Are we moving in the right direction?

Indicators on transport and environment integration in the EU

Executive summary

Final draft, 1. December 1999

European Environment Agency

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (http://europa.eu.int).

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Foreword

An efficient, effective and flexible transport system is essential for economic activity and quality of life. People demand and expect convenient and affordable mobility for work, education and leisure. But the transport system that has evolved in the EU to meet these needs poses significant and growing threats to the environment and human health, and even defeats its own objectives ('too much traffic kills traffic').
The key to finding a balance between these seemingly opposing concerns is to develop policies that integrate environmental and other sustainability concerns into transport decision-making and related policies. Sustainability, of transport and other sectors, is now a goal for the EU under the Amsterdam Treaty – and progress is required.

'You can't manage what you can't measure'. The success of current and future integrated policies can only be judged by identifying key indicators that can be tracked and compared with concrete policy objectives (benchmarking). Indicators should also help to compare alternatives, identify more successful or better practices, and make results accountable to society. The Transport and Environment Reporting Mechanism (TERM) has been set up specifically for this purpose.

This is the first indicator-based TERM report. It has been designed to help EU and Member States to monitor progress with their transport integration strategies, and to identify changes in the key leverage points for policy intervention (such as investments, economic instruments, spatial planning and infrastructure supply). It is expected to act as a model for other sectoral indicator reports at EU level.

The picture it presents raises urgent concerns. The traditional approach of environmental regulation, such as setting vehicle and fuel standards, has resulted in significant improvements. But much of the gain is rapidly being outweighed by growing transport volumes, particularly private cars and aviation, and the introduction of heavier and more powerful vehicles. In addition to the environment and health problems linked to traffic pollution, traffic accidents continue to exact a heavy toll of deaths and injuries.

Clearly, major efforts are needed to reduce the linkage between transport and economic growth. This requires a change in policy, from the mainly supply-oriented transport policies of recent decades (focusing particularly on road transport infrastructure and car supply) towards more integrated demand-side policies designed to improve accessibility through, for example, better coordinated spatial and infrastructure planning, fair and efficient pricing, telecommunications and public education. To reach the Kyoto targets and beyond (as further reductions of greenhouse gas emissions will be needed) it is also essential to reduce substantially the use of fossil fuels in transport. This would be a win-win track, as in doing so we are also tackling other serious air-pollution problems (acid rain, urban air pollution, eutrophication).

Various groups have a role to play in the integration process. The effectiveness of the process relies on the cooperation of EU, national, regional and local policy makers (in the areas of transport, environment, economy, regional development and spatial planning). Industry, transport operators and users will also have to play their part.

TERM is a participatory process, involving the EEA, the European Commission (DG Transport, DG Environment and Eurostat) and the Member States, following a Council mandate. We would welcome comments and feedback from policy-makers and interest groups. This should help us to improve the indicators and match them more closely to the information needs of policy-makers and the public.
I am confident that this and future TERM indicator reports will help to make the transport sector both more eco-efficient ('more welfare from less nature') and more accountable.

Domingo Jiménez-Beltrán
Executive Director
November 1999

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Are we moving in the right direction?

The Amsterdam Treaty 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 European Environment Agency 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 will enable policy-makers to gauge the progress of their integration policies.

This analysis summarises the findings of the first TERM indicator-based report. Seven questions are addressed which policy-makers in the EU regard as key to understanding whether current policy measures and instruments are influencing transport/environment interactions in a sustainable direction (see Box 1).

Box 1: Seven key integration 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 minimised and recovered?
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?

Until recently, the main instrument used to abate the environmental impacts of transport has been environmental regulation, mainly through the setting of vehicle and fuel-quality standards. This assessment shows that while such 'end-of-pipe' approaches have led to progress in certain areas, their benefits are often offset by growing transport volumes and use of heavier and more powerful vehicles. As a result, transport has become one of the major contributors to several important environmental impacts (climate change, acidification, local air pollution, loss in biodiversity and noise). Traffic accidents continue to cause many fatalities, injuries, and material losses, even though significant improvements have been achieved in recent decades.

To meet international and national environmental targets, increased policy impetus is needed to reduce the link between transport demand and economic growth and to shift the balance towards less environment-damaging transport modes. This requires more preventative actions to be taken by the sectoral (transport and planning) ministries, which are mainly responsible for the 'driving forces'. The 1995-2000 action plan of the Common Transport Policy already initiated some strategies which might in the longer run help to change unfavourable trends, for example fair and efficient pricing, revitalisation of rail, promotion of combined transport, and making best use of existing infrastructure. Implementation of these strategies, however, is facing many difficulties, and their impact is not yet reflected in any significant change in transport activity. Furthermore, the concepts of demand management, accessibility and eco-efficiency need to be better reflected in EU transport policies.

Although the assessment focused mainly on EU developments, important lessons can also be learnt by comparing national performance, as this could yield useful information on the effectiveness of policy measures. TERM will be developed into a benchmarking tool for this purpose.

There are several common features at the Member State level. For example, transport demand, energy consumption and CO2 emissions are increasing in most countries. The modal mix is increasingly biased towards road transport, and air transport is expanding rapidly, to the detriment of more environment-friendly modes. There are, however, substantial differences in approach to delivering transport systems that 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.

Table 1: Qualitative evaluation of key-indicator trends

INTEGRATION QUESTION	KEY- INDICATORS	INTEGRATION OBJECTIVES	EVALUATION OF INDICATOR TRENDS															
			A	B	D	DK	E	F	FIN	GR	I	IRL	L	NL	P	S	UK	EU
1	Emissions of: CO2 NMVOCs NOx	International emission reduction targets	☹ ☺ ☺	☹ 😐 😐	☹ ☺ ☺	☹ ☺ ☺	☹ 😐 ☹	☹ ☺ ☺	😐 😐 ☹	☹ ☹ ☹	😐 ☹ 😐	☹ 😐 ☹	😐 ☺ 😐	☹ ☺ ☺	☹ ☹ ☹	😐 ☺ ☺	😐 ☺ ☺	☹ ☺ 😐
2	Passenger transport	De-link economic activity and passenger transport demand	☺	☹	☹	☹	☹	☹	😐	☹	☹	☺	☹	☹	☹	☹	☹	☹
		Improve shares of public transport, rail, walking, cycling	😐	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹	☹
	Freight transport	De-link economic activity and freight transport demand	☹	☹	☹	☹	☹	☹	☹	☹	☹	☺	😐	☹	😐	☹	☹	☹
		Improve shares of rail, inland waterways, short sea shipping	☺	☹	☹	😐	☹	☹	☹	☹	☹	☹	☹	😐	😐	☹	☹	☹
3	Average journey length for work, shopping, education, leisure	Improve access to basic services by environmental friendly modes	?	?	☹	☹	?	?	?	?	?	?	?	?	?	?	☹	?
4	Investments in transport infrastructure	Prioritise development of environmentally friendly transport systems	☺	😐	😐	☹	☹	☹	☺	☹	☹	😐	😐	☺	😐	☺	😐	😐
5	Real changes in the price of transport	Promote public transport and rail through the price instrument	?	?	?	☹	?	?	😐	?	?	?	?	?	?	?	☹	?
	Degree of internalisation of external costs (1)	Full recovery of environmental and accident costs	☹	☹	☹	😐	☹	😐	☹	☹	😐	😐	☹	😐	☹	😐	☹	😐
6	Energy intensity	Reduce energy use per transport unit	?	?	😐	😐	?	😐	?	?	😐	?	?	😐	?	😐	😐	?
7	Implementation of integrated transport strategies (1)	Integrate environment and safety concerns in transport strategies	😐	☹	☹	😐	☹	☹	☺	☹	☹	☹	☹	☺	☹	☺	😐	😐

☺ positive trend (moving towards objective); 😐 some positive development (but insufficient to meet objective); ☹ unfavourable trend (large distance from objective);
? quantitative data not available or insufficient

(1) no time series available: evaluation reflects current situation, not a trend

This evaluation is mainly made on the basis of the indicator trends. As there is an inevitable time lag between policy development, its implementation, and the showing of its effects in the indicator trends, a 'negative' trend does not necessarily mean that no positive policy developments are taking place to change these parameters. Monitoring these key-indicators is the first step towards managing current and future policy measures. For example, the tracking of user prices, such as is done in the UK and Denmark, is essential to manage current measures to promote of 'fair and efficient pricing.

31 TERM indicators to answer 7 integration questions

The main output of TERM will be a series of regular and indicator-based reports through which the effectiveness of transport and environment integration strategies can be monitored. Table 2 gives an overview of the indicators that form the core of TERM. The list was developed following consultation with various Commission services, national experts, other international organisations and researchers. The indicators were selected and grouped to address the seven key questions listed in Box 1.
The indicators cover all the most important aspects of the transport and environment system (Driving forces, Pressures, State of the environment, Impacts, and societal Responses – the so-called DPSIR framework) and include eco-efficiency indicators.

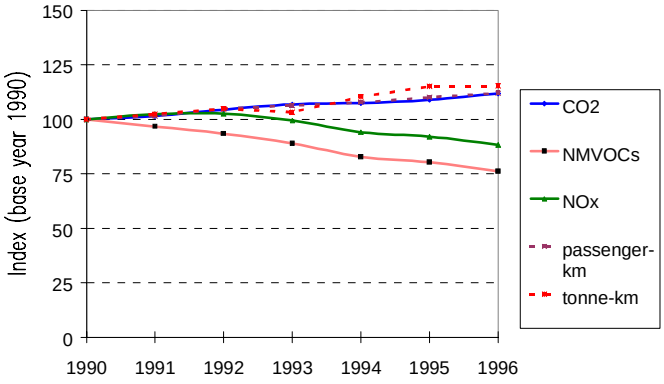
The current list is a long-term vision of an 'ideal' list and some of the proposed indicators could not at this stage be quantified. Where data availability has prevented an EU15 analysis, national examples or proxy indicators were used.

The following sections summarise the findings of the first TERM indicator-based report. Some key indicators are presented to illustrate the most important trends in each policy domain. Table 1 gives a qualitative evaluation of indicator trends with respect to a number of 'integration' objectives. Where possible, internationally-agreed quantitative targets (e.g. the Kyoto targets for greenhouse gas emission reduction) were used to evaluate the indicator trends. For several indicators, EU or national targets have still to be developed, and more qualitative 'integration objectives' were used.

The data that underlie the indicators can be found in the Eurostat Statistical Compendium on transport and the environment which is being published in parallel with this report.

Integration question 1: Is the environmental performance of the transport sector improving?

Key indicator: Emissions from transport (EU)



Transport's growing CO_2 emissions jeopardise the EU meeting its targets under the Kyoto Protocol. Environmental regulations on emission standards have since the early 1990s led to a decrease in emissions of NO_x and NMVOCs, but these technological efficiency gains have been partly offset by growing transport volumes and the use of heavier and more powerful cars.

Source: EEA / ETC-AE / Eurostat

Transport is one of the main sources of CO_2 emissions, which have increased by 40 % since 1985 as a result of growing traffic volumes and the linked growth in energy consumption. There has been little progress towards greater energy efficiency. By 2010, emissions are expected to increase by a further 30 %, making it unlikely that the EU will meet its Kyoto Protocol targets of 6-8 % reductions in greenhouse gas emissions by 2008-2012.

Emissions of NMVOCs and NO_x have been falling since the early 1990s. This shows that environmental regulations, and in particular the tightening of vehicle emission standards, have to a certain extent been effective. However, growing transport demand has partly offset the technological improvements. Overall, larger reductions in emissions have been achieved in other sectors, and transport's of total emissions has

therefore been increasing. Transport is expected to continue to be a major contributor to acidification and air-quality problems.

The Auto-Oil programme is an important instrument through which the Community is tackling air-quality problems caused by road transport. Although air quality has improved in recent decades (particularly in large urban areas), nearly all urban citizens still experience exceedances of EU urban air-quality standards. Ozone exceedances occur over most parts of Europe every summer.

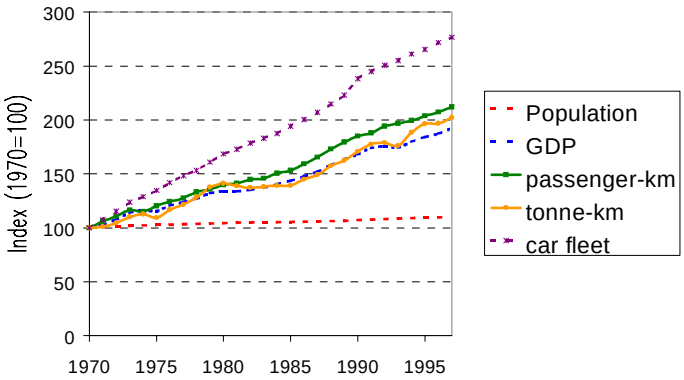
Transport noise is a serious urban problem, but harmonised country information and data are still lacking. Technical progress and legislation on maximum sound levels have led to reductions in noise from individual cars and lorries by 85-90 % since the 1970s. Similarly, noise from modern jets has been reduced by a factor of nine compared to 1970s aircraft. Traffic noise problems remain, however, because of the doubling of transport volumes over the period and increasing traffic speeds. More than 30 % of the EU population is exposed to high road-traffic noise levels, about 10 % to high rail noise levels and possibly a similar number to aviation noise. A Community Noise Policy is currently being prepared which will establish a legislative framework and targets which should lead to a harmonisation of data and indicators throughout the EU.

Transport infrastructure covers 1.2 % of the total EU land area, with road infrastructure by far the main land consumer (93 %). During 1990-1996, on average 10 hectares of land were taken daily for new motorway construction. Road and rail infrastructure takes land mainly from agricultural use, but also from built-up areas, forests, semi-natural areas and wetlands. Linear infrastructure can constitute an important barrier, dividing communities. Transport infrastructure also imposes a significant threat to nature conservation by fragmenting and disturbing habitats and putting areas designated for nature protection under pressure. Already 65 % of Special Protected Bird and Ramsar areas (wetlands) are near major infrastructure. Even though environmental impact assessments are routinely carried out for major infrastructure, they often fail to take into account route alternatives, and infringements of designated nature areas remain common.

Setting technical safety standards and speed limits has helped to reduce accident rates: road fatalities fell by 40 % between 1970 and 1996. The Netherlands, Finland and Sweden show the greatest reductions; fatalities increased in Greece, Spain and Portugal (where growth in passenger transport volumes has been fastest). However, the rate of improvement has slowed in the past few years, and with many thousand fatalities each year (44,000 in 1996), about 40 times as many injured, and significant material damage, road traffic still makes heavy demands on society. Significant efforts will be needed to reach the Community Action Programme on Road Safety target for 2010 of reducing the annual number of fatalities by at least 18,000 from current levels.

Integration question 2: Are we getting better at managing transport demand and improving the modal split?

Key indicator: Passenger and freight transport demand (EU15)



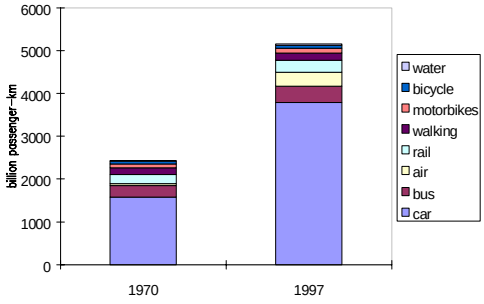
Passenger and freight transport demand is outstripping both economic and population growth. Car ownership is in the driving seat.

During recent decades, a major modal shift towards road transport has taken place.

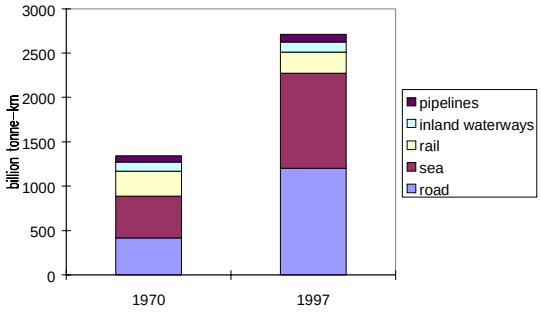
Source: Eurostat, DG Transport

Key indicator: Passenger and freight transport demand with modal split (EU15)

Passenger transport



Freight transport



Source: Eurostat, DG Transport

Transport volumes are the main driving forces behind the sector's environmental impacts. In the EU, transport demand is strongly linked to economic activity. As a consequence, passenger and freight transport have more than doubled over the past 25 years, with the strongest growth in air and road (particularly motorway) transport. Reducing the link between economic growth and transport demand is therefore one of the major objectives of the Common Transport Policy (CTP). Transport demand-management policies are, however, emerging only slowly in some countries.

Strategies to improve the modal balance are being developed under the CTP and in several countries, but are proving difficult to implement. The effects of current policies to promote rail, inland waterways, and public transport are not yet apparent in the current trends in modal shares.

During recent decades there has been a dramatic shift towards road transport: road increased its share of passenger transport from 65 to 74 % between 1970 and 1997. The share of aviation, still the least energy-efficient of all modes, grew from 2 to 6.7 %. The share of rail reduced from 10.1 to 5.8 %, and walking and cycling have dropped markedly. Moreover, 50 % of all car trips are less than 6 km – a distance for which cycling is often faster than the car (in urban areas); 10 % are less than 1 km – an ideal walking distance.

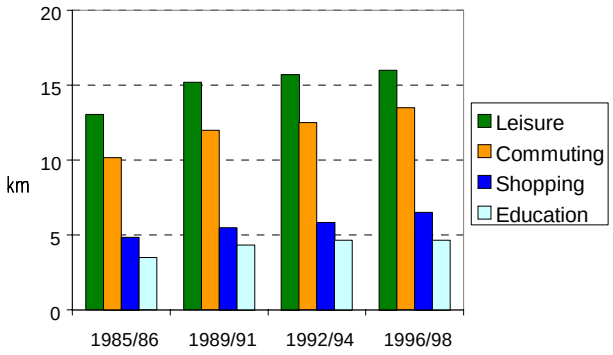
Car ownership, also closely linked to economic growth, is an important factor. The EU car fleet has increased by 150 % since 1970, bringing average car ownership up to 454 per 1000 inhabitants. Whilst saturation levels may be being reached in some countries, elsewhere car ownership is still increasing steeply. Decreasing occupancy rates have also contributed to the growth in passenger transport. Various

initiatives such as car-sharing schemes are emerging to counter this trend but these have as yet had little overall impact.

Freight transport is also shifting increasingly towards road: trucking now accounts for 45 % of total freight transport (30 % in 1970). Globalisation of the economy and liberalisation of the internal market have led to increasing distances between material extraction, the manufacture (and recycling) of goods, and the final consumer. As a result, goods are being transported more, and further. Changes in production and supply systems, increasing distances and low load factors (empty runs still account for around 30 % total vehicle-km) have resulted in a doubling of freight-km between 1970 and 1997, with the largest annual growth in road (4 % on average) and short-sea shipping (3%). While the Community's freight transport action plans have resulted in a better performance of short-sea shipping, they have not yet reversed the declining shares of rail and inland waterways. An important development has been 'just in time' deliveries. These require a flexibility and reliability that rail and water transport cannot offer, but they shift large stocks from warehouses to roads.

Integration question 3: Are spatial planning and transport planning becoming better coordinated so as to match transport demand to the needs for access?

Key indicator: Average journey lengths by purpose (Great Britain)



Data from a number of countries indicate that people have to travel increasing distances to gain access to basic services such as shopping, work and education.

Source: Department of the Environment, Transport and the Regions (1999)

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 take residence 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.

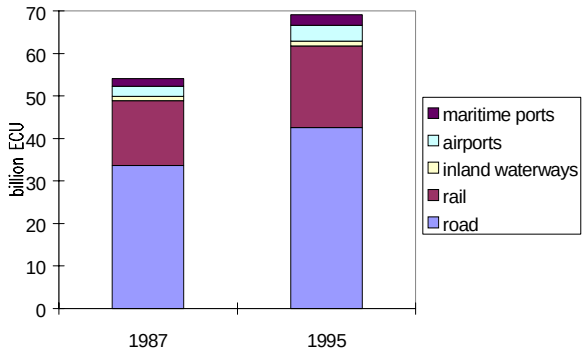
Most transport policies aim mainly to improve mobility through increasing transport infrastructure supply and quality, with a particular focus on road transport. National surveys show, however, that increased availability of road transport has not always resulted in a comparable (and equitable) increase in the accessibility of basic services and activities (shopping, work, leisure and education). In the UK, for example, households without a car (i.e. 30 % of total households) find it more and more difficult to reach basic services. Growing congestion (on roads and in airports) also increasingly hampers access to cities. Road congestion leads to people spending more and more time commuting to work, and to costly delays in delivery.

Spatial planning can be used effectively to influence travel patterns, but has received little attention from transport policy-makers and planners in recent decades. However, there has been a renewed interest in this approach since the early 1990s. 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 by a mixing of urban functions, zoning, parking policies and improvement of public transport. Commission 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.

Integration question 4: Are we improving the use of transport infrastructure capacity and moving towards a better-balanced intermodal transport system?

Key indicator: Investments in transport infrastructure in billion ECU (EU)



Distribution of investment favours the development of road infrastructure.

Source: Eurostat

Transport policies have generally focused on extending infrastructure, particularly roads, as a response to increasing demand. Although rail receives a larger share of total investment than its share of total demand, this has not been enough to counter the gradual reduction in the supply, quality and reliability (and hence use) of railways.

While infrastructure length is only a proxy measure for capacity, the steady increase in the length of the road infrastructure since 1970 (with motorways growing by more than 50 % while the length of conventional railway lines and inland waterways decreased by about 8 %), shows that road capacity has expanded to the detriment of rail and inland waterways. On a more positive note, the extension of high-speed rail infrastructure is expected to enhance the capacity of the rail system significantly.

However, increases in infrastructure capacity lead to additional demand and, in turn, to demand for yet more infrastructure. Experience shows that new infrastructure is not a sustainable solution to congestion problems (for example on roads and at airports), but simply tends to displace the problem in time and place.

Telematics are increasingly being used to route traffic flows and optimise the use of the existing infrastructure but, again, the benefits are usually offset within a few years by increased traffic volumes. This vicious circle can be broken only if infrastructure supply is accompanied by appropriate demand-management measures, but this approach is only slowly gaining acceptance at the national and international policy level.

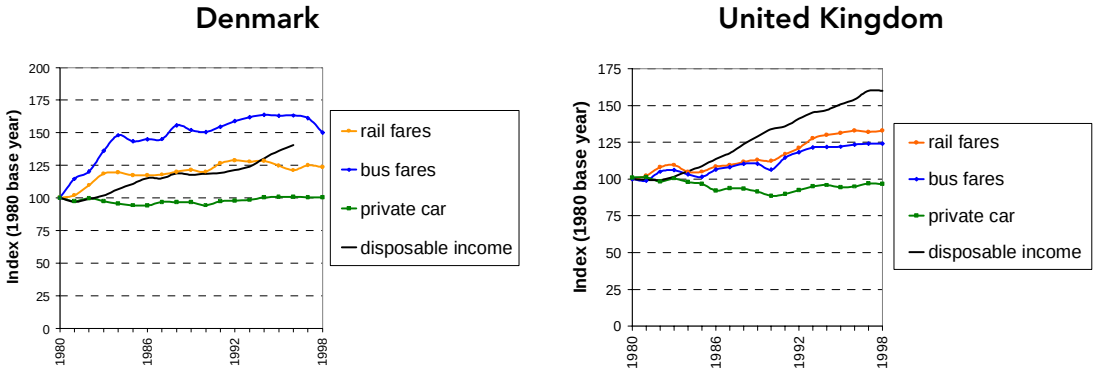
The Community is trying, through the development of the trans-European Transport Network (TEN), to redress investment patterns for major infrastructure projects, and in particular to revitalise rail and combined transport. TEN investment (estimated to exceed EUR 400 bn up to 2010) aims at a 60 % rail to 40 % motorway split, with rail investment mainly for the high-speed network. This might result in some improvement in modal balance. However, implementation of the planned TEN road programme is well ahead of high-speed rail development and Community funding and funding by international banks (such as the European Investment Bank) does not yet reflect the target modal share. Unless demand

management measures are introduced, it is expected that the TEN will induce additional transport demand which may negate any benefits from changing the modal balance.

When combined with other measures, infrastructure investment may succeed in improving public transport and calming traffic in cities (e.g. roundabouts which make traffic flow more fluid and safer). In the 1990s considerable efforts have been made in some Member States to improve the quality of public transport (e.g. new tram and light rail systems, improved local rail services, and flexible forms of public transport) but this has not yet resulted in any major shifts from road transport. Improving intermodal exchange facilities (e.g. train stations at airports, park-and-ride facilities, intermodal transfer points) may also help to improve the modal balance.

Integration question 5: Are we moving towards a fairer and more efficient pricing system, which ensures that external costs are minimised and recovered?

Key indicator: Real changes in the price of transport



Sources: Statistics Denmark; Department of the Environment, Transport and the Regions, UK (1999), Eurostat

Current price systems encourage use of the private car rather than public transport. Car transport is much cheaper relative to disposable income and public transport than it was 20 years ago.

Less than half the external environmental and accident costs of road and rail transport (tentatively estimated at some 4 % of EU GDP) are internalised by the relevant taxes and charges that people pay for these services. 'Getting the prices right' requires full internalisation of environmental costs in market prices, and application of the user-pays principle.

The change in transport demand and modal share can partly be explained by changes in transport *prices*. Data limitations preclude an EU assessment of this indicator. However, data from the UK and Denmark show that the real total cost of car transport (including purchasing, maintenance, insurance, taxes and fuel use) has remained approximately constant since the 1980s. Moreover, the perceived 'marginal' cost (i.e. real fuel price), which often governs decisions on car use, has fallen in some countries. In contrast, the *costs* of public transport have increased at a much faster rate than the costs of car transport and disposable incomes. This has resulted in prices that clearly encourage private car use over public transport.

Fuel prices vary substantially across Member States, with some countries showing an upward and some a downward trend. Leaded petrol was 4-17 % more expensive than unleaded petrol in 1998 and up to 57% more expensive than diesel fuel. The highest prices of unleaded petrol in 1998 were in Finland, Sweden and Italy, the lowest in Luxembourg, Greece and Portugal. A similar picture is seen for diesel prices (with the UK included in the high price group). Fuel *taxes* account for 70-80 % of the total unleaded

petrol price and 60-80 % of the diesel price. Luxembourg, Portugal, Ireland, Spain and Greece have the lowest tax rates on petrol (less than 70 %), France and the UK the highest (around 80 %).

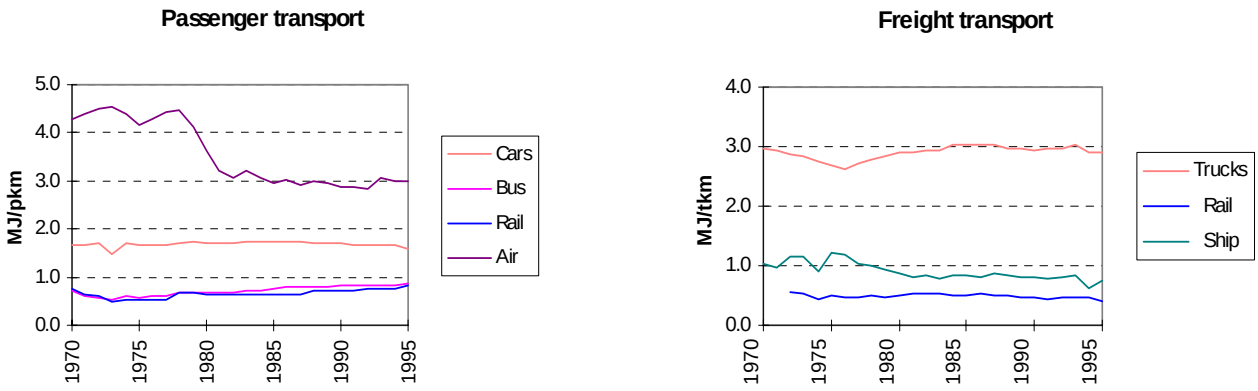
The external costs of road and rail transport in the EU caused by environmental damage (noise, local air pollution, and climate change) and accidents are estimated at around 4 % of GDP. This excludes the costs of infrastructure wear and tear, congestion and a number of other environmental problems that are difficult to quantify. An important objective of the EU's fair and efficient pricing strategy is to internalise all external costs (based on the 'user-pays' principle). However, establishing correct market price levels is complicated because of the difficulties inherent in external cost calculations and because price elasticities are poorly understood.

Although the figures are uncertain because of methodological and data problems, the current internalisation of infrastructure and environmental costs is estimated to be only about 30 % for road and 39 % for rail. This means that transport revenues (via relevant taxes and charges) still do not cover all external costs. The highest cost recovery rates are found in France, Austria, Denmark and Spain.

Integration question 6: How rapidly are improved technologies being implemented and how efficiently are vehicles being used?

Key indicator: Energy intensity of passenger and freight transport (8 EU countries)

The energy intensity of passenger and freight transport has shown little or no improvement over the past decade. Technology improvements have made vehicles more fuel-efficient, but the increasing penetration of heavier and more powerful vehicles, together with decreasing occupancy rates and low load factors, have offset these gains.



Source: International Energy Studies, Lawrence Berkeley Laboratory, as compiled from recognised national sources

The energy intensity and specific emissions of the transport sector (i.e. the energy input and emissions per unit of transport) are determined by the technological characteristics and utilisation (occupancy rates, load factors and driving behaviour) of vehicle fleets.

Energy intensity of passenger and freight transport has shown little or no improvement over the past decade. Technological improvements have made engines more fuel-efficient, but the increasing penetration of heavier and more powerful vehicles compounded with decreasing occupancy rates and load factors have outweighed these gains. Voluntary agreements with the car industry to reduce average CO_2 emissions from new cars should improve the situation, and progress with implementation of such agreements should be closely monitored.

The introduction in 1992-93 of emission standards for cars (requiring catalytic converters) and similar standards for trucks has led to significant reductions in specific emissions of NO_x and NMVOCs in some countries. According to data from Austria and the Netherlands, emissions of NO_x and NMVOCs per passenger-km and tonne-km have dropped significantly for road, rail, and air transport. The benefits of this have, however, been offset by growing transport demand. Moreover, only 48% of the petrol-driven cars in the EU are as yet fitted with a catalytic converter, with large variations between countries. Recent research has confirmed that specific emissions increase systematically with increasing mileage, and that large discrepancies exist between test emission measurements and on-road measurements. This shows the importance of implementing regular maintenance programmes.

The phase-out of leaded petrol is a major integration success story. The market share of unleaded petrol has reached 75 % through the use of instruments such as taxes and technology standards (catalyst systems). Leaded petrol is expected to be almost phased out by year 2000 and completely phased out by 2005. Despite efforts at EU level for promoting alternative (electricity, natural gas, fuel cells) and renewable energy sources (biofuels) for transport, these still have a low penetration.

Slowing the rate of renewal of the EU car fleet has prolonged the average age of the fleet from six to seven years between 1980 and 1997, with a consequent slowing in the rate of penetration of more modern technologies. Greece, Portugal, Finland and Sweden have the oldest car fleet while Luxembourg, Ireland and Belgium have the fastest rates of renewal. The high average age in Portugal, Greece, Sweden and Finland relates to the high vehicle taxation levels and economic conditions in these countries.

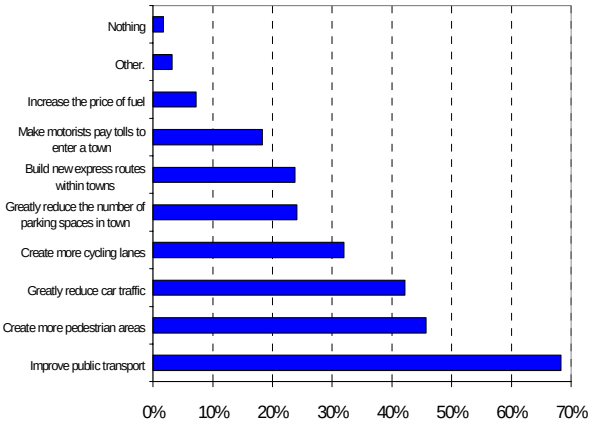
Several Member States (Greece, Denmark, Spain, France, Ireland and Italy) have introduced car-scrapping schemes during the 1990s. Of course such programmes only result in environmental improvements if the new vehicles have emission rates substantially better than older models and if the environmental impact of vehicle construction and dismantling processes is reduced.

EU policies (such as the Auto-Oil programme) are currently focusing mainly on technology and fuel quality to achieve improvements in efficiency. Additional initiatives include scrapping schemes for old cars and voluntary agreements with the car industry on CO_2 emissions. Such measures need to be complemented by measures to influence buying and driving behaviour (consumer information, driver training programmes, eco-management and auditing schemes for companies, car-sharing schemes).

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

Key indicator: Public opinion regarding solutions to transport problems (representative sample of 16 000 EU citizens)

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



Improvements in public transport, cycling and walking provisions, and car restrictions in certain areas are the solutions most supported by the public. The use of pricing measures is much less acceptable to the public. Furthermore, the link with their own behaviour is not always made.

Source: Eurobarometer, 1999

Few Member States are yet implementing integrated transport and environment strategies. Eight countries are in the course of developing such strategies, but in most cases they still need to be fully adopted, funded and implemented. Only Austria, Finland and Portugal have as yet developed an indicator report along the lines of TERM. Sweden is planning to do so. The Cardiff Process should provide a greater impetus to report on progress of integration at the sectoral level. TERM could be used as a common model for national reporting activities, and will be closely coordinated with these.

Internationally, there is a growing consensus that strategic environmental assessment (SEA) is an essential tool for integrating environmental considerations into national/regional/local transport (and related spatial) policies and plans. SEA would also help to ensure that public and environmental authorities are fully involved in the decision-making process. SEA practice in the transport sector is emerging in several countries. However, links between SEA and actual decision-making are generally poor, as the legal SEA framework is often slow and institutional barriers hamper its acceptance.

At the company level, the transport sector is increasingly adopting environmental management systems (notably, ISO 14001 and EMAS) as a cost-effective means to improve environmental performance.

45% of EU citizens see road congestion as a severe problem for their local environment, 40% see air pollution, and 30% see noise. Improvement of public transport, cycling and walking provisions associated with car restrictions in certain areas are seen as the most effective solutions. There seems to be low public acceptance for the use of pricing measures to improve the situation. People tend to hold local, regional and national (and to lesser extent EU) authorities accountable for solving current problems: the link with their behaviour as individuals is not fully made.

Future TERM agenda

TERM has been conceived as a continuing process; data and methods will gradually be improved.

Data gaps have imposed constraints on this first TERM report. Some of the proposed indicators cannot yet be quantified (and proxy-indicators had to be used instead), while others could only be presented for a limited number of countries. Data and methodological improvements are also needed to achieve a better understanding of:

- the causal links between the driving forces of transport demand;
- how these exert pressures and impact on the environment and people;
- the effectiveness of policy responses to remedy these pressures and impacts.

Actions to harmonise methodological approaches and streamline data collection efforts nationally and internationally are important to the TERM agenda. Member States, Eurostat, the EEA and its European Topic Centres are the key actors. The Commission's Transport RTD programme can be used to target international research efforts on specific TERM needs.

In parallel, the TERM indicator list will be revised regularly, to match information needs with emerging integration strategies. Work will soon have to start to include the Accession Countries in the TERM process and to adapt the indicator list accordingly.

As data and methods gradually improve, better evaluation of the effectiveness of specific policy measures will become possible. The regular indicator report will be complemented by focus reports on specific policy topics that require more detail. In addition, the feasibility of including scenario forecasts in the indicator reports will be investigated.

Several national indicator reporting systems are emerging, and coordination will be needed to ensure comparability of national assessments and to provide feedback to TERM. Networking with other international organisations (such as the Organisation of Economic Cooperation and Development, the World Health Organization, the European Conference of Ministers of Transport and the United Nations Economic Committee for Europe) should continue so as to avoid duplication.

Clearly, all these actions can only be set up gradually and require the provision of adequate resources in the Member States as well as for the EEA and Eurostat.

Table 2: Envisaged TERM indicator list (key indicators in blue)

GROUP	INDICATORS	POSITION IN DPSIR	WHEN FEASIBLE	DATA QUALITY
TRANSPORT AND ENVIRONMENT PERFORMANCE				
ENVIRONMENTAL CONSEQUENCES OF TRANSPORT	Transport final energy consumption and primary energy consumption, and share in total (fossil, nuclear, renewable) by mode	D	++	+
	Transport emissions and share in total emissions for CO_2, NO_x, NMVOCs, PM_{10}, SO_x, by mode	P	++	+
	Exceedances of air-quality objectives	S	++	+
	Exposure to and annoyance by traffic noise	S and I	- -	- -
	Infrastructure influence on ecosystems and habitats ('fragmentation') and proximity of transport infrastructure to designated areas	P and S	-	-
	Land take by transport infrastructure	P +	+	+
	Number of transport accidents, fatalities, injured, polluting accidents (land, air and maritime)	I	++	-
TRANSPORT DEMAND AND INTENSITY	**Passenger transport (by mode and purpose):** · total passengers · total passenger-km · passenger-km per capita · passenger-km per GDP	D	++	-
	Freight transport (by mode and group of goods) · total tonnes · total tonne-km · tonne-km per capita · tonne-km per GDP	D	++	+
DETERMINANTS OF THE TRANSPORT/ENVIRONMENT SYSTEM				
SPATIAL PLANNING AND ACCESSIBILITY	**Average passenger journey time and length per mode, purpose (commuting, shopping, leisure) and territory (urban/rural)**	D	-	-
	Access to transport services, e.g.: · number of motor vehicles per household · % of persons in a territory having access to a public transport station within 500 metres	D	-	-
TRANSPORT SUPPLY	Capacity of transport infrastructure networks, by mode and by type of infrastructure (e.g. motorway, national road, municipal road etc.)	D	+	-
	Investments in transport infrastructure/capita and by mode	D and R	++	+
PRICE SIGNALS	**Real passenger and freight transport price by mode**	R	-	-
	Fuel price	D	++	+
	Taxes	R	-	-
	Subsidies	R	-	-
	Expenditure for personal mobility per person by income group	D	+	-
	Proportion of infrastructure and environmental costs (including congestion costs) covered by price	R	-	-
TECHNOLOGY AND UTILISATION EFFICIENCY	**Overall energy efficiency for passenger and freight transport (per passenger-km and per tonne-km and by mode)**	P/D	-	-
	Emissions per passenger-km and emissions per tonne-km for CO_2, NO_x, NMVOCs, PM_{10}, SO_x by mode	P/D	-	-
	Occupancy rates of passenger vehicles	D	-	-
	Load factors for road freight transport (LDV, HDV)	D	+	-
	Uptake of cleaner fuels (unleaded petrol, electric, alternative fuels) and numbers of alternative-fuelled vehicles	D	++	+
	Vehicle fleet size and average age	D	+	+
	Proportion of vehicle fleet meeting certain air and noise emission standards (by mode)	D	-	+

GROUP	INDICATORS	POSITION IN DPSIR	WHEN FEASIBLE	DATA QUALITY
MANAGEMENT INTEGRATION	**Number of Member States that implement an integrated transport strategy**	R	+	-
	Number of Member States with national transport and environment monitoring system	R	+	+
	Uptake of strategic environmental assessment in the transport sector	R	+	+
	Uptake of environmental management systems by transport companies	R	+	-
	Public awareness and behaviour	R	-	-

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

When: ++ now; + soon, some work needed; - major work needed; - - situation unclear.

Quality: ++ complete, reliable, harmonised; + incomplete; - unreliable/ unharmonised; - - serious problems