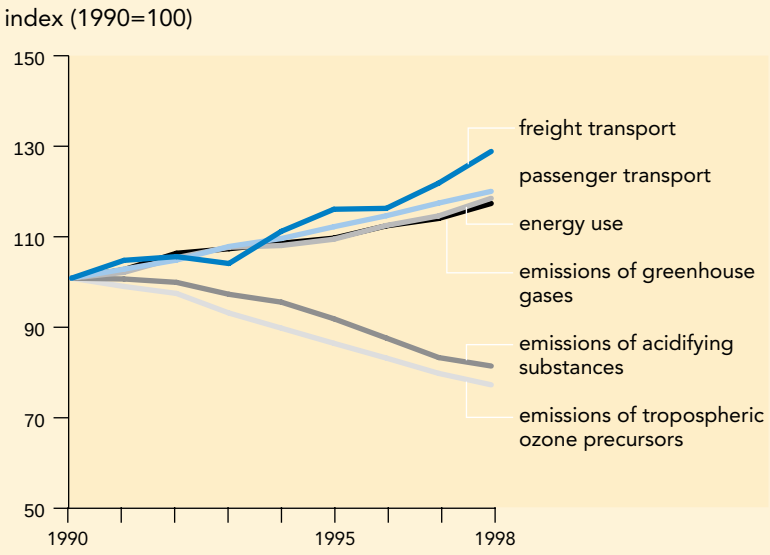
Is the environmental performance of the transport sector improving?

The sector's growing greenhouse gas emissions, mainly carbon dioxide (CO_2) from road and air traffic, jeopardise the EU meeting its target under the Kyoto protocol.

Technology has been effective in reducing transport emissions of acidifying substances (by 20 %) and tropospheric ozone precursors (by 25 %) between 1990 and 1998. A substantial reduction of both non-methane volatile organic compound (NMVOC) and nitrogen oxide (NO_x) emissions (from all sectors) is still required to achieve the UNECE Gothenburg protocol and EU National Emission Ceiling Common Position targets for 2010.

A large number of people, particularly in urban areas, are still exposed to high pollution levels, and this will continue to be the case in 2010. Other important problems persist, for example noise, accidents and fragmentation of natural and urban areas.

Transport eco-efficiency (EU-15), 1990–1998 Figure 1



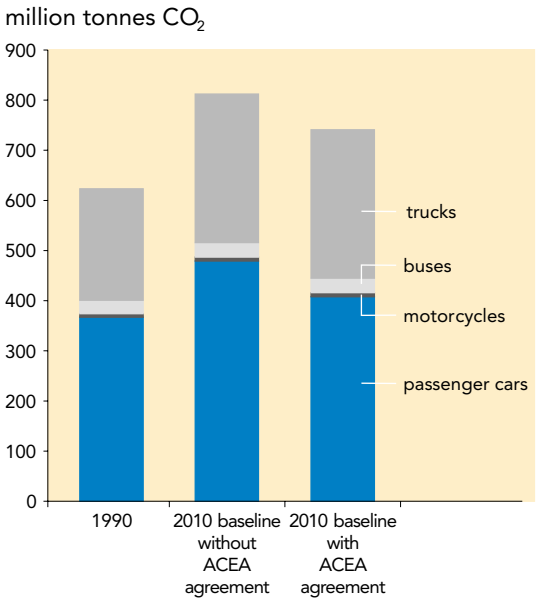
Sources: EEA-ETC/AE, 2001; EEA, 2000b; data on passenger-km and tonne-km from Eurostat, 2001

Note: Transport emission data for 1990-1998 do not include emissions from international aviation and shipping (as these are not part of national emission inventories under UNFCCC). Ozone precursors include nitrogen oxides, non-methane volatile organic compounds and carbon monoxide.

The growth in energy use and greenhouse gas emissions by transport jeopardises the EU meeting its targets under the Kyoto protocol

Figure 2 **CO_2 emissions by road transport (EU-15), 1990 and 2010**

Sources: EEA-ETC/AE, 2001; EEA, 2000b; AEA, 2001



Transport is the fastest growing energy consumer in the EU: a 47 % increase since 1985, compared with 4.2 % for the other economic sectors. More than 30 % of final energy in the EU is now consumed by transport, and the sector is therefore one of the priority target areas for the Community's Action Plan to Improve Energy Efficiency (European Commission, 2000c). It is also a major source of anthropogenic CO_2 emissions, contributing 24 % of the total. CO_2 emissions from transport in the EU increased by 15 % between 1990 and 1998.

Road transport is the main cause of this increase and contributed 84 % of CO_2 emissions from transport in 1998. The voluntary agreement with the car manufacturers to reduce average CO_2 emissions from new cars (the 'ACEA agreement') is expected to slow down the growth of car transport emissions. Without the agreement, CO_2 emissions from road passenger transport would increase by 29 % from 1990 by 2010 (AEA, 2001). With full implementation of the ACEA agreement the growth would be much less, i.e. 11 %.

CO_2 emissions from road freight are also expected to increase substantially, by 33 %, between 1990 and 2010. The ACEA agreement does not include trucks and so has no effect on these emissions. It is therefore likely that further benefits would result from addressing the road freight sector.

Road transport is also a small but growing source of nitrous oxide (N_2O) emissions, from passenger car catalysts. Emissions almost doubled between 1990 and 1998, to 7 % of total N_2O emissions. A substantial rise is expected by 2010 but changes in catalyst technology could limit this. These increases will not have a major impact on the overall trend of N_2O emissions since transport is not a large source.

The transport working group of the European Climate Change Programme identified several measures as having the best potential to reduce greenhouse gas emissions from transport. These were: fiscal measures for passenger cars; a voluntary agreement with the car industry on light commercial vehicles and further technological improvements for passenger cars (e.g. enhanced environment-friendly cars) and fuels; improvements in transport infrastructure and charging; more efficient intermodal/multimodal freight transport and logistics; awareness raising and behavioural change (ECCP, 2001).

In 1998, EU greenhouse gas emissions from international transport (aviation and shipping) amounted to 5 % of total EU emissions. Emissions from aviation are growing dramatically. These emissions are not addressed under the Kyoto protocol, but the International Civil Aviation Organization and the International Maritime Organisation are currently examining reduction options.

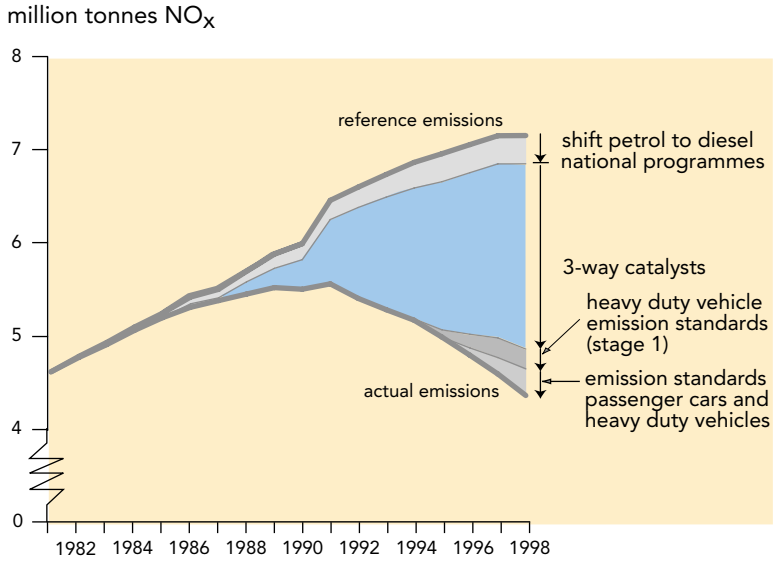
Cleaner technologies and fuels has led to significant reductions in emissions of local and regional air pollutants, but additional efforts are needed to reach targets

Emissions of acidifying substances and tropospheric ozone precursors from the transport sector fell by 20 % (EEA, 2001) and 25 %, respectively, between 1990 and 1998. Reductions in road transport emissions of NMVOCs (by 33 %) and NO_x (by 21 %) made the largest contributions to the reduction of ozone precursors, mainly as a result of the introduction of catalysts in new petrol-engined cars and stricter regulations for emissions from diesel vehicles, which led to technical changes to reduce emissions. Another important contributor to reducing emissions of certain air pollutants was the improvement of fuel composition. Nitrogen oxide emissions from transport in the EU would have been 50 % higher in 1998 without these improvements (EEA, 2001).

Projections assuming implementation of existing and agreed policies and measures suggest a decrease of 66 % in NO_x emissions from road transport between 1990 and 2010 and of 77 % in volatile organic compound (VOC) emissions.

Transport is, however, still responsible for more than half of emissions of tropospheric ozone precursors and more than 20 % of emissions of acidifying substances. Further emission decreases in all sectors are needed to meet the targets of the European Commission's 1999 proposal for a directive on national emission ceilings.

NO_x emissions from road transport (EU-15) Figure 3

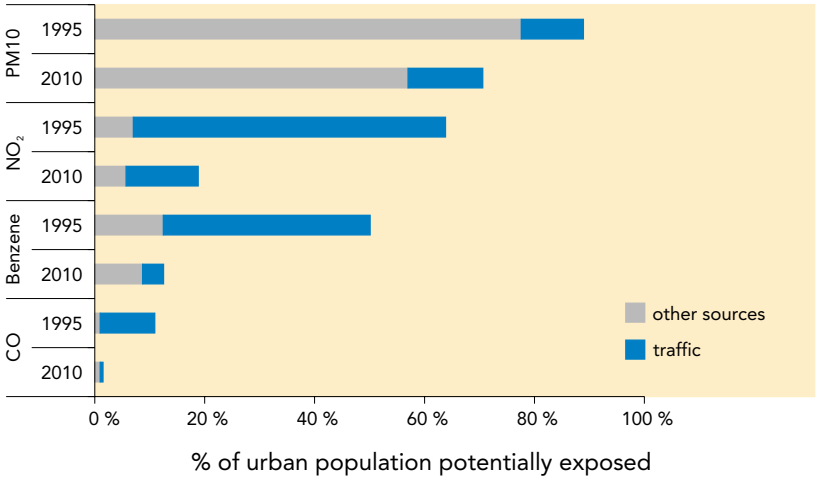


Source: EEA-ETC/AE, 2001

Emissions from international shipping are not included in national inventories, but it is estimated that shipping in European waters contributed 24 % of total sulphur dioxide (SO_2) emissions and 22 % of total NO_x emissions from EU-15 countries in 1998 (European Commission, 2000f). EU regional action to tackle ship emissions is legally possible by means of environmentally differentiated incentive schemes and, in some cases, by regulatory instruments, even where these go beyond global international standards, such as those in MARPOL.

Urban air quality is improving, but urban populations are still exposed to pollution levels that pose health risks

Figure 4 **Urban population potentially exposed to exceedances of EU urban air quality standards (EU) — 1995 and 2010 (including Auto Oil II emission scenarios)**



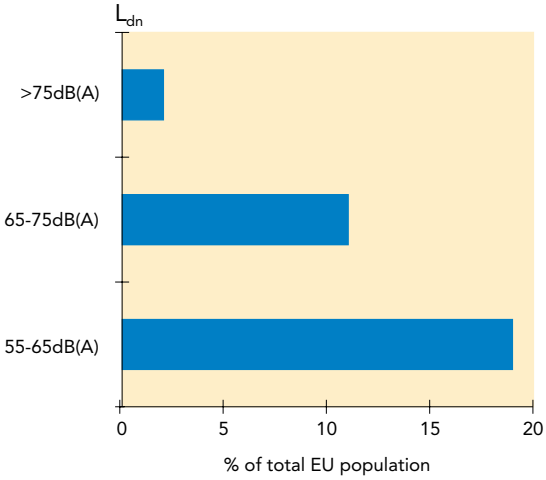
Source: EEA-ETC/AQ, 2001
Note: The figure indicates 'potential exposure' as estimates are based on the assumption of exposure for a person permanently in ambient air (i.e. not taking into account indoor exposure).

A significant improvement of urban air quality has resulted from the reductions in pollutant emissions from transport. This trend is expected to continue with the implementation of recent EU directives, following the Auto Oil II agreements. However, large numbers of people, particularly in urban areas, are still exposed to high pollution levels. The 2010 outlooks show that some 70 % of the EU urban population would still be exposed to PM_{10} levels exceeding the limit values, some 20 % to NO_x exceedances and some 15 % to benzene exceedances. World Health Organisation studies show that this is associated with a significant number of premature deaths, new cases of chronic bronchitis (adults and children) and asthma attacks (WHO-UNECE, 2001).

A large proportion of the population is exposed to traffic noise levels which can be annoying or harmful for health

Figure 5 **Estimated percentage of population exposed to different road traffic noise levels (EU-15)**

Source: EEA, 2000a
Note: The category 45<55 dB L_{dn} is not included because of lack of data. Noise levels above 40 dB L_{Aeq} can influence well-being. Most people are moderately annoyed at 50 dB L_{Aeq} and seriously annoyed at 55 dB L_{Aeq}. Levels above 65 dB L_{Aeq} can be detrimental to health (WHO, 1999; WHO-UNECE, 2001).

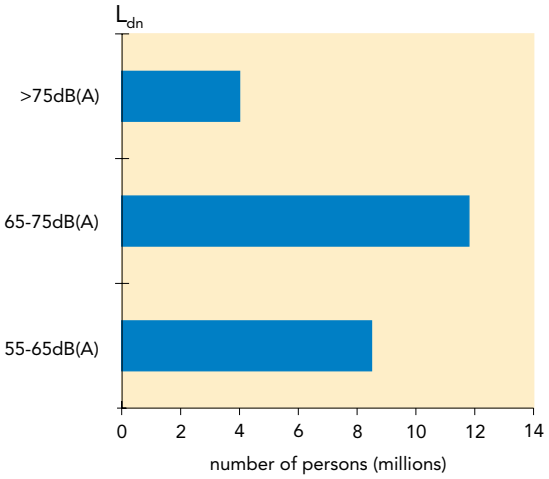


Road, rail and aviation transport are major sources of noise annoyance. It is estimated that more than 30 % of Europeans are exposed to road noise levels, and around 10 % to rail noise levels, above 55 L_{dn} dB(A).

Data on noise nuisance by aircraft are the most uncertain, but 10 % of the total EU population may be highly annoyed by air transport noise (INRETS, 1994). Noise levels around several large airports in the EU have dropped in recent years as a result of the phasing out of noisier 'Chapter 2' aircraft. However, this trend is expected to reverse as the growth in aircraft movements is no longer compensated by the use of quieter aircraft (RIVM, 2000). The International Civil Aviation Organization is being urged by the European Commission to develop more stringent noise certification standards.

The proposed noise directive would harmonise EU noise assessment methodology (using L_{den} as an indicator), and will require countries to make noise maps publicly available as a basis for the development of action plans (European Commission, 2000a). The proposal also includes measures such as noise control in the rural environment and the protection of relatively quiet areas. No assessment has yet been made of the potential effectiveness of the directive in reducing traffic-related noise problems in the EU. No update has been made of the current noise indicators since TERM 2000; further work on this indicator awaits the adoption of the proposed noise directive.

Number of people highly annoyed by road traffic noise — preliminary estimate (EU-15) Figure 6



Source: EEA, 2000 a

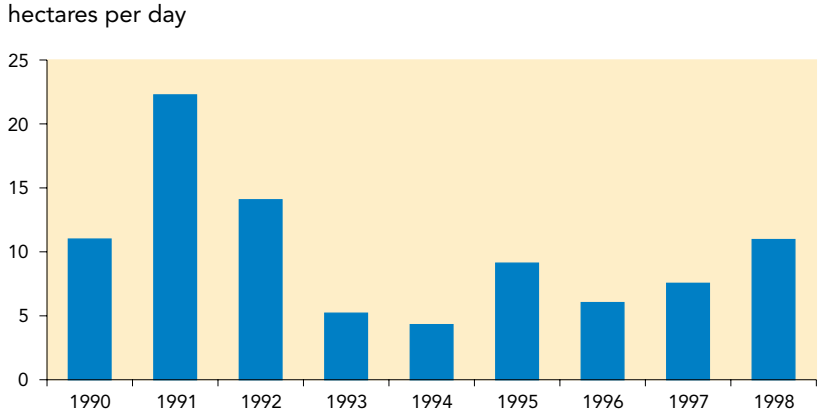
Transport infrastructure, and in particular roads, takes up increasing amounts of rural and urban land

Land is under continuous pressure for new transport infrastructure. Road and rail infrastructure takes land mainly from agricultural use and to a lesser extent from built-up areas. Between 1990 and 1998, over 30 000 hectares (ha), about 10 ha every day, were taken for motorway construction in the EU.

Urban road transport (parking space, roads, petrol stations, etc.) takes up increasing amounts of urban land. In several cities this is correlated with the spread of urban areas.

Other modes are less land-intensive. For example, land take per passenger-km by rail is about 3.5 times lower than for passenger cars, and bicycles need 10 to 12 times less space than cars.

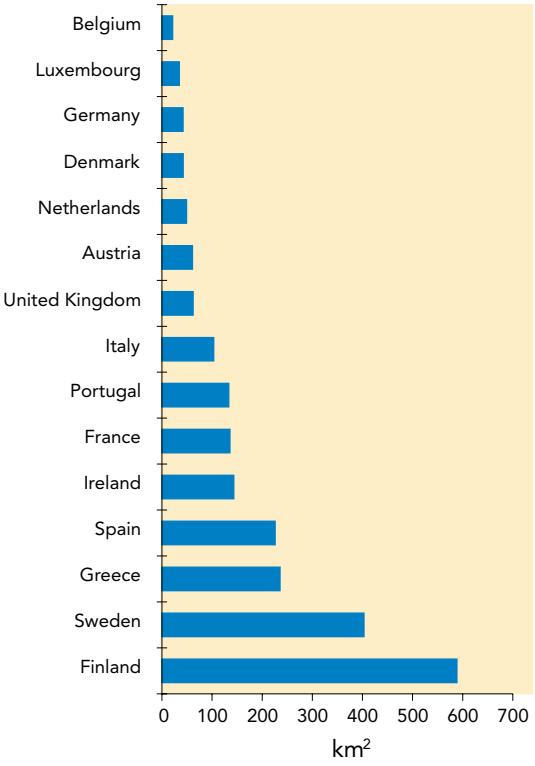
Average daily land take by new motorways (EU-15), 1990–1998 Figure 7



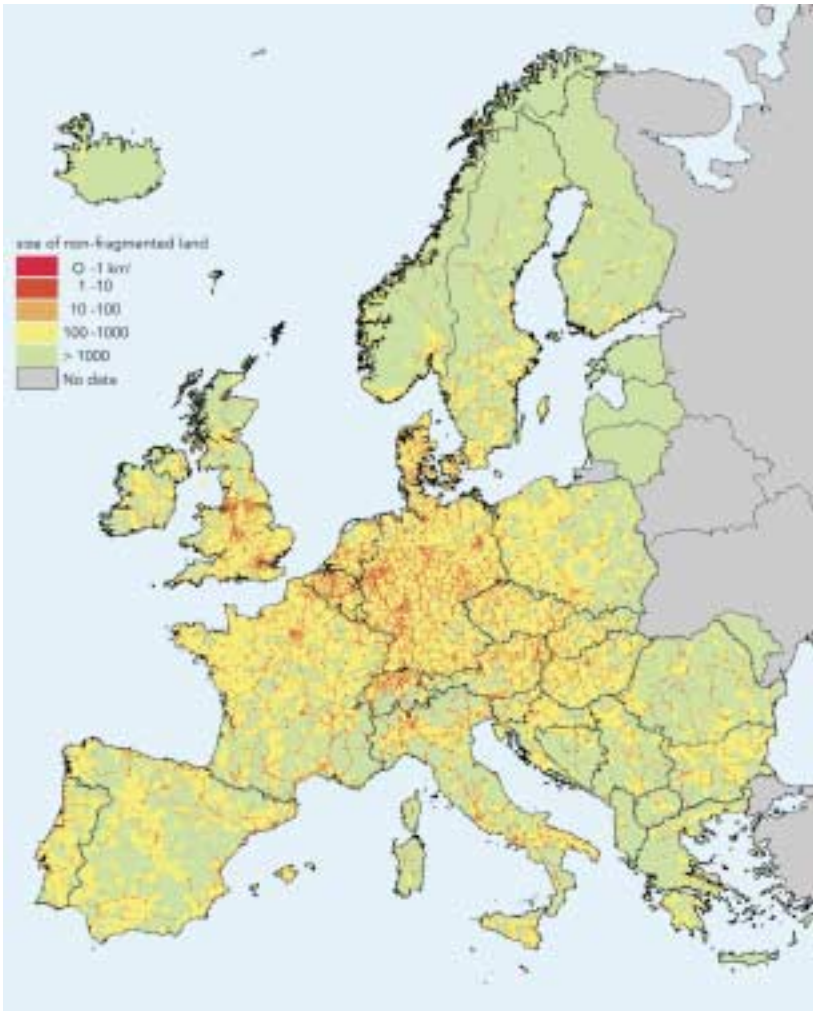
Source: Eurostat, 2001

The expansion of transport infrastructure and intensification of its use jeopardises the future of many designated nature areas

Figure 8 **Average size of non-fragmented land parcels, 1997**



Map 1:Partitioning of land by transport infrastructure, 1997



Source: EEA-ETC/LC, 2000
Note: No update has been made of the fragmentation indicators since TERM 2000 as an updated infrastructure network map was not available.

Transport conflicts more and more with nature conservation. Some 1 650 special bird areas (SPAs) designated up to 1997[1], 66 % of the total number, have at least one major transport infrastructure within 5 km of their centres, as have 430 Ramsar sites (wetlands), 63 % of the total.

The future of many sensitive rural areas, in particular in mountainous areas (such as the Alpine region), wetlands and coastal zones could be jeopardised by further expansion of the infrastructure and intensification of its use.

The EU territory is becoming highly fragmented by transport infrastructure. The average size of contiguous land units that are not cut through by major transport infrastructure ranges from about 20 km² in Belgium to nearly 600 km² in Finland, with an EU average of about 130 km².

[1] The total number of SPAs currently amounts to 2 938: however, since no updated version of the infrastructure network was made available, the numbers quoted still refer to the 1997 situation.

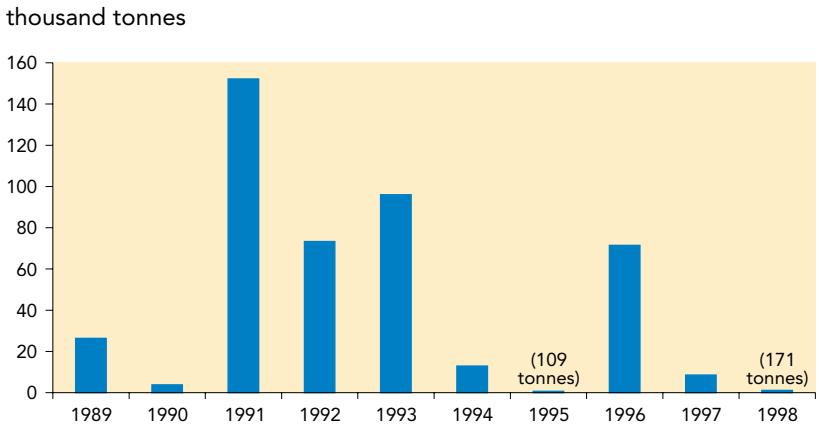
Major accidental oil spills from maritime shipping still occur at irregular intervals in the EU, but more oil slicks come from illegal discharges

Oil spills from shipping — from accidents or illegal discharges — are an important source of pollution in sea areas. Worldwide estimates show that transport contributed 22 % of the total spill in 1973 (1.3 million tonnes out of a total of 5.9 million tonnes), and 34 % in 1981 (1.1 million tonnes out of a total of 3.2 million tonnes). Over this period, the quantities of accidental spills always remained below those of operational spills. The latest estimate is for 1989, when transport-related oil spills (0.387 million tonnes) were only a third of the 1973 estimate.

More oil slicks come from illegal discharges than from accidents. Operational discharges are prohibited in the North Sea, Baltic Sea, Black Sea and Mediterranean Sea — all International Maritime Organisation (IMO) 'special areas'. Aerial surveillance over these seas aims to prevent and detect violations by tankers and platforms. Aerial surveillance of the number of slicks in the North Sea and the Baltic Sea shows a steady decline between 1992 and 1996 (the high frequencies in 1997 and 1998 are due to the reporting of very small oil spills (less than 1 m^3) by one country). Much of the Black Sea and parts of the Mediterranean Sea are polluted with oil, but there is no international aerial surveillance of spills in these seas.

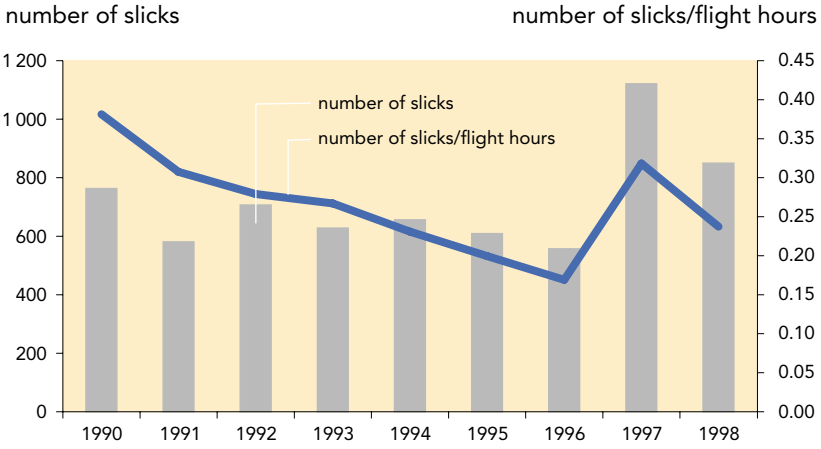
Directives 93/75/EEC and 95/21/EC were issued to support the MARPOL 73/78 Convention on the prevention of pollution from ships. Improvement measures on maritime safety and avoidance of accidental oil spills were proposed by the European Commission in March and December 2000, following the Erika oil spill in France in 1999. These should reduce the number of accidents per ship-km when properly implemented. However, there are no detailed statistics on enforcement of the rules.

Accidental oil spills (above 7 tonnes per spill) from tankers, combined carriers and barges in Europe (EU-15) — Figure 9



Source: Eurostat, 2001 (based on data from ITOPF, 2000)

Annual number of oil slicks from illegal discharges observed by aerial surveillance in the North Sea and Baltic Sea — Figure 10

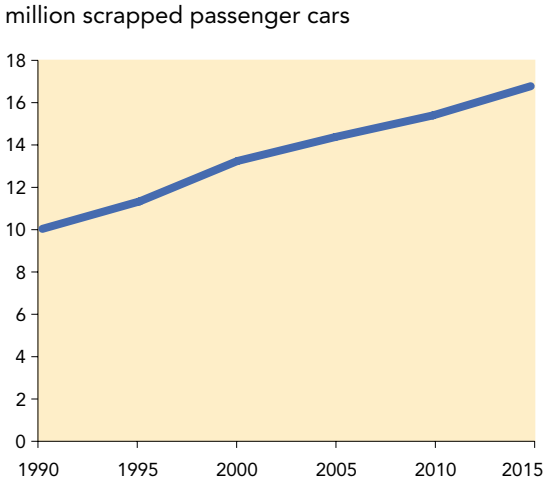


Source: Bonn Agreement (for North sea), HELCOM (for Baltic sea)

The number of end-of-life vehicles is increasing steadily; despite a higher percentage of recycling, non-recyclable waste from cars continues to grow

Figure 11 **Number of scrapped cars — trend estimates (EU-15)**

Source: Kilde, N. and Larsen, H.V., 2000



The specified targets of the EU waste strategy (European Commission, 1999e) are to reuse or recycle 80 % of the waste from car scrapping before 2006 and 85 % by 2015. For waste recovery, the targets are 85 % for 2006 and 95 % after 2015.

The number of end-of-life vehicles (EOLV) continues to increase, but the data are neither particularly accurate nor harmonised. The estimated number of scrapped cars in the EU is projected to grow from about 11.3 million in 1995 to 17 million in 2015.

About 2.4 million tonnes of waste tyres were collected in the EU in 1998, and this is likely to increase. The proportion landfilled fell from 62 % in 1993 to about 39 % in 1999, while the proportion recycled increased from 6 % to 18 %.

The EU landfill directive imposes a ban on landfilling of tyres from 2006 and prohibits the landfilling of whole tyres from 2003. Compliance with this directive and the directive on waste combustion emissions will require considerable investment in new treating and recycling facilities for used tyres. Information on such facilities should be used to assess their effectiveness against other treatment options.

The waste indicators presented here are incomplete as they do not address wastes from other transport modes, or those related to production and operation of vehicles and infrastructure. This requires more methodological work and data collection.

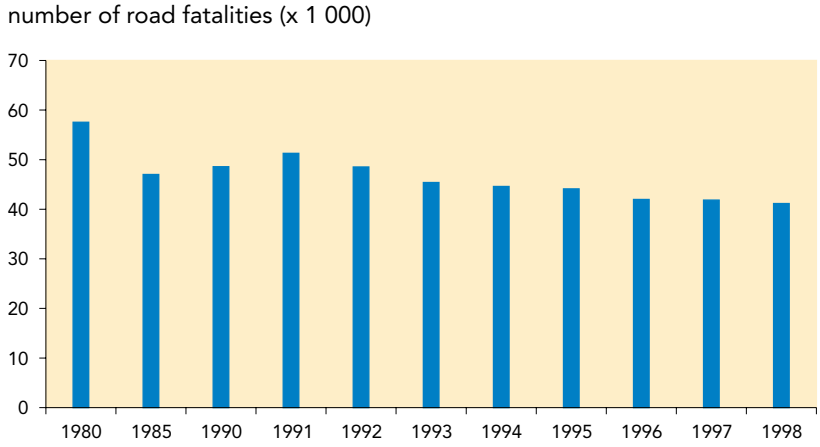
Fatality rates have decreased, but road accidents still claim 41 000 lives per year

Aviation is the safest motorised transport mode, both in absolute terms and per passenger-km, followed by rail. Road accidents claimed a total of 41 000 lives in 1998, but numbers have fallen by 28 % since 1980. Significant efforts will be needed to reach the target of the Community's road safety strategy (European Commission, 1997) of reducing annual fatalities to a maximum of 27 000 by 2010. Road accidents are the largest cause of death for persons under 40.

The number of people injured by road accidents (about 40 times the number of fatalities) has also fallen during the past two decades, but more slowly than fatalities.

Accident costs are the largest external cost of transport, totalling about EUR 156 billion a year (EU-17), or about 2.3 % of the GDP (INFRAS/IWW, 2000). This is nearly 30 % of the total external costs of transport.

Road transport fatalities per year (EU) Figure 12



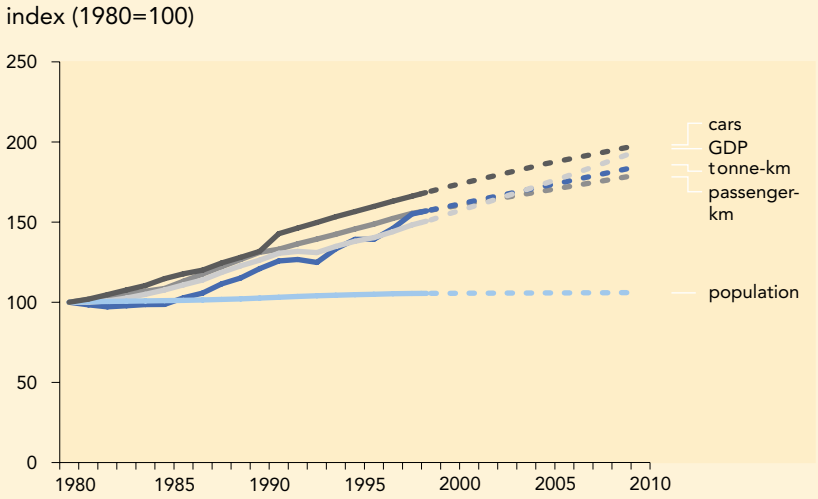
Source: Eurostat, 2001

Are we getting better at managing transport demand and at improving the modal split?

Decoupling transport growth from economic growth, and stabilising the modal split at 1998 levels by 2010 are important objectives of the revised Common Transport Policy and the recently proposed EU strategy for sustainable development (European Commission, 2001b and 2001d). However, during the past two decades, passenger transport growth has been closely coupled to the growth in GDP, and only a slight decoupling is expected by 2010. Growing car ownership, poor spatial planning and urban sprawl induces more urban passenger transport. Rising private incomes, in particular in the northern part of Europe, also boost tourism travel.

Freight transport growth also remains strongly coupled to economic growth, and no significant change is expected by 2010. The growth and structure of production and consumption processes, for instance in the food sector, leads to increasing freight transport. Fair pricing and congestion charging, and the recently adopted railway package that aims at the opening of international freight rail transport by 2008, may increase the shares of rail and short sea shipping — the share of the latter is already growing.

Figure 13 **Passenger and freight transport, car fleet, population and GDP (EU-15), 1980–2010**



Sources: Eurostat, 2001; projections: European Commission, 1999b, AEA, 2001; ETC/AE, 2001

Passenger transport continues to shift to car and aviation, and only a slight decoupling from economic growth is expected by 2010

Passenger transport has increased by about 55 % over the past 20 years, with most growth in air and road (particularly motorway) transport. Leisure trips, commuting and shopping account for the vast majority of all trips. Long-distance passenger travel is growing, as rising private incomes boost tourism (see Box 2).

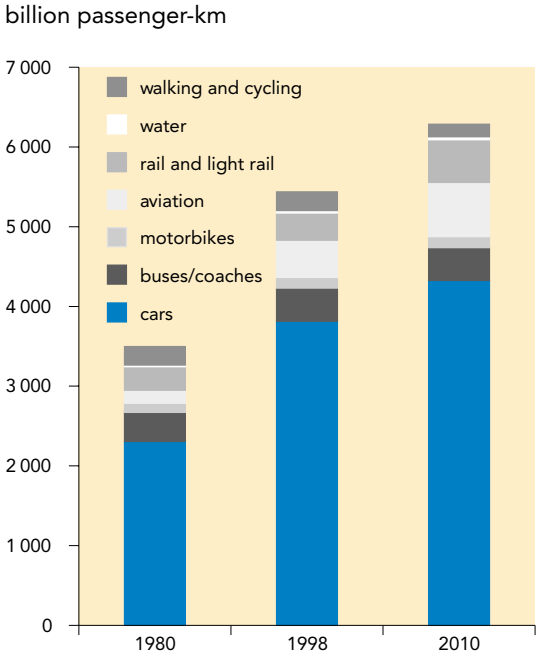
Increasing incomes enable more people to buy cars and travel more. The EU car fleet has increased by 64 % since 1980, to 451 per 1 000 inhabitants (1998). Whilst saturation levels may be being reached in some countries, car ownership is still surging elsewhere (e.g. Portugal and Greece).

Prices for public transport are increasing while those for car use remain about constant (see indicator on real price of transport). In most countries the number of vehicle-km by car has increased more rapidly than the number of passenger-km by car, meaning that the occupancy rates for passenger cars are also falling.

Travel distances to destinations such as work, shops, schools and leisure activities are all increasing as residential areas, industrial areas, shops, hospitals and schools are being located further apart ('urban sprawl'). Alternatives to the car are often lacking or less attractive, or ill-adapted to new urban patterns. Initiatives like car-sharing schemes are emerging to counter this trend but these have as yet had little impact.

The share of car transport increased from 66 to 70 % between 1980 and 1998 and that of aviation from 3 to 6 %.

Passenger transport by mode, 1980, 1998 and 2010 projection (EU-15) — Figure 14



Sources: Eurostat, 2001; projections: AEA, 2001; European Commission 1999b, ETC-AE, 2001

Shares of rail are decreasing, as the train is often not considered to be an attractive option despite increasing congestion on roads, partly because of inefficient rail services. This trend might be countered as high-speed rail lines are developing quickly to connect large cities so as to compete with air transport.

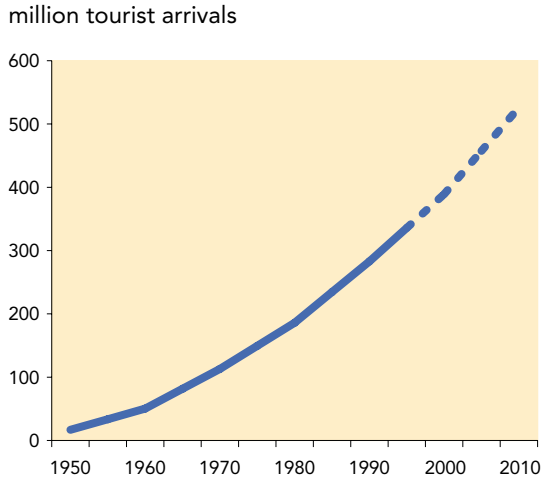
The modal shares of walking and cycling have fallen. Yet half of all car trips are less than 6 km, for which cycling is often faster than driving (in urban areas); 10 % are less than 1 km, an ideal walking distance.

Box 2: Tourism is the fastest growing travel purpose

Tourism is the fastest growing travel purpose
Tourism is one of the fastest growing economic sectors. The number of international tourist arrivals, a proxy indicator for tourism-related passenger-km, more than doubled between 1980 and 1998, an average annual growth rate of 4.1 %. Even though this growth is expected to slow, tourism will continue to have major environmental impacts. The Transport Council and the European Commission have therefore stressed the need for a strategic approach to the problems of tourism.

Source: OECD, 2000

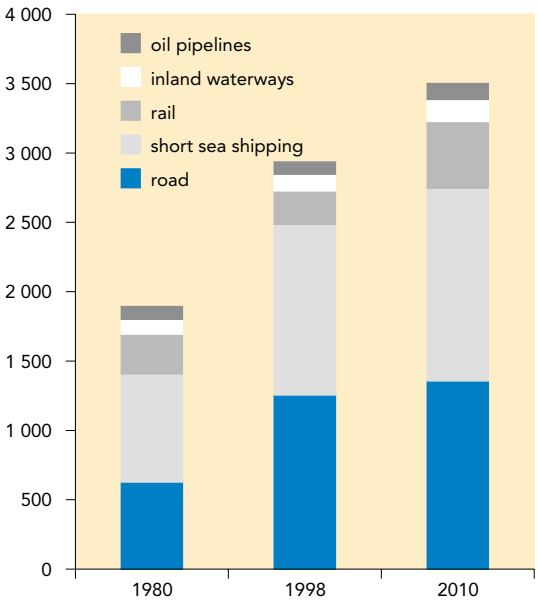
Figure 15 **Inbound international tourist arrivals (all modes) in Europe, 1950–2010**



☹ Trucking and short sea shipping are the main freight transport modes; freight growth is expected to remain closely linked to economic growth for some years

Figure 16 **Freight transport by mode, 1980, 1998 and 2010 projection (EU-15)**

Source: Eurostat, 2001; projections: AEA, 2001; European Commission, 1999b; ETC-AE, 2001



Freight transport increased by 55 % between 1980 and 1998, with the largest growth in road (3.9 % per year) and short sea shipping (2.6 %). The main driving forces for this growth are the globalisation of the economy, the liberalisation of the internal market, the complexity of trading networks, specialisation of production processes, preferences of customers and decreasing transport costs.

Trucking now accounts for 43 % of total tonne-km (33 % in 1980), and 80 % of total tonnes transported. The preference for road can be explained by the economic growth in the services sector and high-value goods (which require high-speed transport), 'just-in-time' deliveries, and the spatial structure of production and consumption processes. The average

tonne of goods trucked travels 110 km, a distance for which rail and inland waterways are less efficient, since transport to and from loading points is generally by road.

For longer distances, short sea shipping has become quite successful in some parts of the EU: in 1998 its share in tonne-km (42 %), almost equalled that of road transport, transporting 6 % of total tonnes, on average some 1 430 km (European Commission, 2000b).

Rail freight transport in the EU fell by 16 % between 1980 and 1998, despite growth in several Member States. Its share in total freight transport has dropped to 8 %. The recently adopted railway package should lead to the total opening of international freight rail transport by 2008.

Freight transport by inland waterways increased over the same period by around 13 %, but its share fell to 4 %. The share of these modes is expected to continue to fall, unless prices are set correctly and there are improvements in quality and flexibility.

An important instrument to decouple economic growth and freight transport growth is a differentiated kilometre charge, to replace current fixed charges and to internalise external and infrastructure costs. Switzerland introduced such charge on 1 January 2001; introduction by 2003 is being considered by several countries such as Germany, Austria and the Netherlands.

Are spatial planning and transport planning becoming better coordinated so as to match transport demand to the need for access?

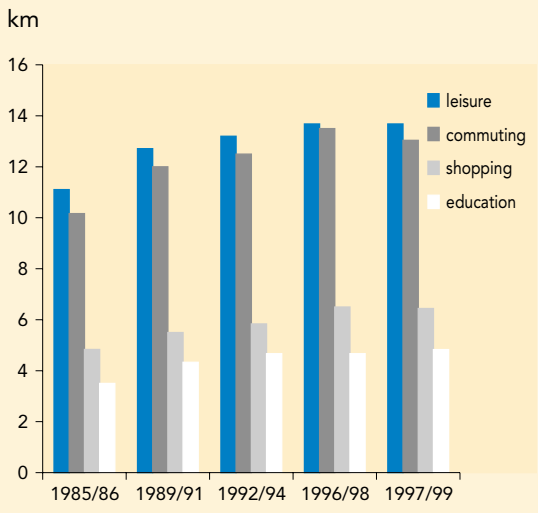
Improving the accessibility of cities and regions in a sustainable manner requires appropriate location policy and land-use planning, as well as better coordination of spatial development policy and land-use planning with transport and telecommunications planning. Actions to promote better planning practices are included in the European Spatial Development Perspective (ESDP) (European Commission, 1999a), and 6EAP. The proposed directive on strategic environmental assessment also aims to ensure that environmental concerns are integrated in spatial planning processes.

However, the results of improved spatial and land-use planning can only be expected in the longer term, and trend reversal is not yet noticeable in the indicators. Furthermore, data are scarce and the findings are based on information from only a few countries. Data for the UK show that people have to travel increasing distances for access to basic services and are becoming more and more reliant on the car.

Studies on the link between the transport infrastructure and services and regional development are not conclusive as regards the extent to which transport infrastructure actually leads to growth in economic welfare and strengthens cohesion among regions.

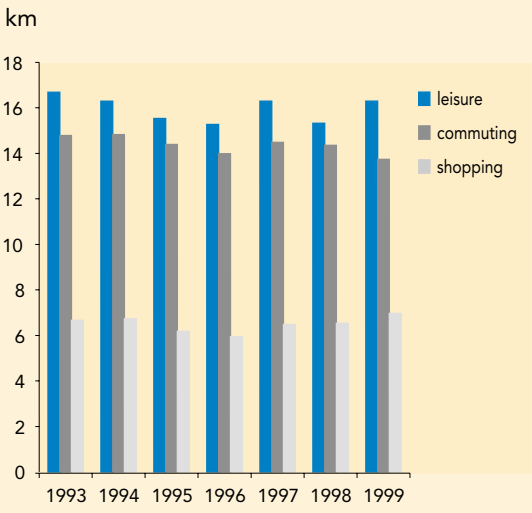
Figure 17 a & b **Average journey lengths by purpose, UK and Denmark**

United Kingdom



Sources: DETR, 2001

Denmark



Source: Denmark Statistics

In some countries people have to travel increasing distances to gain access to basic services such as shopping, work and education

Changing spatial patterns (e.g. urban sprawl) have led to increases in both journey lengths and the number of trips. Increasing welfare not only motivates people to live in more spacious suburban areas, but also leads to inner-city dereliction and increased demand for transport. Shopping is increasingly at out-of-town centres, often with ample parking but poor public transport connections. Industries choose locations near motorway junctions. Decreases in the supply, quality and reliability of public transport, growth in car ownership, the bias of investments towards road infrastructure, and changes in travel behaviour are all resulting in access becoming more and more reliant on road transport.

Some countries (and cities) have taken initiatives to better coordinate regional, urban and transport planning to improve accessibility while reducing the demand for car transport, for example through a mix of urban functions, zoning, parking policies and improved public transport. The effectiveness of such an approach is demonstrated in e.g. Denmark, a country with a strong spatial planning tradition, where travel distances prove to be more constant over time. Spatial planning is generally effective in the long term, but results are already becoming evident in various cities; in many, some re-urbanisation is already occurring.

Information-exchange initiatives such as the Car-Free Cities network, the European Local Transport Information Service and the database on Urban Management and Sustainability are contributing to the spread of good practices. Increasing awareness among planners and decision-makers has, however, not always led to more stringent actions.

Box 3: Teleworking is growing, and may help to avoid congestion

The European Commission intends to promote teleworking by accelerating investment in communications infrastructure and services (European Commission, 2001a). Currently, about 4 % of European employees are regular teleworkers, with the highest shares in the Scandinavian countries and the Netherlands. The UK and Germany are above the European average. Teleworking is lagging in Italy, France, Spain and Ireland.

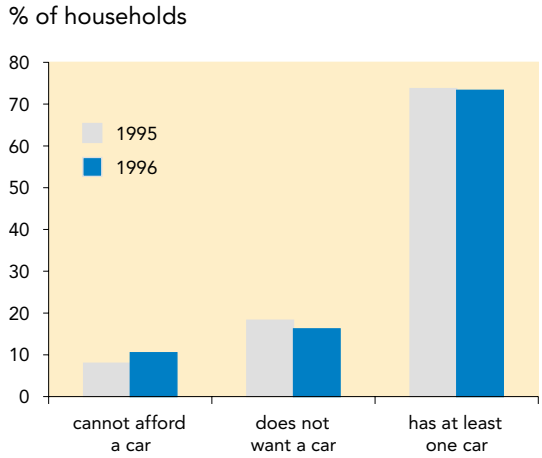
The number of teleworkers is expected to rise to 11 % of the EU labour force by 2005. However, only a minority will use telework to reduce commuting trips ('telecommuting'). Other types of decentralised work like mobile telework are also important. Teleworking may affect location patterns, as it can lead to people moving to residences further away from work.

Source: EcaTT web site: http://www.ecatt.com/ecatt/

Non-car owning households (26 % of EU households) find it more difficult to access basic services

Figure 18 **Households and car ownership, EU-15**

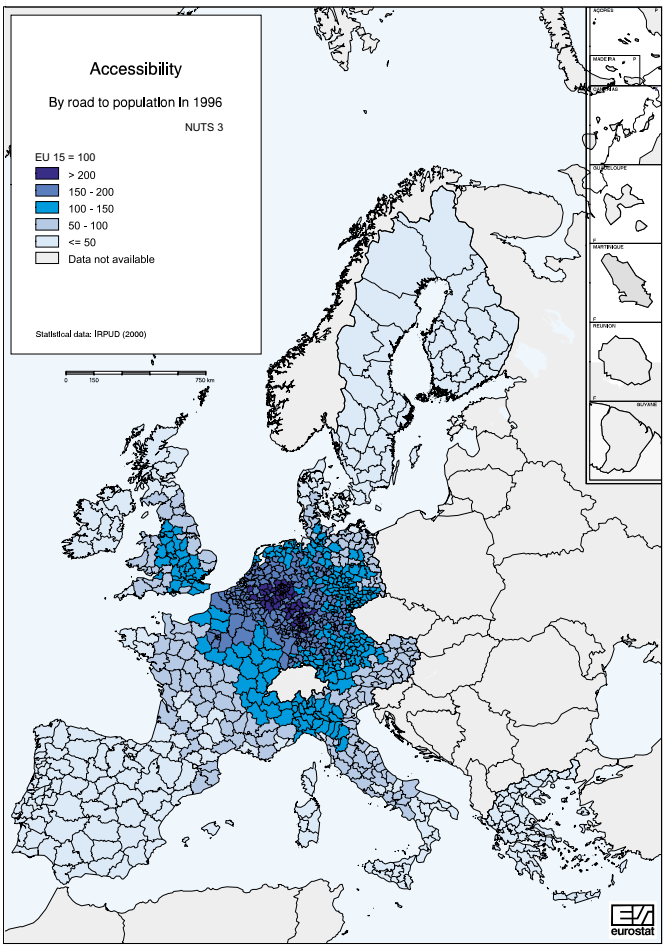
Source: Eurostat, 2001



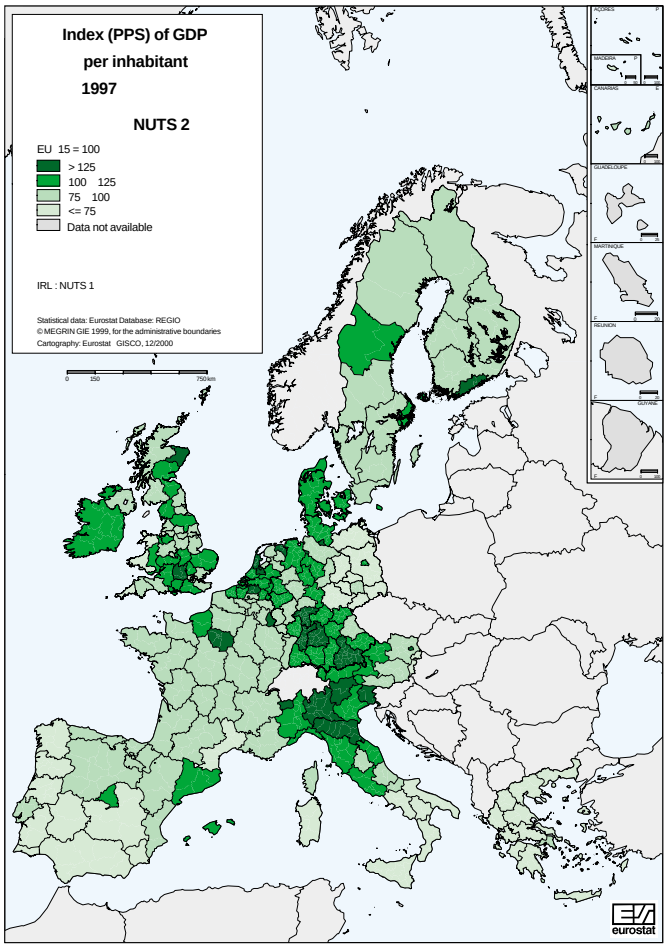
In 1996, 10.5 % of EU households did not have a car because they could not afford it and 16.2 % because they did not want one. A major challenge is to provide this important group of citizens with quality access to basic services. Some national surveys show, however, that transport developments do not always result in a comparable (and equitable) increase in access to basic services and activities. In the UK, for example, households without a car are finding it more and more difficult to reach basic services (DETR, 1998).

Accessibility by road and rail to markets is still unbalanced among regions; infrastructure building does not necessarily trigger socio-economic growth

Map 2: Accessibility by road to population, 1996



Map 3: GDP per inhabitant, 1996



Sources: European Commission, 2000d; Eurostat, 2001

The maps above illustrate the heterogeneity of EU territory in terms of economic development and accessibility by road. Maps for accessibility by rail show a similar pattern.

Community cohesion policies have an important link with spatial and transport planning. Studies on the link between the transport infrastructure and services and regional development are however not conclusive as regards the extent to which transport infrastructure actually triggers growth in economic welfare and strengthens cohesion among regions.

Transport improvement (which is not necessarily infrastructure improvement) may, theoretically, have positive effects on the economy but empirical evidence is limited (DETR, 1999). Improving access to poorer regions does not automatically create more economic growth there. Increasing accessibility enhances centrality and can thus increase the marginalisation of more remote rural areas (European Commission, 2000d). Improved accessibility between two countries (and similarly between cities, areas or regions) may benefit one of them to the detriment of the other.

Better indicators need to be developed to monitor progress towards sustainable cohesion and in particular to assess the link between spatial developments and infrastructure planning for various modes.

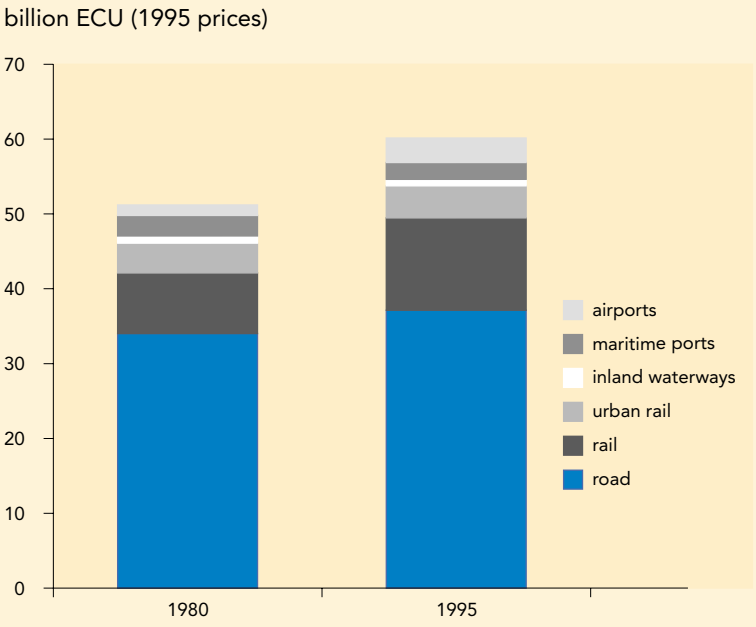
Are we optimising the use of existing transport infrastructure capacity and moving towards a better balanced intermodal transport system?

Decisions on transport infrastructure are still made mainly in response to problems of traffic bottlenecks. This reactive approach favours the extension of road infrastructure. Overall modal investment shares have hardly changed since 1980, dominated in 1995 by road (62 %) and rail (28 %). Rail receives a larger share of total investment than its share of total demand, but this has not made rail flexible enough to meet new transport demands.

The development of the trans-European transport network (TEN) aims at improving intermodality and the shares of combined (high-speed) rail and inland waterways transport. However, TEN investments are still biased towards motorways.

There are positive signs in cities where cycling and public transport are being encouraged, and in the growth of high-speed rail for longer distances.

Figure 19 **Investments in transport infrastructure (EU-15)**



Sources: Eurostat, 2001 (using ECMT data); European Commission, 2000b

The overall modal investment shares have hardly changed since 1980: 62 % of investments are in roads

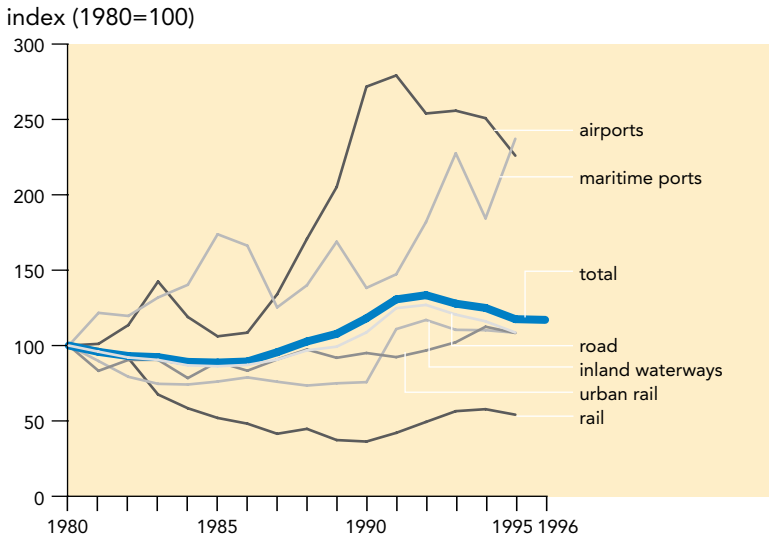
General infrastructure investment has been falling since 1993. The overall modal investment shares have hardly changed since 1980, dominated in 1995 by road (62 %) and rail (28 %).

Rail receives a larger share of total investment than its share of total demand, but this has not made rail flexible enough to meet new transport demands.

Investment to promote alternative modes at the urban level is still low, but there are some positive signs. There was a relatively high investment in urban rail between 1986 and 1994. More and more attention is also being paid to cycle tracks and public transport. For example, Italy has reserved a considerable national budget to stimulate the building of cycle tracks, and the German transport ministry envisages increasing investment in cycle tracks parallel to national roads.

The Community is trying to redress investment patterns for major infrastructure projects, in particular in the development of the TEN. Total TEN investment (estimated to exceed EUR 400 billion by 2010) is targeted to be 60 % for rail and 30 % for motorways, with rail investment mainly for the high-speed network. However, funding by the Community and by international banks does not yet reflect this modal share.

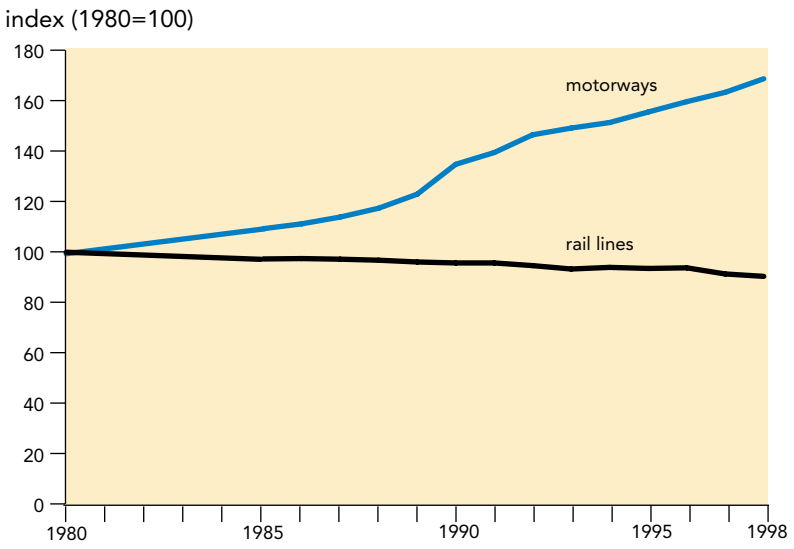
Infrastructure investment trends by mode (EU-15), 1980–1996 — Figure 20



Sources: Eurostat, 2001 (using ECMT data); European Commission, 2000b

☹ The motorway network has increased by more than 70 % since 1980

Figure 21 **Length of motorways and railways, EU-15**



Sources: Eurostat, 2001

The above investment trends have been one reason for the length of the motorway network increasing by more than 70 % since 1980 while the length of conventional railway lines and inland waterways decreased by about 9 % (mainly due to the closing of unprofitable small lines).

The high-speed rail infrastructure is gradually being extended in line with plans for the TEN: the length of high-speed track almost tripled between 1990 and 1999, to more than 2 700 km, and is expected to increase to 24 000 km (of new and upgraded existing lines) by 2010. However, high-speed rail will only be efficient if well linked to a quality regional network. High-speed rail can result in a shift in modal shares, in particular as regards short-distance flights (there is evidence for this on the Paris-Lyon, Brussels-France and Madrid-Seville links), but can also induce extra travel. The shift from road traffic is more limited, as high-speed rail typically serves longer distances.

Revitalising the more environment-friendly transport modes requires more efficient management and operation of services as well as developing infrastructure capacity. The Council and the European Parliament adopted a freight railway package at the beginning of 2001. This aims at creating a legislative framework enabling the railway companies to provide better services to their customers. It includes the opening up of rail freight transport, separation of transport operations and essential functions relating to capacity allocation and infrastructure charging, improved safety, greater efficiency, and increased harmonisation of rules and procedures at European level. The effectiveness of the package will need to be monitored for several years.

Are we moving to a fairer and more efficient pricing system, which ensures that external costs are internalised?

Charges and taxes are a fundamental (though not the only) policy tool for internalising external costs in the transport sector. Most Member States are considering reframing transport-related tax and charge structures, differentiating them on the basis of external costs. However, it is still difficult to identify the most appropriate tax framework and to decide what tax and charge levels to apply.

Internalisation measures are currently mostly concentrated on air pollution in the road sector and noise in the aviation sector. Almost no measures have yet been taken to internalise costs of congestion (some aviation and rail charges, and some urban parking fees are exceptions). In most urban areas, internalisation of external costs is still very incomplete.

Transport tax/charges differentiation in the Member States Table 2

		A	B	DK	FIN	F	D	EL	IRL	I	L	NL	P	E	S	UK
Non fuel-related taxes and charges																
Air pollution	Rail transport				✔											
	Aviation														✔	
	Water transport				✔							✔	✔	✔	✔	✔
	Road freight	✔	✔	✔			✔					✔			✔	✔
	Road passenger		✔	✔		✔	✔					✔			✔	
CO_2	Rail transport				✔											
	Aviation															
	Water															
	Road freight															
	Road passenger	✔		✔												✔
Noise	Rail transport															
	Aviation	✔	✔			✔	✔			✔	✔	✔			✔	✔
	Water transport															
	Road freight	✔					✔									
	Road passenger															
Congestion (**)	Rail transport															
	Aviation															
	Water transport															
	Road freight															
	Road passenger															
Total number of measures (excluding fuel taxes)		4	3	3	3	2	4			1	1	4	1	1	5	4
Fuel taxation																
Lower fuel tax for unleaded petrol		(*)	(*)	(*)	(*)	(*)	(*)	✔	(*)	✔	(*)	(*)	(*)	✔	(*)	(*)
Lower fuel tax for low-sulphur diesel or petrol			✔	✔	✔		✔					✔			✔	✔
Carbon tax on diesel and petrol					✔					✔						

(*) Leaded petrol no longer on the market.

(**) Some rail, aviation and possibly motorway charges differentiated according to the time of day and/or week can be considered as a pricing tool that addresses congestion, but it is difficult to identify which charges are precisely aimed at congestion. Urban parking charges that vary with time of day and/or proximity to central business district also address congestion. They have not been included in this table as they only concern specific local areas.

☹ The price of car transport has increased less than the price of rail and public transport: this has not encouraged the use of rail and public transport

Figure 22 **Real changes in the price of passenger transport, UK**

Sources: DETR, 1999-2000; Eurostat, 2001
Note: The costs of car use include all costs born directly by the private motorist, i.e. purchase, maintenance, fuel, oil, taxes amd insurance

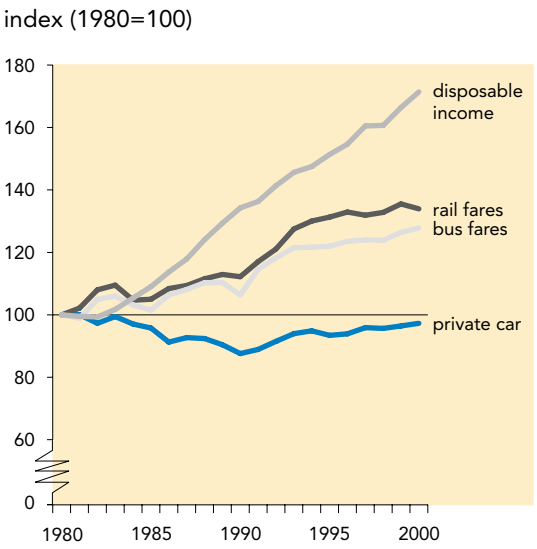
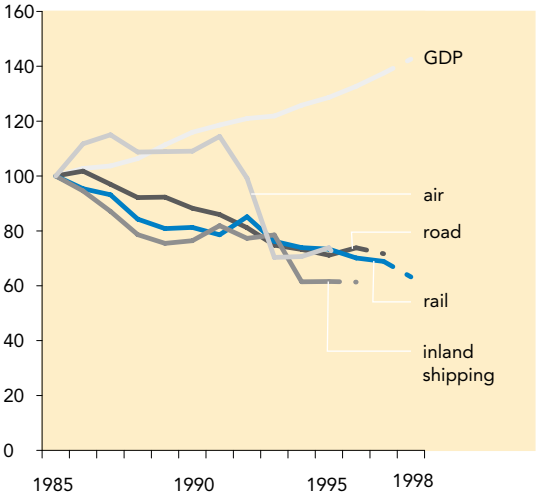


Figure 23 **Real changes in the price of freight transport, the Netherlands**

Sources: CEST, 1999
Note: Air freight prices are EU averages



EU-wide data on real passenger and freight transport prices are still lacking. However, data for some countries (e.g. UK and Denmark) show that passenger car transport has become cheaper relative to public transport than it was 20 years ago. In the Netherlands freight transport by all modes has become cheaper during recent decades. Trucking has gained market share because it has become much faster, and it remains a flexible mode for low quantities of freight.

☹ External costs of transport are estimated at 8 % of GDP; passenger cars, trucks and aviation have the highest external costs per transported unit

There are various reasons for the pricing of different transport modes not being an efficient way of promoting an environment-friendly balance between modes and managing demand. Some relate to imperfections in the structure of the sector (e.g. unjustified subsidies for certain modes), others to the fact that prices do not properly reflect external costs.

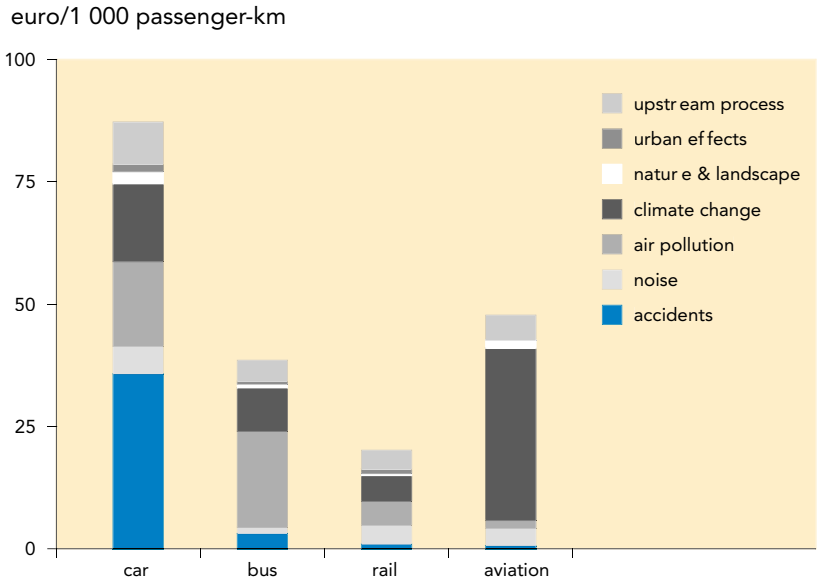
The external costs of transport in the EU amount to around 8 % of GDP. Motorised road transport — which takes the highest share in both freight and passenger trips — accounts for more than 90 % of these costs (INFRAS/IWW, 2000). Accidents, noise, air pollution and climate change are the most important external costs.

Passenger transport is estimated to be responsible for 65 % of total external costs. The average external costs (per passenger-km) of cars are the highest, then aircraft, bus and train. For freight, water and rail transport have the lowest external costs per tonne-km, with air transport and trucking 10 and 5 times, respectively, more than rail.

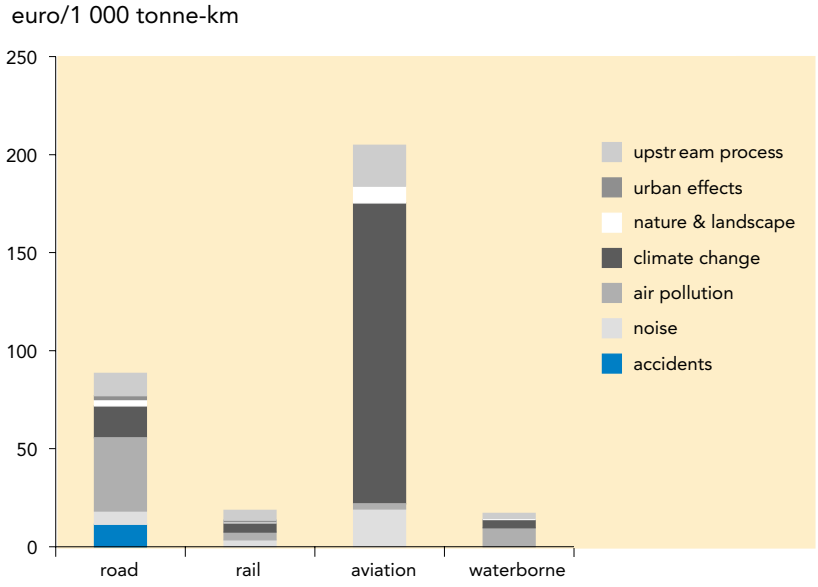
Average external costs of transport in 1995 by transport mode and cost category (excluding congestion costs and uncovered parking costs) — EUR-17, 1995

Figure 24

Passenger transport



Freight transport

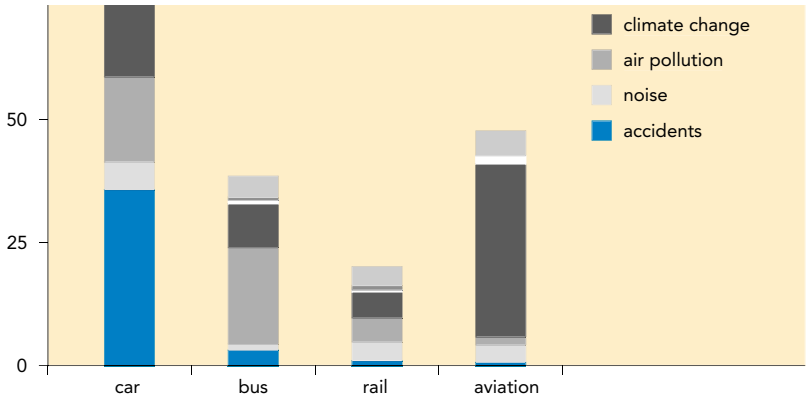


Sources: INFRAS/IWW, 2000

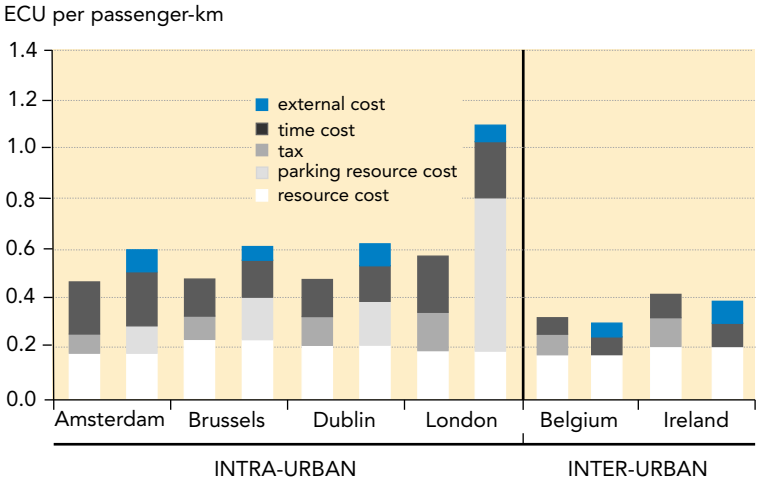
Price structures do not properly reflect the marginal social costs of transport, in particular in rush hours and urban areas.

Figure 25 **Car costs and social costs, expected situation for 2005 with unchanged pricing policies (four cities and two countries)**

Peak situation



Off-peak situation



Source: TRENEN, 1999
Note: For each town, the left bar shows the costs actually borne by a car user, given by the resource cost (the overall private cost of using the car), the various taxes paid on the vehicle and the fuels, and the trip cost in terms of time used for it (assuming zero parking costs). The right bar shows the marginal social cost of the trip, split into its main components.

Fair and efficient pricing is one of the major pillars of the EU's Sustainable Development Strategy and Common Transport Policy (European Commission, 1998; EP, 2000). The guiding principle is the internalisation of marginal external costs. This means that the price of any transport service should equal the sum of the marginal production cost (usually given by prices observable on the market) plus the marginal external cost imposed on society (accidents, congestion and environmental impacts). Internalisation would encourage shifts to cleaner and safer vehicles and fuels, shifts of demand away from peak periods, safer driving and increases in occupancy rates.

The main internalisation difficulty is that external costs vary widely according to the time of day (peak/off peak), location (urban, inter-urban or rural), type of vehicle (e.g. compliance with emission standards) and fuel used (diesel, electricity, petrol). There may also be substantial differences even between trips in urban areas under the same traffic conditions, depending, for example, on weather conditions.

Case studies for four cities illustrate for instance that the actual price paid by a car user is in many cases far lower than the marginal social cost, particularly during peak hours. The differences in off-peak hours are much smaller for the four cities. It appears that the true social costs in the latter case are more than paid for in the whole of Belgium and in Ireland.

Most countries are establishing internalisation instruments, but implementation is still facing barriers

There are many barriers to implementing internalisation. Estimating marginal external costs is rather complex. International studies give different estimates, partly because of different methodologies and valuation approaches. Any policy tool that aims to raise the level of transport prices up to the level of marginal social costs should be flexible enough to adapt to differences in location, time and vehicle characteristics. Last but not least, governments may have other economic and social objectives, which in some cases may not favour a full and consistent implementation of the internalisation principle. For example, in some cases setting transport prices equal to (possibly high) marginal social cost might impose too heavy a burden on lower income groups or people with impaired mobility.

Several tools can be used for 'setting the right prices', including fuel taxes, kilometre charging systems, parking charges and vehicle taxes. Environment-related subsidies can be used (to favour cleaner technologies) and so can tradable polluting permits (for which very few applications have yet been created). Shifting the burden from fixed taxes and charges (such as annual vehicle taxes or the payment of an annual ticket for motorways) to variable taxes and charges (such as tolls, fuel taxes, road kilometre charging) is generally considered to be the most appropriate way forward (ECMT, 1998; HLG, 1999).

Table 2 shows that many countries already apply some elements of a differentiated tax structure. Differentiated taxes mainly appear in the road transport and aviation sector and apply to air pollution and noise, for example: tax reduction for low-sulphur fuels, reduction of vehicle purchase tax differentiated by type of vehicle (i.e. its compliance with emission standards), and noise surcharges in airports. Taxes on CO_2 and congestion tolls are rare.

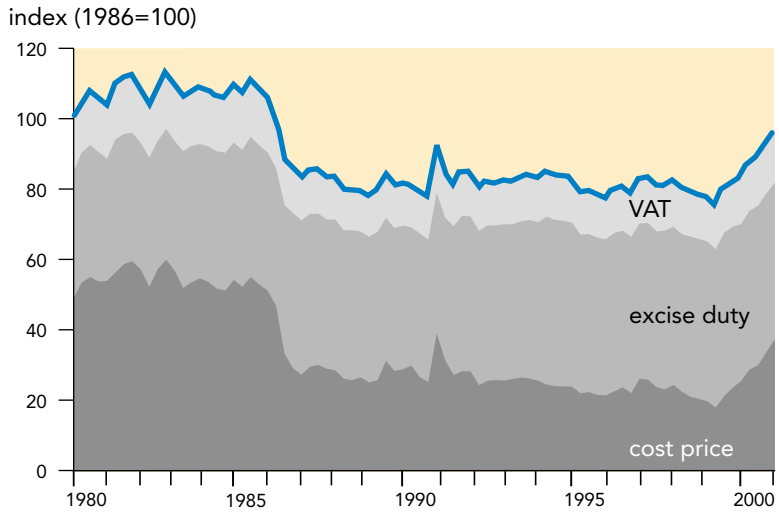
Current trends in fuel prices do not encourage fuel-efficient driving, but tax differentiation helps to promote the use of cleaner fuels

The inflation-corrected EU-average price of road fuel at the end of 2000 was lower than in the first half of the 1980s (see Box 4). Fuel prices have therefore not discouraged fuel consumption.

Excise duties on transport fuels are applied in all Member States. Such duties offer a good way of internalising the external costs of CO_2 emissions since there is a direct relationship between fuel consumption and CO_2 emissions. However, they cannot be differentiated to reflect specific vehicle or trip characteristics (e.g. vehicle emission class, urban/rural and peak/off-peak trips).

Fuel taxes are, however, differentiated to promote cleaner fuels such as unleaded

Real average price of motor fuels, EU Figure 26



Source: CE Delft, 2000 (using Eurostat data)

petrol or low-sulphur diesel. A number of Member States are promoting low or ultra-low sulphur fuels to comply already with the EU standards of Directive 98/69 set for the year 2005. This should help to reduce NO_X, PM_{10}, and CO_2 emissions.

Box 4: Fuel prices and transport demand

Autumn 2000 saw rapidly increasing fuel prices, caused by increased crude oil prices on the world market and the falling euro against the dollar. Although real fuel prices were actually slightly lower in Autumn 2000 than in the early 1980s, the sudden rise provoked protests, in particular from truckers, fishermen and farmers. Some governments reacted by (temporarily) decreasing fuel tax rates or granting tax rebates.

A recent study by DG ECFIN suggests, however, that the impact of fuel prices on overall transport demand is small; an increase of 30 % in the price at the pump leads to 6.8 % higher overall transport costs. This would induce a reduction of road transport demand of only 1.9 %, suggesting that higher prices have a limited impact. Moreover, the report suggests that the overall social costs of achieving this reduction in transport demand might outweigh its benefits.

Should fuel taxes be raised for environmental reasons? Apart from possible reductions in transport demand, higher fuel prices may help to induce vehicle manufacturers to improve fuel efficiency and vehicle operators to increase load factors, and may encourage a shift towards cleaner fuels if such fuels were cheaper. However, fuel taxes have a limited value for internalising external transport costs. Although fuel taxes can properly address greenhouse gases emissions, they cannot be made to vary by time of day (peak/off-peak) and geographical situation (urban/rural) which is a necessary condition for efficient internalisation of most local environmental and congestion effects. Other more flexible policy tools (e.g. road pricing) may complement fuel taxes in this respect.

Whether revenues from transport taxes fall below or exceed the sum of total external costs differs from country to country. Moreover, matching total costs to total taxes is no guide to achieving internalisation of external costs. A Dutch study indicated that external transport costs taken as a whole are matched by the revenues raised through the existing taxation system, but that there is no match at the level of specific trips and therefore no efficient internalisation. For example, road trips at peak times in urban areas are undercharged whilst some extra-urban trips are overcharged.

Sources: DG ECFIN, 2001; Dutch Advisory Council for Environment, Housing and Spatial Planning, 1999

How rapidly are improved technologies being implemented and how efficiently are vehicles being used?

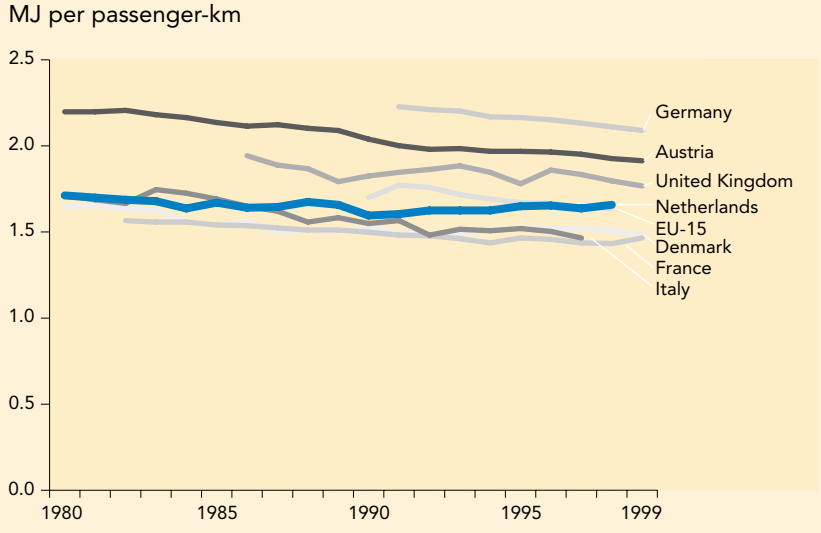
The energy efficiency of passenger car transport has improved slightly during the past two decades, and as a result so have average specific CO_2 emissions. The voluntary agreement with the car industry to reduce CO_2 emissions from new cars is making progress towards its target, although further efforts are still needed. Technological improvements in fuel efficiency have been largely offset by traffic growth and low occupancy rates. Technology measures alone are therefore unlikely to be sufficient to stabilise or reduce overall CO_2 emissions of road transport in future.

There has been no improvement in the energy efficiency of trucking transport, partly because of low load factors. Trucks consume significantly more energy per tonne-km than rail or ship transport.

The energy efficiency of passenger and freight rail transport has remained stable in recent decades, but rail is still the most energy efficient mode. Despite improvements during the 1980s, aviation continues to be the least efficient mode. In terms of specific emissions, aviation is the most polluting freight transport mode, especially short-haul aviation. Ship and rail freight transport are the least polluting modes, which underlines the importance of revitalising the Community's rail and waterway network.

The specific NO_x emissions of all modes — except aviation — have decreased markedly in the past two decades, mainly following technological and fuel improvements. This trend is expected to continue.

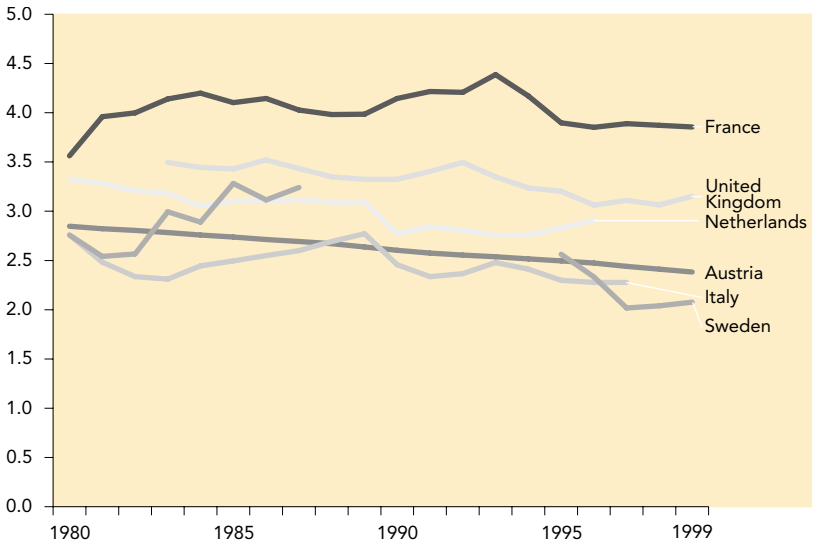
Energy use per passenger-km (total car fleet) for selected countries and EU, 1980–1999 Figure 27



Sources: ODYSSEE database (ADAME/SAVE project on energy efficiency indicators)

Not much improvement in energy efficiency of road passenger and freight transport

Figure 28 **Energy use per tonne-km of trucks, selected countries, 1980–1999**



Sources: ODYSSEE database (ADAME/SAVE project on energy efficiency indicators)

The energy efficiency of passenger transport (and consequently specific emissions of CO_2) has improved only slightly, following technological improvements, which have been enhanced by the voluntary agreement with the car industry to reduce CO_2 emissions from new cars. Freight transport shows no improvement in energy efficiency. The discrepancy between improvements in technology and actual energy efficiency is partly the result of the use of heavier and more powerful vehicles and low occupancy rates and load factors.

According to the voluntary agreement with the car manufacturers[2], the average CO_2 emission from new passenger cars sold in the EU is to be reduced to 140 g CO_2/km by 2008-09. This means that the reduction rate must be on average 2 % per year. The Commission's first evaluation of the voluntary agreement shows that ACEA achieved an average reduction rate of 1.5 %, JAMA 1.15 % and KAMA 0.4 % per year. The report concludes that all three cooperating car-manufacturing associations will need to increase their efforts to meet the final target. Additional non-technical measures will need to be developed in order to meet the Community's strategy target of 120 g CO_2/km for new cars by 2010 (European Commission, 2000e).

The increases in energy use by air conditioning, heated seats and new electronic devices that are becoming standard also constitute a risk for the Community strategy. The Community's action plan for energy efficiency includes incentives for optimal occupancy of vehicles, promotion of new and alternative infrastructure and subsequently modal shifting and modal integration, alternatives to air transport, completion of the internal market in rail transport and changing behaviour regarding mobility (European Commission, 2000e).

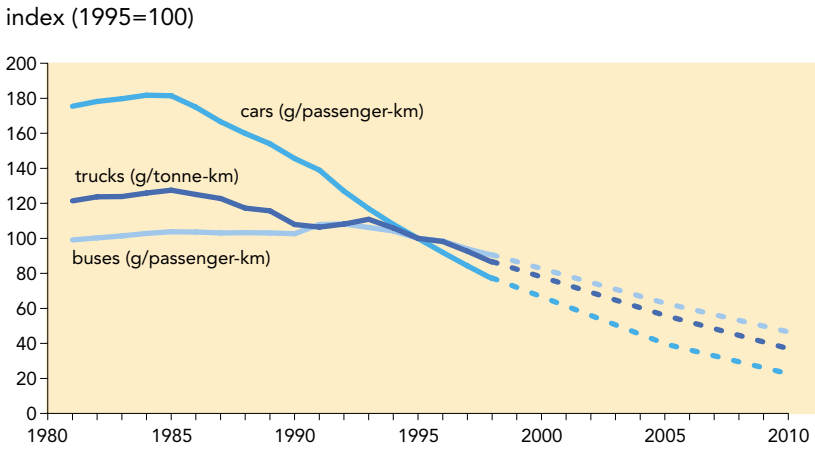
[2] These include the European, Japanese and Korean car manufacturing associations (ACEA, JAMA and KAMA).

Technology improvements (e.g. catalyst systems) and cleaner fuels make road vehicles less polluting per transport unit

The mandatory introduction of catalytic converters since the late 1980s and fuel quality regulations have markedly reduced specific emissions of NO_x, NMVOC and carbon monoxide (CO). This trend is expected to continue with the introduction of stricter emission standards for new cars and trucks (Euro IV in 2005 and more stringent NO_x standards for heavy-duty vehicles in 2008) and motorcycles (from 2003 for new types and 2004 for all new motorcycles, which will be further limited by the year 2006). This should result in a reduction of 60 % for NO_x and 76 % for VOC (compared to 1980 levels) in the specific emissions of road vehicles (excluding motorcycles) by 2010. There have also been significant decreases in pollutant emissions per transport unit for other modes of road transport (buses, trucks) during the past two decades.

The reduction of lead, sulphur and benzene in fuels has reduced the specific emissions of these substances. This trend is expected to continue up to 2010. The phase-out of leaded petrol is a major integration success story: in 1999 the market share of unleaded petrol in the EU reached more than 80 % through the use of instruments such as taxes and technology standards (catalyst systems). Leaded petrol is expected to be completely phased out by 2005, though the differences between countries are large (Spain and Greece — with 54 % leaded petrol in 1999 — are running behind). Recent research on the use of low-sulphur content fuels has shown that side benefits can be expected regarding the exhaust treatment systems of the current fleet, resulting in decreases in emissions of other pollutants, and improvement in fuel efficiency of the future fleet[3] (AEA Technology, 2000). The magnitude of these benefits is still under discussion.

Modelled specific emission of NO_x per transport unit (EU-15) — Figure 29

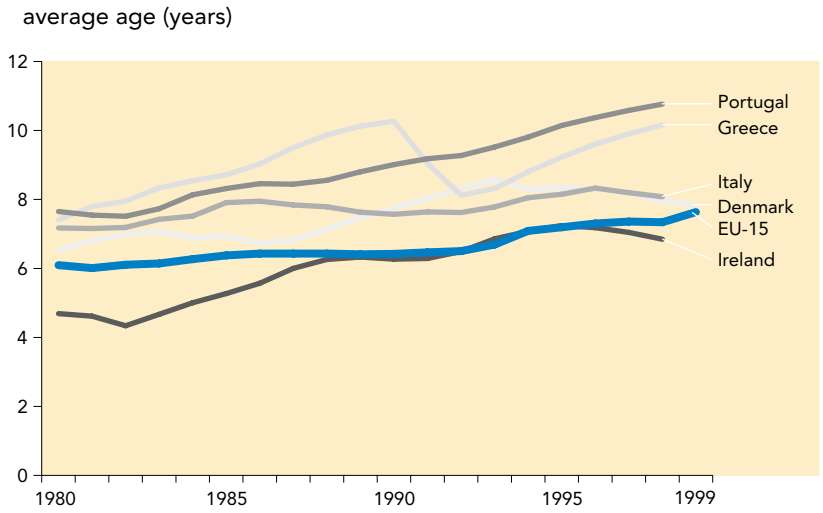


Source: EEA-ETC/AE, 2001; Eurostat, 2001

[3] Stemming from a reduction in the frequency with which the exhaust gas treatment catalysts (NO_x storage traps) need to be regenerated by periodically running engines on fuel rich mixtures.

The average age of the car fleet has increased, slowing the penetration rate of new technologies

Figure 30 **Average age of passenger cars**



Source: Eurostat, 2001

The potential benefits of new technologies have been reduced by the slow market penetration of new cars: the average age of the car fleet increased from 6.1 years in 1980 to 7.3 years in 1998. Although many new cars are being bought, old cars are being kept longer. New technologies therefore take longer to penetrate fully. However, older cars are often used as the second or third car in a household, usually driven less than new ones, and therefore have less impact.

In 1998, 58 % of petrol-driven cars in the EU had catalytic converters, with significant variation between countries. The share of catalyst equipped cars is in particular low in Portugal and Greece, which had the highest growth in car ownership.

Several Member States introduced car-scrapping schemes during the 1990s to speed up the renewal of the fleet. Of course such programmes only result in environmental improvements if the new vehicles have emission rates substantially better than older models and if the environmental impact of vehicle construction and dismantling is reduced. The directive on end-of-life vehicles aims to ensure this.

It is expected that electric vehicles, hybrid electric vehicles and fuel-cell electric vehicles will start to be introduced in the car market during the coming years, resulting in an expected share in sales of hybrid electric vehicles in total passenger car sales of around 1–2 % by 2010 (TRL, 1999).

Occupancy rates and load factors remain low; this may reduce the potential benefits of improved technologies

Though data quality on occupancy rates and load factors is poor, figures for some countries indicate that occupancy rates of cars and load factors of trucks are low. This may partially offset the gain in fuel efficiency from technology improvements.

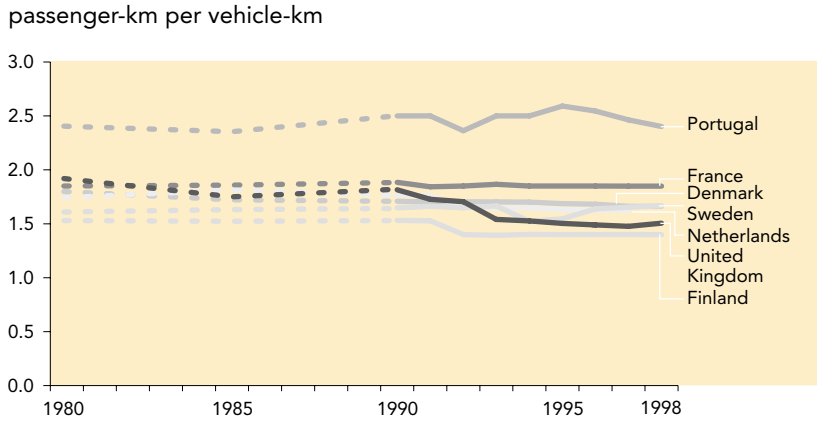
Passenger car occupancy is falling in some countries (Portugal, Finland), but is rather stable as an EU average. This is despite EU efforts to increase utilisation efficiency, for example through its Citizens' Network strategy, which aims to develop traffic priority for vehicles with more than one person and promote car sharing initiatives.

In Denmark, Germany, Spain and Portugal the load factors increased between 1980 and 1995. In the Netherlands, Finland and Sweden the load factor dropped significantly (by 10-17 %) between 1980 and 1995. Empty hauling makes up only 25 % of total truck vehicle-km in Germany and over 40 % in the Netherlands. In the United Kingdom, empty hauling declined from about 33 % to 29 % of total truck vehicle-km between 1980 and 1996.

Information and communication technologies can help to make logistics and route planning more efficient, thereby reducing the number of vehicle-km. However, the internet and e-commerce probably further stimulate 'just-in-time' deliveries, and increase haulage distances, because distribution facilities are more centralised to minimise costs and goods are delivered to more destinations (homes) than before (supermarkets). New design approaches to packaging can also help to increase load factors significantly (European Commission, 2000g).

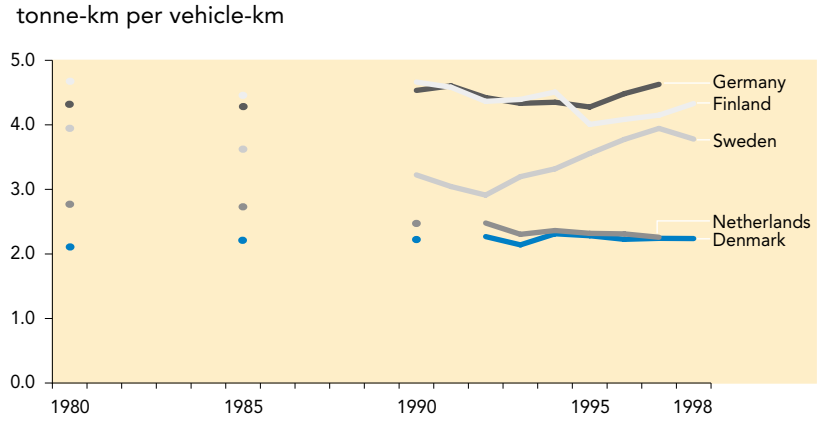
The picture is more positive for rail freight transport, where load factors improved slightly (3 %) between 1980 and 1998.

Occupancy rates of passenger cars Figure 31



Source: Eurostat, 2001

Load factors of road freight transport Figure 32



Source: Eurostat, 2001

Alternative and renewable (biofuels) energy sources for transport still have low penetration

The Commission's proposal for an EU strategy for sustainable development aims for a 7 % share of alternative fuels (including biofuels) in fuel consumption by cars and trucks by 2010, and 20 % by 2020 (European Commission, 2001a). However, despite EU efforts to promote alternative (electricity, natural gas, fuel cells) and renewable (biofuels) energy sources for transport, these still have low penetration. One problem is that alternative fuels are still too expensive for large-scale use. Fair pricing, as part of internalising the external costs of transport, could change this lack of competitiveness. For example, the use of alternative fuels could be promoted by introducing a minimum carbon tax to be applied to all transport modes, differentiated by fuel type. However, the potential benefits with respect to CO_2 emission reduction are still uncertain.

Aviation continues to be the least energy-efficient mode; technology and operation improvements are offset by growth

Between 1960-1970, the energy efficiency of air transport improved by around 6.5 % annually. This was mainly due to technological improvements (following the rise in fuel prices of the 1970s) and increasing occupancy rates. This improvement rate has slowed down to 1.9 % during the period 1980-2000.

Air passenger travel remains less energy-efficient than road and rail transport. The Commission considers a fuel efficiency improvement of 4 % or 5 % per year (in the next 10 to 15 years) feasible, and will investigate the possibility of a voluntary agreement with the aviation sector to achieve this (European Commission, 1999c). Efficiency gains could be realised among others by fleet renewal and improvements in aircraft operations through air traffic management.

Aviation has on average higher NO_x and hydrocarbons (HC) emissions per passenger-km and per tonne-km than road and rail transport. While it is estimated that specific emissions of HC and CO decreased with 85 % and 78 % respectively between 1976 and 1988, the specific emissions of NO_x increased with 12 % in this period. This is increase is mainly caused by the higher engine temperatures required to increase fuel efficiency and reduce other emissions. Specific emissions of NO_x, CO and HC are expected to decrease, by between 2 and 15 % in 2010 compared to 1995 (TRL, 1999).

The environmental impact of aviation is expected to increase as the gap between the rate of growth and the rate of technology and operational improvements appears to be widening. It is for instance expected that CO_2 emissions will grow by 3 % annually over the period 1990-2015 (IPCC, 1999).

The Commission has recognised that this trend is unsustainable and announced a strategy to enhance technical standards and (noise and emission) standards for aircraft (European Commission, 1999c). The strategy also includes economic and regulatory incentives, drawing a clearer line between operations on the basis of their environmental quality, and inviting the air transport industry (by means of voluntary agreements) to make a proactive contribution to reducing the environmental impacts of air transport.

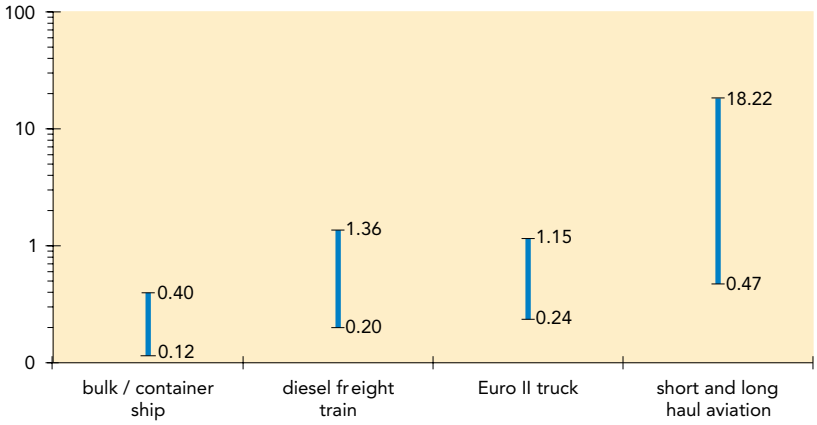
Shipping and rail transport are the cleanest motorised modes in freight transport, though they show little improvement in energy efficiency

The figure above provides some results showing typical emissions of NO_x per tonne-km. A range of values is provided for each means of transport, based on operating conditions and load factors.

Ship and rail transport compares very favourably with road as regards energy efficiency per tonne-km. The average fuel consumption for road, rail and short sea shipping is around 31.3, 8.9 and 4.8 g per tonne-km, respectively (European Commission, 1999d). However, the energy efficiency of rail transport has changed little during the past two decades, suggesting that additional energy saving measures need to be explored even in the rail sector. Noise and fragmentation are areas of concern for rail as well as for other transport modes.

Data on specific emission from ships are still poor, and therefore cannot be fully compared with data for other modes. However, some calculations show that short sea shipping is the mode that emits the least CO, HC, particulate matter and NO_x per tonne-km (European Commission, 1999d). Only the SO_2 emissions are higher when compared with road and rail. The Commission therefore recognises short sea shipping as a sustainable mode of transport. EU legislation setting more stringent limits for sulphur content in fuel oils will contribute greatly, especially to SO_2 emission reductions.

Specific NO_x emissions for various modes of freight transport — Figure 33



Source: Eurostat, 2000

How effectively are environmental management and monitoring tools being used to support policy- and decision-making?

Most countries have some form of institutional coordination of transport and the environment: integrated strategies, national monitoring systems and strategic environmental assessments. Such tools help to integrate environmental considerations at various decision-making levels, and also to enhance public information and involvement. There is a large variation in the details and effectiveness of these approaches.

Institutional cooperation is essential for the development and implementation of integrated transport and environment strategies. However, in practice, cooperation between ministries (of transport, environment and, where applicable, spatial planning) is still weak in most Member States. The division of control over transport and environmental issues varies and informal contacts are highly important.

Table 3 **Status of integrated transport planning and tools for environmental management**

Member State	Institutional coorperation	Integrated transport strategies system	National transport - environment monitoring	Implementation of strategic environmental assessment
Austria	✔	✔	✔	UD
Belgium	✔	UD		UD
Denmark	✔	✔	UD	✔
Finland	✔	✔	✔	✔
France	✔		✔	✔
Germany	✔	UD	✔ (some Länder)	UD
Greece				
Ireland	✔	✔		UD
Italy	✔			
Luxembourg		UD		
Netherlands	✔	✔	✔	✔
Portugal				
Spain				✔
Sweden	✔	✔	✔	✔
United Kingdom	✔	✔	UD	✔

Note: UD 'under development'

At least 10 Member States are developing integrated transport and environment policies, but concrete targets and objectives are often lacking

Even where integration strategies and policies are being developed, most have yet to be fully approved, funded and implemented. National policies vary in substance, but have common elements, such as the acknowledgement of the need for demand management (for road and air transport), for the promotion of cleaner transport modes, and for changes in life style and driving behaviour. Other common elements concern technical improvements of vehicles and increasing fuel prices.

Introducing common targets would help to direct efforts towards a common objective, thereby strengthening integration across the sectors involved. It would also provide greater transparency and political accountability, and allow for benchmarking progress against clear goals. Although most Member States have identified some environmental integration objectives, the benefits of setting targets are being questioned by a number of countries. For example, few countries have put in place objectives for demand reduction or modal shares.

The scope of national management integration efforts are not always fully in line with the EU strategies and policy papers on integration (see Box 5). Most notable is the general failure to implement the 'internalisation of externalities' principle. Also, there are wide variations in governmental management of the transport sector and its environmental impacts, including differences in the organisation of the rail sector, infrastructure planning systems (and the method of accounting for environmental impacts), and national management of urban planning.

Box 5: Integration strategies: recommendations by the Joint Expert Group on Transport and Environment

The Transport Council has developed and approved (end 1999) an integration strategy for the EU transport sector in response to the request of the Cardiff Summit. The Council has allowed for a regular review of the strategy. The Commission recently published its first review report (European Commission, 2001c).

To support this review, a joint transport and environment country expert group (chaired by DG ENV and DG TREN) produced a report (Joint Expert Group on Transport and Environment, 2000), proposing ways and means for the further development of the strategy towards a sustainable transport system. The report highlights the need for a package containing economic incentives, demand management, land-use planning, information and education, technology, regulation and research. The setting of intermediate and long-term sectoral targets is strongly recommended to focus and facilitate the instruments for implementation. Progress towards these targets should be monitored regularly through the indicator-based transport and environment reporting system (TERM).

Source: Joint Expert Group on Transport and Environment, 2000

National monitoring systems are emerging and could become valuable building blocks for TERM

Most countries report transport and environment indicators, mostly under general state of the environment reports or sustainability reports. Regular transport and environment indicators are prepared in six countries. Only Austria and Finland have as yet set up indicator reporting mechanisms along the lines of TERM (the Austrian system mainly addressing environmental indicators). Sweden, France and part of Germany (Baden Württemberg), are planning to do so. In the Netherlands, transport-environment monitoring is also part of the yearly 'environmental balance sheet' and 'biodiversity balance sheet', which are the responsibility of legally independent bodies that have the sole task of

policy performance monitoring and reporting to support the political process.

Monitoring at the national level is needed to evaluate the effectiveness of national and regional policy measures and strategies in more depth than is possible at the EU level within TERM.

While TERM can serve as a common framework, national reports are expected to be more detailed. There is as yet no agreed common framework for national reporting on integration of environmental objectives into transport policy.

The practice of strategic environmental assessment is growing, but links with actual decision-making are weak

A survey (on behalf of DG ENV) on use of strategic environmental assessment (SEA) in the transport sector showed that Denmark, Finland, Sweden and the Netherlands have an established history of SEA of transport, supported by legal requirements (ERM, 2000). Austria, Belgium, France, Germany, Italy, Spain and the UK are moving towards systematic application of SEA (or elements of SEA) of transport at national level or in certain regions, but the link with decision-making is often still weak. Greece, Italy, Luxembourg and Portugal have chosen to postpone action until the EU directive has been approved. The latter has been recently adopted; Member States will have three years for implementation in their national legislation (European Parliament and the Council, 2001).

The survey also indicates that applying SEA, in particular on a mandatory basis, has many of the expected benefits. As to be expected in an early phase, there are also difficulties related to public participation, availability of expertise and high implementation cost.

Cooperation between transport and environment ministries is being formalised in most countries, but needs to be enhanced at all hierarchical levels

Formal cooperation between various ministries is a prerequisite for the development, implementation and follow-up of a joint and integrated transport and environment strategy. Cooperation with spatial planning ministries is equally important given the increased importance of demand management.

Eleven Member States are applying some identifiable form of institutional coordination (co-signing of policy papers by ministers, collaboration at senior level, job rotation). However, the degree of cooperation needs to be improved in all countries, in order to achieve sound and balanced formulation and implementation of integrated strategies.

Cooperation between the modal authorities within the transport ministry (e.g. road, rail, maritime and aviation administrations), and between national and local governments, varies greatly between countries.

On the positive side, even in countries, such as France, where in the past transport decisions have been taken mainly by modal and regional authorities, there is now extensive consultation between the environment and transport ministries in relation to new strategic policy documents.

The setting up of an 'integration unit' with expertise and responsibility for

integration in the transport and/or environment ministry is increasingly common. Some countries have seconded staff to such units (for example from the environment to the transport ministry); others have created independent bodies for integrated transport, or use inter-ministerial working groups to address specific transport and environment issues.

Several countries are also addressing institutional coordination between land use, transport planning and economic policy in a more or less structured way. Most Member States appear to recognise its importance, particularly in connection with local and urban dimensions.

Public awareness does not always result in changes in behaviour

The Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (ECE/CEP/43) aims at promoting environmental education and awareness among the public through the provision of environmental information.

The environmental effects of transport are of major and increasing public concern. The provision of information (for example on products and alternatives) and awareness raising may help to enhance the acceptance of certain transport and environment policies. Various countries undertake awareness-raising campaigns and training programmes.

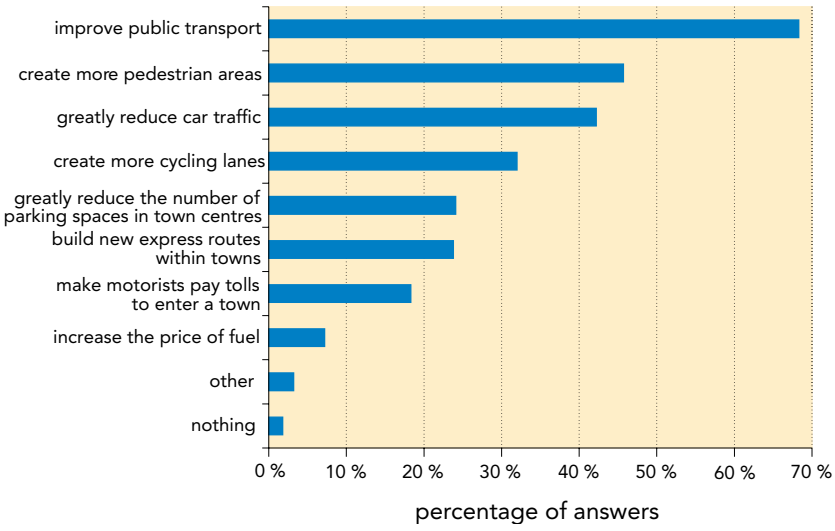
Improvements in public transport and better facilities for pedestrians and cyclists are stated as priorities in public surveys. However, pricing measures to restrain car use appear to receive little public support.

The European Climate Change Programme (ECCP) reports that behavioural changes have a large potential for reducing greenhouse gas emissions from transport. Unfortunately public awareness does not always result in the desired changes in mobility behaviour. Strong incentives are needed.

Better behaviour-related indicators need to be developed.

Public opinion regarding solutions to transport problems (representative sample of 16 000 citizens) Figure 34

In your opinion: which one of these measures would make it possible to most effectively solve environmental problems linked to traffic in towns?



Sources: European Commission, 1999f

Learning lessons from national differences

Although the assessment in TERM focuses mainly on the EU level, comparing indicator trends at national level can also teach important lessons (Figure 35).

There are several common features at the Member State level. For example, personal mobility, expressed as the average number of passenger-km per capita, increased in all Member States (except Finland). Differences between countries can be explained by differences in personal income, size of the country and location of holiday destinations.

The modal split moved towards the less environment-friendly modes of transport, i.e. passenger cars and powered two-wheelers in most Member States. There are two notable exceptions: the Netherlands (where passenger transport by rail increased markedly) and Austria (where bus/coach transport increased considerably).

Freight transport demand per unit of GDP (freight transport intensity) also increased in most Member States, with significant differences between countries. However, in Austria, Denmark, Finland and Portugal only, an increasing share of rail, inland waterways and oil pipelines can be observed.

CO_2 emissions from transport are increasing in all countries. Most countries have made considerable progress towards reducing NO_x emissions. Exceptions are Spain, Greece, Ireland and Portugal.

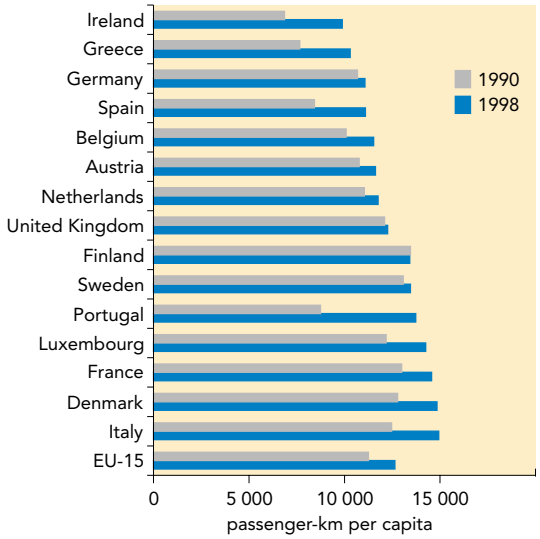
There are substantial differences in approaches to adapting transport systems to better address sustainability concerns. For example, Nordic countries make much greater use of taxes, other pricing mechanisms and land-use planning than countries in southern Europe.

Some countries, such as Austria, Denmark, Finland, the Netherlands and Sweden, have developed environmental action plans and set targets for the transport sector. Some have also established conditions for carrying out strategic environmental assessments of certain transport policies, plans and programmes. This enhances the integration of environmental concerns and ensures the involvement of environmental authorities and the public in decision-making.

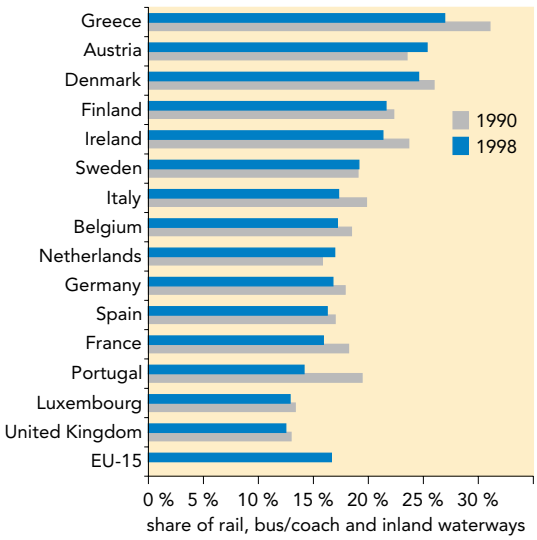
More details on national differences can be found in the indicator fact sheets. However, more methodological work is required to develop TERM fully into a tool for country benchmarking, which can help countries to learn from each other's experience (see Box 6).

Country profiles Figure 35

Passenger transport per capita

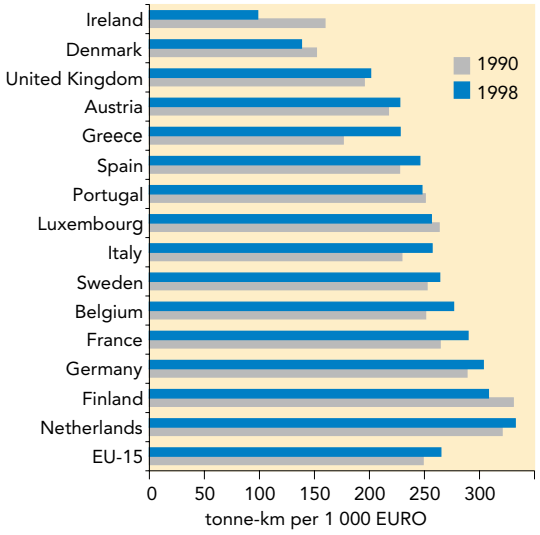


Passenger transport (excluding aviation): modal shares

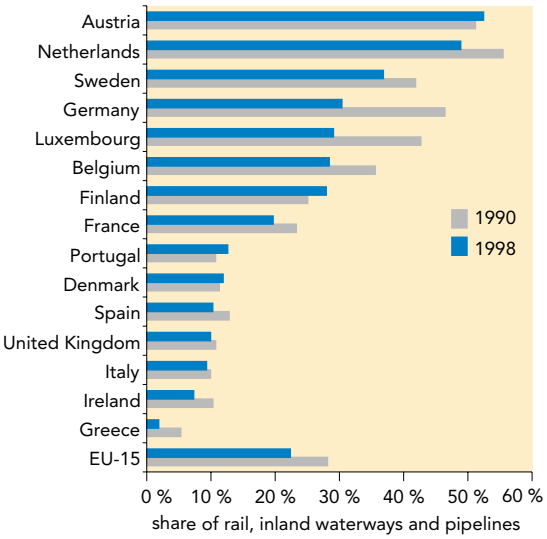


Source: Eurostat, 2001

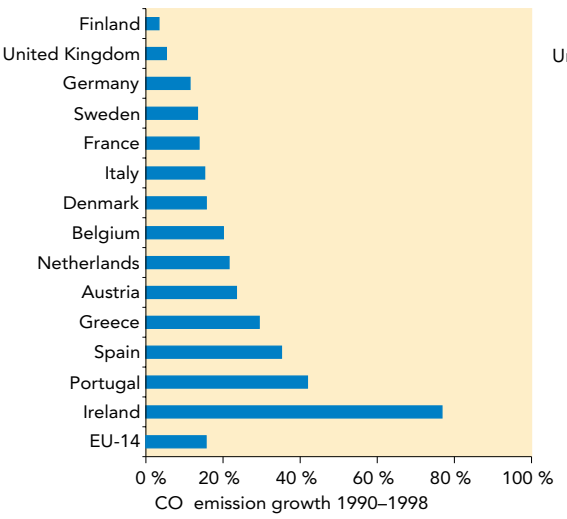
Freight transport per GDP



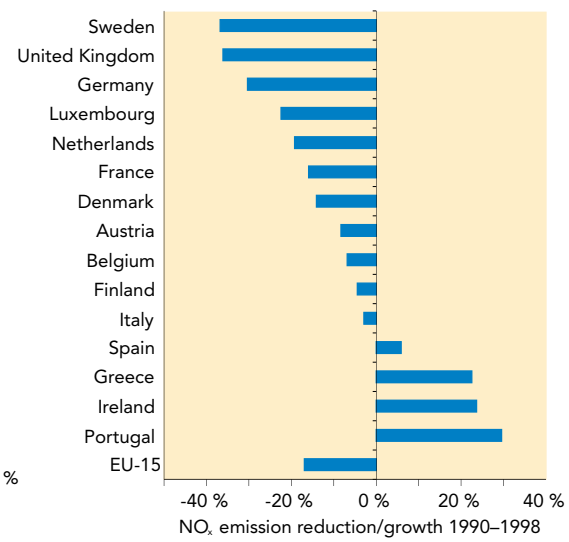
Freight transport (excluding aviation and maritime shipping): modal shares



CO_2 emissions by transport



NO_x emissions by transport



Source: EEA-ETC/AE, 2001

Note: Luxembourg not included due to data inconsistencies in the figure on CO_2 emissions by transport

Box 6: Workshop 'Shared policy learning in transport and environment' — 15–16 March 2001, The Hague

This workshop was organised jointly by EEA and the Dutch Ministry of Transport (which hosted the meeting). The participants were transport/environment experts of the EU countries, the Commission and international organisations. The purpose of this consultation was to discuss:

- how the TERM indicators can be used for national comparisons;
- how far EEA can/should get involved in such analyses;
- how countries can contribute to improve this aspect of the TERM process.

Most experts agreed that national comparisons can be useful, both from a European perspective (to assess EU developments on transport and environment, a good insight into country differences is necessary) and from the national point of view (some countries like to know what position they have in the EU transport/environment 'race').

However, serious concerns were expressed regarding the poor quality of data for various indicators, which can give a distorted picture of national differences. There was also difficulty in getting, at EU level, the proper insight into specific national policies and the various instruments they use (i.e. the explanatory factors behind the country differences). EEA was recommended in future to limit the number of indicators used for national comparisons and to strive for full country coverage when doing so. Another concrete recommendation was for the development of 'country fact sheets', in which the country's main policy priorities and instruments are summarised. EEA will develop standard formats for this, and will invite the countries to provide their input to such a system.

Where possible, the indicators and countries are to be evaluated against concrete EU targets and objectives. The current lack of sector-specific targets is a major problem in this respect.

It was generally agreed that the countries should be involved more directly in the TERM process, at the data level (through the national statistical offices), the assessment level (EEA is gradually establishing a network of national reference centres for transport and environment) and the political level (the Commission has created a working group on TERM under the DG ENV-DG TREN expert group on transport and environment).

Another item on the agenda was a proposal by the Dutch Ministry to launch a pilot study, in cooperation with other countries, to make more in-depth analyses of one or two indicator themes, and thus to evaluate the effectiveness of certain country policies (benchmarking). As this pilot could result in very useful lessons for TERM, EEA will follow up this initiative, to ensure proper feedback with TERM.

The next steps: data and method improvements, networking and TERM 'enlargement'

There are still serious data gaps for most TERM indicators. Actions to harmonise methodological approaches and streamline data collection nationally and internationally remain most important to TERM. Eurostat will do this in the context of the development of its multi-year action programme on transport statistics. Its TERM Statistics Task Force should ensure that the necessary actions are taken by the national statistical offices. For EEA, providing the TERM environmental data needs is part of the work programmes of the five European Topic Centres (ETCs).

Significant methodological work is needed to improve indicator definitions for certain policy areas (including accessibility, costs and pricing, and behaviour).

In parallel, the TERM indicator list will be evaluated regularly, to ensure that it matches the information needs of emerging integration strategies and targets. In particular the system will be re-evaluated in the light of the revised Common Transport Policy, 6EAP and the sustainable development strategy.

One of the difficulties perceived in the assessment is the lack of clear targets against which the indicator trends can be evaluated. The DG ENV-DG TREN expert group on transport and environment has also strongly recommended the setting of intermediate and long-term sectoral targets, and the linking of indicator development to these. To do this, EEA will continue to keep track of target development, using its STAR database as a tool (http:/star.eea.eu.int).

TERM will gradually be developed into a tool for analysing policy effectiveness e.g. by including future projections in the indicator assessment. This will require careful coordination with the Commission's activities on sectoral scenarios and with the environmental outlooks that will be developed by EEA (and the ETCs) for its 2004 state of the environment and outlooks report.

Several national indicator reporting systems are emerging, and coordination will be needed to ensure comparability of national assessments and provide feedback to TERM. EEA is currently extending its EIONET to include national reference centres on transport and environment to exploit national expertise more effectively. EEA will continue to organise regular workshops on specific methodological issues with national and international experts. There is a need to better link TERM with national policy-makers. To this end, the Commission has announced the creation of a TERM work group under its transport and environment expert group.

Networking with other international organisations (such as the Organisation for Economic Co-operation and Development, the World Health Organization, the European Conference of Ministers of Transport and the United Nations Economic Committee for Europe) will continue so as to avoid duplication.

The Commission considers enlargement as one of the key areas for future activities in integrating environment and sustainable development into energy and transport policies (European Commission, 2001b). Preparatory work has started to include the Accession Countries in the TERM process and to adapt the indicator list accordingly. A workshop with these countries was held at EEA on 8 June 2001 to discuss the appropriateness of the indicator selection (given the specific policy context of the region), to take stock of main data problems and to discuss organisation of future networking with the countries. A 'zero-version' of

TERM indicators for the Accession Countries is under development.

Various methodological studies are needed to improve the assessment methods used in this regular indicator-based report. The improvement of benchmarking methods (following the recommendations of the 'The Hague' workshop), the use of life cycle analysis for certain indicators (essential to give a fair modal comparisons) and the development of behavioural indicators are examples of issues that require more in-depth study. The Commission's Transport RTD (Research, Technological Development and Demonstration activities) programme can be used to target international research efforts on specific TERM needs. EEA, together with the Commission, will also investigate the need and feasibility of a gradual extension of TERM to wider sustainability issues (i.e. socio-economic indicators).

Work on TERM is still hampered by lack of resources, in the countries and (staff-wise) in Eurostat and EEA. The Transport Council has invited the Commission to investigate options to propose a regulation to safeguard a continuous operation of TERM and to ensure appropriate funding.

Glossary

ACEA	European Automobile Manufacturers Association
CLRTAP	United Nations Convention on Long Range Transboundary Air Pollution
CO	carbon monoxide
CO_2	carbon dioxide
CTP	Common Transport Policy
dB(A)	international sound pressure level unit meaning 'decibel with an A frequency weighting' which reflects the sensitivity of the human ear
DG	Directorate-General (of the European Commission)
DG ECFIN	Directorate-General Economic and Financial Affairs (of the European Commission)
DG ENV	Directorate-General Environment (of the European Commission)
DG TREN	Directorate-General Energy and Transport (of the European Commission) DPSIR Driving forces, pressures, state, impact, responses
EAP	environmental action programme (6EAP is the sixth environmental action programme of the European Union)
ECCP	European Climate Change Programme
ECMT	European Conference of Ministers of Transport
EEA	European Environment Agency
EIA	environmental impact assessment
EIB	European Investment Bank
EIONET	European Information and Observation Network
EMAS	Eco-Management and Auditing Scheme
EOLV	end-of-life vehicles
ESDP	European Spatial Development Perspective
ETC	European Topic Centre
EU	European Union
Euro II	Euro II passenger cars are cars that comply with the emission standards as defined in Directive 94/12/EC
Euro III and IV	vehicles that comply with the vehicle emissions limits as defined in Directive 98/69/EC, which will enter into force in 2003 (EURO III) and 2005 (EURO IV)
Eurostat	Statistical Office of the European Union
GDP	gross domestic product
HC	hydrocarbon
HSR	high-speed railway
ICAO	International Civil Aviation Organization
ICT	Information and communication technology
IEA	International Energy Agency
IMO	International Maritime Organisation
IPCC	Intergovernmental Panel on Climate Change
ITOPF	International Tanker Owners Pollution Federation
JAMA	Japan Automobile Manufacturers Association
KAMA	Korean Automobile Manufacturers Association
km	kilometres
ktonnes	thousand tonnes
L_{Aeq}	energy equivalent sound pressure level in dB(A).
L_{dn}	day-night level, is a descriptor of noise level based on energy equivalent noise level (Leq) over the whole day with a penalty of 10 dB(A) for night time noise (22.00-07.00 hrs).

L_{den}	day- evening- night level, is a descriptor such as L_{dn} but with an additional penalty of 5 dB(A) for evening noise (i.e. 19.00-23.00 hrs)
LCA	life-cycle assessment
MARPOL	International Convention for the Prevention of Pollution from Ships
MEET	methodologies for estimating emissions from transport
MS	Member State (of EU)
Mt	million tonnes
N_2O	nitrous oxide
NGO	non-governmental organisation
NMVOC	non-methane volatile organic compound
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
OECD	Organisation for Economic Co-operation and Development
PM_{10}	respirable particulate matter with aerodynamic diameter between 2.5 and 10 µm
PPP	purchasing power parities
SEA	strategic environmental assessment
SO_2	sulphur dioxide
SOHO	Small Office, Home Office
SPA	Special bird areas
TEN	trans-European transport network
TERM	transport and environment reporting mechanism for the EU
TINA	transport infrastructure needs assessment
TRENDS	transport and environment database system
UN	United Nations
UNCSD	United Nations Commission on Sustainable Development
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
VOC	volatile organic compound
WHO	World Health Organization
6EAP	European Union's sixth environmental action programme

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