# European Commission

## Review of the Common Transport Policy

Task 1.8 Environmental sustainability and transport-related energy issues – Final Report

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## Executive summary

1.1 The 1992 White Paper set the protection of the environment among the objectives to be fulfilled by the CTP. Following the Treaty of Amsterdam, environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities.

1.2 The environmental aspects of the CTP may be assessed using the objectives of the CTP itself and those of the Sustainable Development Strategy (SDS) of 2001 and of the Renewed SDS of 2006. The SDS objectives are however more of a long-term nature. They are unlikely to have been achieved within the period reviewed and also require actions at national and local level, as well as EU level. The objectives of the CTP as formulated in the 2001 White Paper and its Mid-Term Review of 2006 are more operational.

1.3 Both the 2001 White Paper and the 2006 Mid-Term Review promoted a shift in the balance between modes of transport – away from road transport and towards lower emission modes, particularly rail. However, it is important to note that the objectives of the CTP in this area were changed slightly by the Mid-Term Review. The 2001 White Paper targeted modal shift to reverse the growing market share of road transport but the Mid-Term Review qualified this target to seek modal shift only where appropriate, such as over long distances, on congested corridors and in urban areas.

1.4 The objective of the 2001 White Paper of modal shift towards rail transport has not been achieved. However, the relative decline of rail freight does appear to have stopped, and there has been some progress towards meeting the objective of the Mid-Term Review of modal shift where this is appropriate. Rail market shares have increased significantly on individual corridors, such as Madrid-Barcelona, although it is not possible to assess this in detail, because rail operators usually do not publish route-specific traffic statistics.

1.5 The 2001 White Paper also emphasised decoupling transport demand growth from GDP growth, but the Mid-Term Review emphasised decoupling demand growth from negative effects such as greenhouse gas emissions.

1.6 The objectives of the 2001 White Paper relating to decoupling of freight transport growth from GDP growth, and reduction in transport emissions, have not been achieved to date. The objective of decoupling passenger transport growth from GDP growth has been achieved, to the extent that demand growth is slower than GDP growth, but this was also the case before 2001 and there is no clear evidence that the relationship between transport growth and GDP growth has changed. Stronger decoupling has been prevented by greater demand for passenger and freight transport due to globalisation and EU enlargement, and reduction in some transport prices (for example due to the growth of low cost airlines).

1.7 However, there has been some progress towards meeting the objective set in the Mid-Term Review of decoupling the growth of transport from its negative effects. Although greenhouse gas emissions from transport have continued to rise, the growth has been slower than traffic growth. This is primarily due to significant progress on fuel efficiency, particularly of road vehicles. It is also partly due to increased use of biofuels, and the progress of measures to promote the use of cleaner fuels in urban passenger transport. However, a substantial reduction in transport emissions would require a shift away from fossil fuels, but there has been little progress on this and few indications that it will occur in the short to medium term.

1.8 The EU has also sought to reduce pollutant emissions (such as $NO_X$ and $PM_{10}$), and improve local air quality. Although there has been a significant reduction in total pollutant emissions, there are still high concentrations of pollutant emissions at many sites close to major congested roads, particularly in cities. Measures have also been taken to reduce maritime emissions, but more needs to be done to tackle emissions from ships which have increased considerably in recent years.

## Introduction

1.9 The current Common Transport Policy – first set out in the 2001 White Paper and revised in the 2006 Mid Term Review – aims for sustainable mobility, as did the previous Transport White Paper. The policy, which aims to allow greater mobility while reducing the negative impacts of transport, was developed within the framework of the EU's Sustainable Development[1] and Lisbon Strategies. Environment, climate change and energy policies all play an important role in reducing these impacts, supported by EU policies on the Single Market, Research and Cohesion.

### *Sources*

1.10 This analysis has been undertaken primarily by reviewing EU legislation and policy related transport environmental sustainability and comparing this to the objectives specified in the White Paper and the Mid-Term Review.

1.11 The Greening Transport Package adopted by the Commission in 2008 provides a useful source of information on the sustainable transport policies and instruments adopted by the European Union so far[2]. The Greening Transport Inventory[3] therein included has been used as a relevant source for the policy summary and the legislative framework. Other technical reports of relevance for this topic produced by the Commission have also been used, such as:

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1 Council of the European Union: Review of the EU Sustainable Development Strategy (EU SDS) - Renewed Strategy adopted by the European Council on 15/16 June 2006, which builds on the 2001 Gothenburg Sustainable Development Strategy.

2 http://ec.europa.eu/transport/strategies/2008_greening_transport_en.htm

3 Commission Staff Working Document accompanying the Communication from the Commission to the European Parliament and the Council Greening Transport {COM(2008) 433 final}, SEC(2008) 2206

- the report concerning existing community measures relating to sources of environmental noise [COM(2004) 160 final];
- the report on noise operation restrictions at EU Airports [COM(2008) 66 final];
- the report concerning the reduction of the climate change impact of aviation [COM(2005) 459 final]; and
- the European Energy and Transport Trends to 2030.

1.12 The indicators and fact sheets produced by the Transport and Environment Reporting Mechanism (TERM) of the European Environment Agency (EEA), as well as the environmental indicators published within the 2009 EU Transport Statistics Pocketbook, have been used to support most of the analysis and assessment produced[4]. Where necessary, TERM indicators have been integrated with Steer Davies Gleave elaboration of Eurostat and EEA data.

1.13 In addition, the results presented in other sources like the last IPPC Technical Paper VI on Climate Change and Water (2008) and the IEA report on Biofuel Technologies (2008), have been used to guide the policy analysis and to support the recommendations provided.

***Structure of the rest of this section***

1.14 The rest of this section is structured as follows:

- Summary of the policy;
- Summary of the legislative framework;
- Qualitative analysis of the implementation of the policy;
- Quantitative analysis of the implementation of the policy; and
- Conclusions regarding the impact of the policy and lessons that can be learnt.

## Summary of the policy

1.15 The 1992 White Paper set reduced emissions as one of the key objectives to be fulfilled by the CTP. Following the Treaty of Amsterdam, environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities.

1.16 Both the 2001 White Paper and the 2006 Mid-Term Review promoted a shift in the balance between modes of transport – away from road transport and towards lower emission modes, particularly rail. However, it is important to note that the objectives of the CTP in this area were changed slightly by the Mid-Term Review. The 2001 White Paper targeted modal shift to reverse the growing market share of road transport but the Mid-Term Review qualified this target to seek modal shift only where appropriate, such as over long distances, on congested corridors and in urban areas.

[4] http://www.eea.europa.eu/themes/transport/indicators

1.17 The 2001 White Paper also emphasised decoupling transport demand growth from GDP growth, but the Mid-Term Review emphasised decoupling demand growth from negative effects such as greenhouse gas emissions.

1.18 These goals were also at the heart of the Sustainable Development Strategy (SDS) adopted by the Gothenburg European Council in 2001 as well as of the Renewed EU Sustainable Development Strategy adopted in June 2006 which set a long term goal of "ensuring that our transport systems meet society's economic, social and environmental needs whilst minimising their undesirable impacts on the economy, society and the environment". The SDS also set several operational objectives:

- Decoupling economic growth from the demand for transport;
- Reducing pollutant emissions from transport to levels that minimise effects on human health and/or the environment;
- Achieving sustainable levels of transport energy use and reducing transport GHG emissions;
- Achieving a balanced shift towards environment friendly transport modes;
- Modernising the EU framework for public passenger transport services to encourage better efficiency and performance.

1.19 These objectives are consistent with the CTP objectives, although some are quite long term, and it is unlikely to have been possible to achieve all of these within the period reviewed, or just through EU-level action.

1.20 The various CTP environmental objectives are interdependent: for example, decoupling and modal shift should lead to reductions in either the absolute amount or growth rate of negative externalities such as greenhouse gas emissions and pollution. It is the decoupling of transport demand growth from the evolution of the negative effects of transport that has been the primary objective of the CTP since the 2006 Mid-Term Review. We discuss below the legislative and other measures that have been taken in order to meet these various objectives, and then identify the extent to which each of these objectives have been met.

1.21 In addition, the 2001 White Paper made a number of references to reducing transport noise, but few specific actions were identified. In addition, one of the objectives of the Renewed EU Sustainable Development Strategy (SDS) adopted by the European Council in June 2006 was the reduction of transport noise both at source and through mitigation measures. However, no clear targets have been defined, which makes it difficult to measure whether the objectives have been achieved.

### Legislative framework and policy documents

1.22 Hereafter a list of the primary legislative framework of relevance for the measures discussed below is reported.

1.23 Transport and air quality:

- Council Directive 96/62/EC of 27 September 1996 on ambient air quality and management ("Air quality Framework Directive");

- Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air ("First Daughter Directive");
- Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air ("Second Daughter Directive");
- Directive 2002/3/EC of the European Parliament and of the Council relating to ozone in ambient air ("Third Daughter Directive");
- Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons in ambient air ("Fourth Daughter Directive");
- Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe;
- Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants;
- European Commission, 2005b. Thematic Strategy on Air Pollution (2005). Communication from the Commission to the Council and the European Parliament. COM(2005)446 final.

1.24 Noise transport externalities

- Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise;
- Aviation: ICAO Convention of Civil Aviation; Directive 2002/30/EC on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports;
- Rail: Commission Decision 2006/66/EC and Commission Decision 2002/735/EC on noise limits both on conventional and high-speed rail;
- Road: Council Directive 70/157/EEC of 6 February 1970 on the approximation of the laws of the Member States relating to the permissible sound level and the exhaust system of motor vehicles, as amended; Directive 97/24/EC on certain components and characteristics of two or three-wheel motor vehicles, as amended.

1.25 Pricing

- Directive 1999/62/EC of the European Parliament and of the Council of 17 June 1999 on the charging of heavy goods vehicles for the use of certain infrastructures, as amended most recently by Directive 2006/38/EC.

1.26 Maritime

- Regulation No 1726/2003 of the European Parliament and of the Council of 22 July 2003 amending Regulation (EC) No 417/2002 on the accelerated phasing-in of double-hull or equivalent design requirements for single-hull oil tankers.

- Directive 2005/33/EC of the European Parliament and of the Council of 6 July 2005 amending Directive 1999/32/EC as regards the sulphur content of marine fuel.

1.27 Climate change and energy policy:

- European Emission Trading Scheme: Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC. Directive as amended by Directive 2004/101/EC;
- Communication form the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: A European Strategic Energy Technology Plan (SET-Plan), COM (2007) 723;
- Communication from the Commission - 20 20 by 2020 - Europe's climate change opportunity [COM(2008) 30]. Recently endorsed by Parliament (17th December 2008);
- Communication form the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions on alternative fuels for road transportation and on a set of measures to promote the use of biofuels, [COM (2001) 547];
- Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels and other renewable fuels for transport;
- Proposal for a directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources [COM(2008)0019];
- Directive 1999/94/EC of the European Parliament and of the Council of 13 December 1999 relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars;
- European Parliament legislative resolution of 17 December 2008 on the proposal for a regulation of the European Parliament and of the Council setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles;
- Directive 2008/101/EC amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community.
- Commission Recommendation (2006/339/EC) of 8 May 2006 on the promotion of shore-side electricity for use by ships at berth in Community ports.

### Qualitative analysis

1.28 Environmental sustainability is a policy area with strong linkages with all the other spheres of intervention of the CTP and with the measures therein taken. For instance it has strong linkages with measures taken in the field of pricing and taxation; market regulation and enforcement; safety and security; TEN-T; urban

transport; freight and logistics; and, intelligent transport systems and EU research outcomes.

1.29 In what follows, we focus on the actions taken by the EU with respect to the following transport externalities: GHG emissions, air quality, the protection of maritime environment and noise. In this context, we will also present the actions taken to promote energy efficiency and the usage of renewable sources. An in-depth discussion of the measures to achieve a greener urban mobility system is discussed within Task 1.9. Other measures outlined for transport in the Green Paper on Energy Efficiency [COM(2005)265] or in the Sustainable Development Strategy, such as energy and passenger car taxation, or traffic management systems (SESAME initiative and GALILEO), have been dealt with in other tasks. In particular, measures intended to encourage modal shift are discussed in the reports on Tasks 1.1 and 1.3.

1.30 From the analysis undertaken, it seems that several actions still need to be taken to achieve the objectives set by the EU CTP on transport environmental sustainability, though some steps forward have already been made. Table 1.1 below summarises progress to date.

**TABLE 1.1 ASSESSMENT OF CTP MEASURES FOR ENVIRONMENTAL SUSTAINABILITY**

| Measure | Assessment |
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| Euro emission standards | **Done**. The EU has developed vehicle emission standards with the aim to lower the negative environmental and health impacts from motorised transport. The standards are defined in a series of Directives, which date back to the 1970s, staging the progressive introduction of increasingly stringent requirements. Motor vehicle emissions have originally been regulated by Directive 70/220/EEC (light-duty vehicles) and 88/77/EC (heavy-duty vehicles). A whole series of amendments have been issued to tighten the limits. Currently, emissions of nitrogen oxide (NOx), hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM) are regulated for most vehicle types, including cars, lorries, trains, tractors and similar machinery. The setting of standards has had an impact on the evolution of the vehicle fleet composition over years. This led to a considerable change in the size and type of emissions of air pollutants from motorized transport, which have substantially decreased over time (as shown by reported indicators). New standards will be adopted shortly (e.g. Euro 5 for light-duty vehicles) or have been scheduled, which will contribute to further reductions. |

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| Air quality Directive | **Done.** Following the Air Quality Framework Directive, limits have been set for the atmospheric concentrations of pollutants, including SO2, NO2, PM10 and O3, at levels that should prevent or reduce harmful effects on health and ecosystems. For the protection of human health, the NO2 limit value of 200µg/m3 1h average and 40µg/m3 annual average were set in Council Directive 1999/30/EC. The limit is to be met by 1 January 2010. The same Directive also sets limits for SO2 and PM10, 125µg/m3 24-hour average and 50µg/m3 24-hour average respectively, to be met by 1 January 2005. For PM10 there is also an annual average limit, which is set at 40µg/m3.<br><br>The road transport sector is one of the main contributors to air pollution. The contribution to tropospheric ozone formation precursors (TOFP) in 2004 was 30 % in the EU10 and 35 % in the EU15 countries. Regarding the emission of primary PM10 and secondary PM10 (inorganic pollutants) contributing to the formation of particulates, in 2004 17% was attributed to road transport in EU10 and 26% in EU15. However, there has not been a significant improvement in air quality, as the increase in the number of vehicles is offsetting reductions in emissions from technological and fuel quality improvements. In 2006, 40-50% of the EEA urban population still lived in areas where pollutant concentrations are higher than selected limits/targets (see charts in Appendix). |
| Ensuring that pricing and taxation mechanisms better reflect vehicles environmental and health damages | **Some progress.** A legislative proposal to amend the heavy goods vehicles charging directive (Eurovignette Directive) was attached to the Greening Transport Package [COM(2008)433]. The proposal would provide Member States with a framework to vary charges according to local pollution (air and noise) and congestion.<br><br>There have been some examples of restructuring of transport charges at national level, but widespread adoption has not happened. Recent developments are the introduction of urban charging schemes (e.g. London, Stockholm and Milan) and distance related charging schemes on motorways (e.g. HGVs charging scheme in Germany). However, with the exception of Milan, urban road charges have focused on congestion, though some exemptions were allowed for electric or hybrid vehicles. A recent proposal to restructure the London Congestion Charge to reflect environmental damage done by vehicles with larger engines was abandoned after a change of political leadership. Charge differentiation concentrates mainly on: air pollution in the German scheme applied to the road freight sector; congestion in the urban road schemes; noise in the aviation sector and CO2 emissions of passenger cars. In general, few measures have yet been taken to internalise costs of CO2 emissions, rail and road noise and congestion.<br><br>At present there is no common EU environmental framework for road vehicles registration and/or annual taxation. In 2005 the Commission presented a proposal for a Directive (COM/2005/261/FINAL) that would require Member States to re-structure their passenger car taxation systems both for internal market (remove existing tax obstacles to the transfer of passenger cars from one Member State) and transport sustainability purposes (restructuring the tax base of both registration taxes and annual circulation taxes so as to include elements directly related to carbon dioxide emissions of passenger cars). This proposal is still to be debated. At present, to limit internal market distortion, EU legislation sets minimum annual taxes for heavy goods vehicles (above 12 tonnes) and establishes that taxes have to vary according to the number and composition of axles; yet national authorities can set taxes structure as well as the procedures for levying and collecting them.<br><br>However, several Member States already apply charges differentiated on proxies for environmental impact (e.g. engine size and type). |

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| Promote the use of cleaner vehicles in urban public transport | **Some progress.** The approach followed by the Commission is to stimulate good practice, mainly through the support of research projects - such as CUTE (Clean Urban Transport for Europe) and EU initiatives like CIVITAS. CUTE is an European Union initiative to fund, among other things, local hydrogen-powered public transportation, especially by buses, which will contribute to the reduction of overall CO2 emissions. The project as delivered significant result: since mid-2003, 27 public transport buses have covered more than 1 million km and carried more than 4 million people in 9 European cities, producing zero emissions and causing no accidents during their operations. The project, which concluded in 2006, has then been followed by the "Hydrogen for Transport" initiative. The EU is also co-financing the CIVITAS initiative, which is aimed at helping cities to achieve a more sustainable, clean and energy efficient urban transport system. Clean urban transport fleets is one of the measures supported by the initiative: both CIVITAS I and CIVITAS II have co-financed several cities in introducing cleaner public transport vehicles. Significant results have also been achieved, e.g.: in Graz public transport company now operates all of its 120 busses on 100% biodiesel; Toulouse set a complex strategy to get 100% clean public transport fleet by 2009.<br><br>Both CUTE and CIVITAS showed significant results, but they were limited to a number of cities participating to the initiatives, mainly supported the usage of forefront not-exploited technologies, and also limited budgets. To get a cleaner urban transport fleet across the different EU cities, a specific policy framework is needed, accompanied by additional financial support. The EU is making steps in this direction, which should deliver results in the coming years. Since 2005, a Directive to promote the introduction of clean and energy efficient vehicles has been under discussion. The first proposal produced by the Commission in 2005 was thrown out by the Parliament for being too weak. A new version, issued by the Commission in 2007 (see COM(2007) 817 final), was adopted in 2009 (Directive 2009/33/EC of 23 April 2009). This requires that energy and environmental impacts linked to the operation of vehicles over their lifetime are taken into account in all purchases of road transport vehicles, as covered by the public procurement Directives and the public service Regulation .<br><br>In addition, the European Investment Bank (EIB) is currently developing a financing facility to help cities improve their energy efficiency and buy cleaner bus fleets. |

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| Double hull oil tankers, penal sanctions for ship source pollution and other measures to limit maritime pollution from vessels | **Some progress**. Accidents resulting in massive spills, such as "Prestige" or "Erika", provide gripping illustrations of the problem of vessel pollution. Yet, besides large oil spills at sea, which undoubtedly constitute a threat to the environment, there are three types of routine ship operations which pollute the sea: ballast water, tank washings and engine room effluent discharges. Due to these operations large amounts of oil are pumped deliberately from ships every day, along almost all of Europe's coastline. With the intent to tackle maritime pollution, different types of measures have been introduced by the EU: i) the gradual elimination (phasing out) of the fleet of single-hull tankers and replacing these by double hull tankers; ii) establishment of the European Maritime Safety Agency (EMSA) (in particular, since March 2004, EMSA was also given additional tasks related to oil pollution response); iii) penal sanctions for those responsible of causing oil spills or other ship-source type pollution. Despite the reduction in the number of maritime accidents (on average the number of yearly oil spills at sea between 7 to 700 tonnes has decreased in the 2000-2007 period with respect to 1990-1999, and lower figures have been registered in most recent years), certain safety and environmental threats remain. The Commission has recently adopted a new proposal on ship-source pollution and on the introduction of penalties for infringements [COM(2008) 134 final] . In addition, it increased financial support to the EMSA to enable the Agency to undertake a number of activities such as the development of a centralised satellite imagery service, which will facilitate the early detection of polluting incidents and the identification of the ships responsible. |

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| Oil pollution damage compensation fund | **Done.** After the Erika tanker accident in 1999, EU Member States identified the need to increase their involvement at EU level in this area. The Prestige tanker accident in 2002 reinforced the need for such involvement. Following an initiative of EU Members States, the International Maritime Organisation (IMO) adopted in May 2003 the Supplementary Fund Protocol which provided a significant increase (up to about €1 billion) in the fund available to compensate damages caused by oil tanker accidents under a regime of strict liability. |
| Sulphur content of marine fuel | **Some progress.** Maritime transport has a higher energy-efficiency than other modes of transport and is, in general, less harmful to the environment than other modes of transport per tonne or passenger carried. The good environmental performance of shipping is, however, hampered, in particular, by sulphur dioxide (SO2) emissions that are significantly higher than in other modes. The IMO establish a maximum worldwide level of sulphur in fuel of 4.5% for heavy fuel oil burned by ships and set up SOx Emission Control Areas (SECAs) where fuel burned by ships must contain less than 1.5% sulphur, or equivalent abatement technologies must be applied. The Baltic and North Seas (including the English Channel) are currently designated as SECAs. In October 2008 the IMO adopted tighter restrictions on the sulphur content of fuel used both within SECAs and worldwide. In SECAs limits for sulphur levels would be 1% from 1 January 2010 and 0.1% from 1 January 2015. At the same time the global limits will be reduced to 3.5% from 1 January 2012, with a further reduction to 0.5% from 1 January 2020 or 2025 if insufficient fuel is available. EU rules state that, with certain exceptions, Member States must ensure that marine fuels with more than 1.5% sulphur by mass can not be used in SECAs that are within their territorial seas, exclusive economic zones and pollution control zones. These rules also apply to fuel used by recreational craft. For passenger ships operating regular services to or from Community ports, such fuels must be used within these areas, irrespective of whether they are in a SECA or not. The same EU rules require Member States to ensure that marine gas oils with more than 0.10% sulphur by mass are not used, and from 2010 are not sold, within their territory and that ships at berth do not use fuel containing more than 0.1% sulphur. Marine diesel oils cannot be sold if they have more than 1.5% sulphur. The Commission will come forward with a proposal in 2009 which will take into account the significant recent progress on the issue in the IMO. |
| Community support for noise charges and introduction of noise-related operating restrictions at Community airports | **Some progress**. In 2004, an attempt to establish common EU criteria on the noise performance of aircraft [COM (2001) 74] - to be used to compute the level of noise charges in airport - failed. In addition, the effects of Directive 2002/30/EC on the restriction of operation of noisiest aircraft on their airports have been limited. Only five EU airports applied it: London Gatwick, London Heathrow, London Stansted, Paris Charles de Gaulle and Madrid. Though difference exist among airports, in general the number of people affected by noise, particularly at night, has increased since the directive came into force, due to a general increase in the number of movements, in spite of the possibility to introduce partial restrictions. |

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| Reduction at source and other actions to reduce noise in the rail sector | **Some progress**. The contribution of rail transport to noise pollution is significant. TERM indicators on noise pollution are not updated, but they show that in 2001 about 10% of the population was exposed to rail noise levels above the threshold for "serious annoyance". The actions taken so far by the EU to reduce rail noise at source will take several years before showing results: the legislation adopted, which should reduce emission by 50%, is limited to new and renewed rolling stocks, including freight wagons, which have a long lifetime. On the other hand, due to their high costs, noise barriers are a cost-effective alternative only in dense urban areas. Thus, further actions are needed to effectively reduce rail noise in the short-medium term and to provide a uniform legislative framework on EU rail corridors. For this purpose, the Commission has recently produced a legislative proposal on rail noise [COM(2008)432] with the intent to provide a uniform legislative framework on EU corridors and to promote significant abatements also in the short-medium term. |
| EU noise standards and other measures to reduce noise externalities in the road sector | **Some progress.** Road traffic is a major contributor to environmental noise particularly in urban areas. TERM indicators[5] show that almost 67 million people (i.e. 55 % of the population living in towns with more than 250,000 inhabitants) are exposed to daily road noise levels exceeding 55 dB Lden (the lower benchmark for the combined noise indicator). Almost 48 million people are exposed to levels exceeding 50 dB Lnight, (the lower benchmark for night time noise), with 44% of them exposed to levels exceeding 55 dB Lnight, a level which has detrimental effects on health. EU rules set the maximum permissible noise emission levels for all new motor vehicles except tractors. These rules have allowed for harmonisation of the road vehicle fleets regarding noise emission characteristics, but they are not a strong technical driver towards quieter vehicles. In 2004, the Commission recognized that tighter limits, especially for delivery vans and trucks, need to be considered. The revision of the Eurovignette Directive, currently under discussion, could provide an additional instrument to tackle road noise from HGVs. |

5 TERM 3/2009 "Transport at a crossroad"

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| Promotion of biofuels in road transport | **Some progress**. In 2001 the Commission set out a strategy to achieve 20% substitution of conventional automotive fuel by 2020, identifying biofuels as one of the possible alternatives. In 2003 the Directive on the promotion of biofuels and other renewable sources in transport (Directive 2003/30/EC) set indicative targets for road transport biofuels of 2% by the end of 2005 and 5.75% by the end of 2010, although Member States were then allowed to set their national indicative targets. A recent study from the IEA[6] reports that several Member States have passed the biofuels Directive into national law, but some have announced indicative targets below that of the Directive. Member States are far from reaching the targets: in 2007 biofuels made up 2.6% of road transport fuel and they are expected to account for 4.8% by 2010.<br><br>Nevertheless, more ambitious targets have recently been proposed. As part of the review of the renewable energy directive, in 2008 the Commission proposed to raise the share of biofuels in transport to 10% by 2020 [COM(2008)19 final], but the 10% target has been recently assigned to a mixture of renewable sources, including biofuels and green electricity.<br><br>However, there are some concerns about both the environmental effects of biofuel production, and the adverse socio-economic impacts that it may have. For this reason, in 2008 the EU has also proposed "sustainability criteria" to prevent mass investment in cheaper but environmentally harmful biofuels, though the latest text adopted does not take into account for indirect land displacement as a negative effect to be addressed in the production of biofuels.<br><br>As part of the measures to promote biofuels, the Energy Products Directive (Directive 2003/96/EC) allows Member States to exempt biofuels from taxation. Today, most EC Member States have introduced exemptions at various levels up to 100%. |

[6] IEA report on Biofuel Technologies (2008).

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| Reducing CO2 emissions from cars | **Done.** In 1998 and 1999 the European Commission entered a voluntary agreement with the European, Japanese and Korean car industry to reach average emissions of $CO_2$ from new cars of 140g/km by 2012. In 2007 the Commission concluded that, although there had been a reduction in average emissions (from 186g/km in 1995 to 161g/km in 2004), the target was unlikely to be met, and made a legislative proposal to ensure that, along with other technological improvements and an increased use of biofuels, the target of 120g/km would be met by 2012.<br><br>The legislation was discussed and approved on December 2008. It sets that the fleet average to be achieved by all cars registered in the EU is 130 grams per kilometre (g/km), with an additional 10g/km to be achieved from other sources, including CO2 restrictions for vans, the use of biofuels, cleaner fuels, more efficient air conditioning systems, and the use of tyres with lower rolling resistance. A so-called limit value curve implies that heavier cars are allowed higher emissions than lighter cars while preserving the overall fleet average. In 2012, 65% of each manufacturer's newly registered cars must comply on average with the limit value curve set by the legislation. This will rise to 75% in 2013, 80% in 2014, and 100% from 2015 onwards. If the average CO2 emissions of a manufacturer's fleet exceed its limit value in any year from 2012, the manufacturer has to pay an excess emissions premium for each car registered. This premium amounts to €5 for the first excess g/km, €15 for the second g/km, €25 for the third g/km, and €95 for each subsequent g/km. From 2019, even the first excess g/km will cost €95.<br><br>A target of 95g/km is specified for the year 2020. The implementation of this target, including the excess emissions premium, will have to be defined in a review to be completed no later than the beginning of 2013. |
| Rules on vehicle labelling to promote most energy-efficient vehicles | **Some progress**. Directive 1999/94/EC aimed at ensuring that information related to the fuel economy of new passenger cars offered for sale or lease in the Community is made available to consumers, in order to enable consumers to make an informed choice. However, an independent evaluation of the effectiveness of the Directive, as well as reports from the Member States, concluded that there was a need for a revision of the Directive to ascertain better and more consistent information for consumers. In 2007, the European Commission, as part of the new strategy to reduce carbon dioxide emissions from new cars and vans sold in the European Union [COM(2007) 19], announced a revision of Directive on CO2 labelling of cars. The adoption of the proposal to revise CO2/cars labelling Directive is now foreseen towards the end of 2009.<br><br>As part of the measures aimed at reducing GHG gases from road transport, the Commission is also developing a scheme to grade and label tyres according to rolling resistance (this is of direct relevance for fuel consumption and hence CO2 emissions) and is planning a proposal for the first half of 2009. The aim is to shift the market towards tyres that have low rolling resistance, but which also satisfy safety standards. |

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| Inclusion of aviation in the ETS and other measures | **Done**. To date aviation produces about 12.2% of transport GHG emissions, but its role is expected to grow as technological improvements will not be able to compensate for expected growth in global air traffic.<br><br>Aviation contributes to climate change through different aircraft emissions (carbon dioxide and water vapour emissions, contrails or 'aviation smog', indirectly nitrogen oxides). The Intergovernmental Panel on Climate Change (IPCC) has estimated that the total impact of aviation on climate change is currently about 2 to 4 times higher than what stems from CO2 emissions alone, notably due to aircrafts' emissions of Nitrogen oxides (NOx) and water vapour in their condensation trails. The EU is seeking to reduce aviation GHG emissions through a comprehensive approach based on: 1) R&D for 'greener' technology, 2) modernisation of air traffic management systems and 3) introduction of market based measures.<br><br>In the 2000-2005 period several policy options for market based instruments were examined by the EU: in particular the possibility to introduce aviation taxes, such as a fuel tax – as kerosene is currently exempted from taxation – was explored, but this option resulted not to be feasible as it would have required a unanimous decision in the Council and was strongly opposed by the aviation industry. In its 2005 Communication "Reducing the Climate Change Impact of Aviation", the Commission concluded that bringing aviation into the EU's emission trading system (EU-ETS) was the most cost-effective way of reducing the climate change impact of this sector. Aviation has recently been included in the European Emission Trading System (ETS) and as from 2012 planes arriving at or departing from EU airports will be subject to a cap on GHG emissions which will require airlines to buy and sell 'pollution credits' on the EU 'carbon market'. |
| Promotion of the shore-side electricity for use by ships at berth in EU ports | **Some progress.** In 2006 the Commission encouraged the use of shore-side electricity by ships (and did not specifically exclude recreational craft) in ports, claiming that the switching to shore-side electricity would reduce CO2 emissions by over 50%, carbon monoxide by about 99% and nitrous oxide emissions (N2O) by over 50%, as well as eliminating vibrations and noise from auxiliary engines.<br><br>In particular, the Recommendation, which is a soft measure without any binding effect on Member States, called for Member States to install shore-side electricity for use by ships at berth in ports and to offer economic incentives (particularly in the form of electricity tax reductions) to operators to use such electricity. The recommendation was released just as eight states bordering the North Sea agreed to introduce economic incentives for provision of shore-side electricity.<br><br>The Commission calls on Member States to work within the IMO to promote the development of harmonised international standards for shore-side electrical connections. At present only a few EU ports (Stockholm, Gothenburg, Lübeck) offer shore side electricity equipments.<br><br>Overall, although the adoption of the EU Regulation has been achieved, more actions need to be taken both at international and Member State level. |

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| R&D in transport energy efficiency and in reduction of reliance on fossil fuels | **Done**. New energy technologies can make a significant contribution to both reducing energy use in transport, and reducing its environmental impacts. The White Paper stresses the need to develop technology apt to provide safe and clean modes of transport (in particular Clean Urban Transport), ensuring that climate change be a major theme of Community policy for research and technological development and for national research programmes. Several actions have been taken at EU level either within the research framework or other initiatives (e.g. LIFE).<br><br>Within the thematic priority "Sustainable development, global change and ecosystems", the 6th research framework programme (FP6) financed several measure aimed at improving transport energy efficiency and reducing the reliance on fossil fuels, such as: the technological development and integration of renewable sources in all aspects of energy supply (storage, distribution, use); the development of alternative fuels; the development and application of fuel cells; improving transport and storage technology, in particular hydrogen technology; reducing GHG emissions by using cleaner fossil fuel installations; new technologies and new concepts for inland transport, including propulsion systems and the use of fuel cells. The 7th research framework programme (FP7) set the objective to develop safer, 'greener' and 'smarter' pan-European transport systems that will benefit all citizens, respect the environment, and increase the competitiveness of European industries in the global market..<br><br>Significant achievements and ongoing initiatives by mode of transport are reported in the Appendix. |

*SWOT analysis*

1.31 Table 1.2 sets out a SWOT analysis relating to environmental sustainability.

**TABLE 1.2 SWOT ANALYSIS – ENVIRONMENTAL SUSTAINABILITY**

| | |
|---|---|
| **Strengths** | Climate Change is currently at the top of the agenda of most transport policy areas, which should strengthen the efforts directed at tackling this challenge<br><br>Heightened awareness of the need to tackle GHG emissions growth to reduce impacts on climate change can facilitate to take actions to reduce other transport negative external effects<br><br>The EU took the lead in actions aimed at improving vehicle technology and fuel quality to reduce pressures on the environment and can build on this experience to keep promoting technology improvements<br><br>Better internalisation of external costs can help reduce market distortions and emission growth<br><br>Actions to promote environmental sustainability can have a positive synergy with other policy aims: measures aimed at reducing environmental externalities and congestion can also reduce journey times and improve the reliability of both goods and passenger services, at benefit also of a more accessible and integrated internal market |
| **Weaknesses** | Strong cooperation between the EU and international organizations is crucial to support the effectiveness of instruments aimed at reducing GHG emissions from sectors, such as aviation and maritime, which operate at a global level. Similarly, cooperation between the EU and national or local institutions is crucial to achieve the targets set for air quality. Yet local governments might lack financial resources to invest in more sustainable transport modes or might find some travel demand management instruments (like road pricing) unpopular<br><br>In most cases road haulage is still considered the preferred mode for freight transport<br><br>There is limited ability to use renewable resources in the short term to meet transport energy demand<br><br>Increased demand for land from certain bio fuels production– and the displacement of existing agricultural production –can lead to conversion of forests for agricultural, displacing the environmental benefits of this renewable source of energy<br><br>Clean private vehicles such as electric, hybrid and plug-in hybrid cars have difficulties in penetrating the market |

| | |
|---|---|
| **Opportunities** | Market for cleaner, quieter and energy efficient vehicles is likely to expand, being led both by EU legislation and Member States actions such as subsidies, support for R&D, etc.<br><br>Revision of the energy taxation directive as well as an harmonisation of passenger car taxation can help reducing GHG emissions<br><br>Introduction of freight transport road usage charging that internalize external costs can help reducing emissions, inducing efficiency in the logistic chain and supporting the usage of alternatives modes<br><br>Soft measures aimed at promoting travel behaviour change can provide a noticeable contribution to the reduction of motorized travel demand and can support the shift towards environment friendly transport modes<br><br>Information and Communication Technologies (ICT) can provide significant improvements in vehicle efficiency, carrying capacity and shifts to more sustainable transport modes<br><br>Especially in urban areas, coordination with spatial planning can bring to substantial achievements in transport emissions reductions<br><br>Changing structure of the EU economy towards services combined with productivity gains in transportation can contribute to a gradual decoupling of freight transport from GDP growth |
| **Threats** | Increased congestion, especially in urban areas, can outweigh the benefits obtained through improved vehicles environmental performances<br><br>Declining trends of average occupancy rates of private cars threaten reduction in road energy consumption and GHG emissions<br><br>Forecasted growth of traffic demand growth in some sectors like aviation and shipping put at risk the achievements of reduction targets of GHG or acidifying pollutant emissions<br><br>Increase of generalized cost of travel (such as the increase in fuel costs) can limit the scope for Member States to introduce environmental charges on road usage. Public acceptance can also be a constraint for the introduction of road user charging<br><br>Introduction of environmental taxation or of tighter environmental standards can be difficult in periods of economic downturns |

***Results***

1.32 Hereafter we discuss the results achieved in improving the environmental sustainability of the EU transport sector and in reducing its reliance on fossil fuels.

*Decoupling economic growth and the demand for transport*

- **Passenger Transport: Neutral.** In the past decade passenger transport growth has been slower, on average, than growth in the economy. Yet, it has grown steadily in the EU as a whole, which makes it difficult to stabilise or reduce the environmental impacts of transport. The majority of countries saw growth in passenger transport demand every year, with few exceptions. This trend is partially explained by the fact that the growth in incomes coupled with a tendency to spend more or less the same share of disposable income on transport. Additional income therefore often leads to additional travel. In addition, the growth of low-cost carriers has made air transport affordable for more people.
- **Freight Transport: Not achieved.** Freight transport volume has grown rapidly, and has generally been seen as strongly coupled with growth in GDP, especially

in EU15. Data up to 2005 from the EEA reveal growth faster than GDP in the EU-15 Member States and slower than GDP in the EU-10 Member States, mainly a result of the economic restructuring in the new Member States over the past decade. Overall, as discussed below, there is no clear evidence that the relationship between growth in freight transport volumes and GDP growth has changed over the 2000-2007 period.

*Air quality*

- **Reducing pollutant emissions from transport to levels that minimise effects on human health and/or the environment. Moving towards targets.** Transport emissions of air pollutants show a decreasing trend in EEA Member States (see quantitative analysis below). In particular, road transport is generally becoming less polluting thanks to increasingly strict air pollutant emission standards (the so-called EURO standards). These reductions can largely be attributed to advances in exhaust gas after-treatment devices together with improved fuel quality introduced since the early 1990s. Nevertheless, people in European cities continue to be exposed to significant health threats due to air pollution. Furthermore, concerns derive from the increase of shipping contribution to acidifying pollutant emissions.

- **Reducing pollutant emissions from transport at local level**. Though transport emissions of air pollutants have decreased over time, the targets set for particulates and NOX in urban areas have not been achieved because the improved vehicle environmental performances have been outweighed by increased traffic and congestion. In particular:

  - **PM10**: not achieved. Reducing pollutant emissions from transport the EEA, in the 1996-2005 period significant proportion of the urban population (16-45%) was exposed to concentrations of particulate matter in excess of the EU limit values set for the protection of human health.

  - **NOX (NO2)**: not achieved. Data analysed from selected stations in major urban areas indicate that maximum values of NO2 concentrations at road traffic stations remain relatively stable during the 1999-2002 period, though an increase was observed in the maximum observed concentrations in 2003-2004. Background concentration remained relatively stable over the 1999-2004 period.

*Noise*

- **Reducing transport noise both at source and through mitigation measures**: the current EU policy framework sets general objectives for reducing exposure to transport noise. Yet, there is no binding target to be achieved, which makes it difficult to define strategies and measure progress towards this goal. To date some progresses have been made across different modes but still actions need to be taken to tackle noise externalities in the aviation, rail and road sectors. In the rail sector, the actions taken so far by the EU will take several years before showing results. The standards set for road vehicles, which have allowed for harmonisation of the road vehicle fleets regarding noise emission characteristics, have not been a strong technical driver towards quieter vehicles.

*Greenhouse gas emissions*

- **Reducing transport GHG emissions. Not achieved.** Different EU strategic documents set different goals for the reduction of GHG emission from transport.
  - The 2001 transport policy White Paper and its 2006 Mid-Term Review did not include a specific target to reduced transport GHG emissions, although the Mid-Term Review required GHG emissions, along with all other negative effects, to be decoupled from transport demand.
  - The Council's Renewed Sustainable Development Strategy of 2006 set the objective of "achieving sustainable levels of transport energy use and reducing transport greenhouse gas emissions in the longer term".
  - The Presidency Conclusions of the European Council of March 2007 called for a 20% (or even 30%) reduction of CO2 emissions by 2020. At present, apart from air transport from 2012 onwards, transport is not part of the Emission Trading Scheme. Whilst in total, non-ETS sectors are intended to achieve a 10% reduction in emissions, there is no specific target for transport.
- GHG emissions in the transport sector continue to increase. However, significant improvements have been achieved in promoting energy efficiency of various transport modes. At the same time, non-fossil fuels have been introduced. This contributes to the CTP objective of reducing the carbon-intensity of transport, but the experienced increase of transport demand cancelled out these positive effects on the abatement of total GHG emissions from the sector.

*Energy issues*

- **Reducing energy consumption by mode. Not achieved**. Transport energy consumption in countries of the European Economic Area has grown by 2.3% per year during the 1991 – 2004 period, with remarkable distinctions among regions. For the 10 new EU Member States (Bulgaria and Romania had not joined the EU) growth is around 10%: here stronger economic growth since the mid 1990s, accompanied by significant increase in vehicle ownership, led to increasing transport demand. The improvements registered in energy efficiency, such as for passenger cars, where new vehicles have increased energy efficiency by 1.5% per year since 1995 (driven by increasing fuel prices, motivating prudent behaviour in car driving and use, and the design of more energy efficient engines), have been offset by the growth in demand.
- **Achieving a significant reduction in the dependence on fossil fuels to provide the energy needs for all forms of transport. Not achieved**. Biofuels are expected to account for 4.8% by 2010 against an original target of 5.75%. In 2008, the target has been moved to a 10% share of biofuels in transport by 2020, to be reached through a mixture of renewable sources, including biofuels and green electricity, which will be challenging to meet, given the projected 10% increase in transport energy demand by 2020.

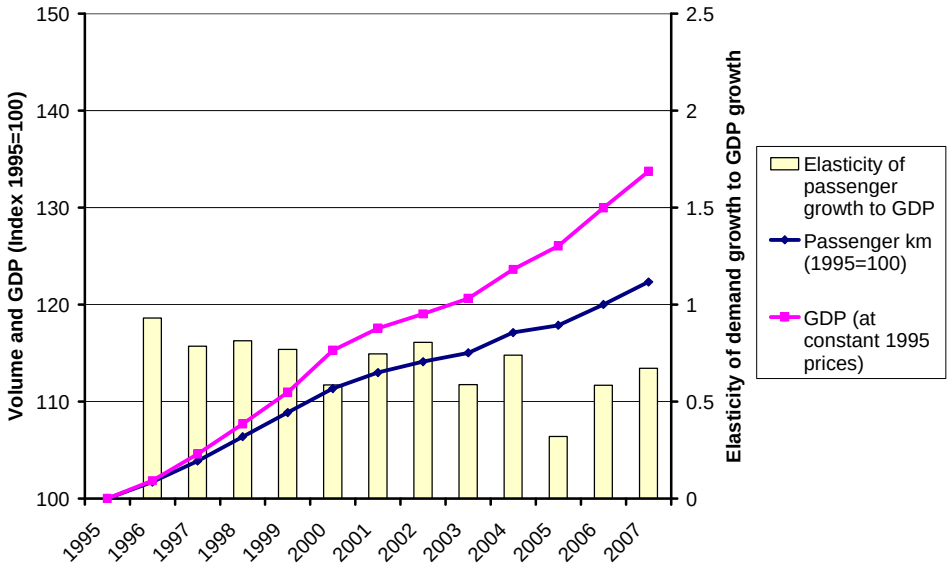
## Quantitative analysis

1.33 In what follows we report outcome indicators of the measures assessed above. Additional supporting output and outcome indicators are provided in the Appendix.

*Decoupling economic growth and the demand for transport*

1.34 The Commission and the EEA define decoupling as meaning a reduction in transport intensity, so transport growth is less than GDP growth (the elasticity of transport growth to GDP growth is less than 1). Therefore, we have analysed the rates of growth of both freight and passenger transport, and identified what the elasticity to GDP growth is, and whether it has changed. Figure 1.1 presents this analysis for passenger transport. This shows that the elasticity of transport growth to GDP growth has been less than one throughout this period and therefore the objective of decoupling appears to have been achieved as far as passenger transport is concerned.

**FIGURE 1.1 PASSENGER TRANSPORT GROWTH RELATIVE TO GDP GROWTH**

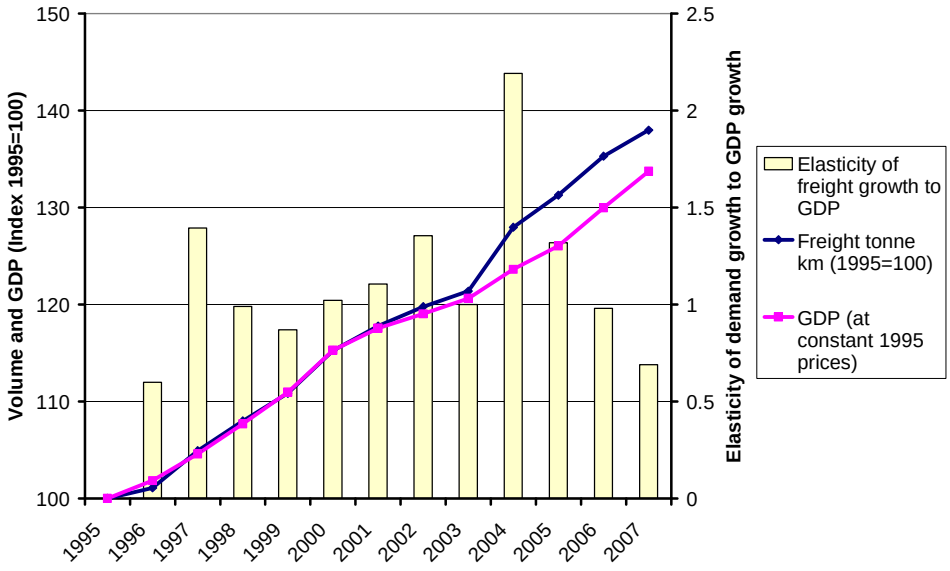



1.35 However, the figure also shows that the elasticity of transport growth to GDP growth was less than one before the 2001 White Paper, and that there has been at best a marginal change in this elasticity during this period. In our view, it is therefore difficult to attribute decoupling to the CTP.

1.36 Figure 1.2 presents the equivalent analysis for freight transport. This shows that the elasticity of transport growth to GDP growth is on average close to one. In a number of years, it was above one, freight transport having grown by more than GDP. Therefore, the objective of decoupling freight transport growth from GDP growth has not been achieved. This is likely to be due to the effects of increased trade, globalisation, and deeper market integration within Europe, above all due to enlargement.

1.37 However, decoupling transport growth from its negative effects has been achieved to some degree. Overall pollutant emissions from transport have fallen considerably despite rising traffic volumes and GHG emissions from transport have also not increased by as much as transport demand, reflecting some improvements in the energy efficiency of transport and in the carbon intensity of the energy used.

**FIGURE 1.2 FREIGHT TRANSPORT GROWTH RELATIVE TO GDP GROWTH[7]**




Source: Steer Davies Gleave Elaboration on DG TREN Transport Statistics Pocketbook 2009

***Modal shift***

1.38 The objective of the 2001 White Paper of achieving modal shift towards rail transport has not been achieved overall, although the decline in the relative share of rail freight appears to have stopped, and passenger rail has increased market share on some corridors. The objective of the Mid-Term Review of achieving modal shift where this is most appropriate may have been achieved, although it is too early to assess this, and assessment is in any case difficult because rail companies usually do not publish route-specific traffic statistics[8].

1.39 Most of the additional freight traffic registered in the past decade has been transported by road. Road tonne kilometres increased by 49.6% in EU27, and by 2007, road had a modal share of about 45% in intra-EU freight transport. Growth was significantly higher in the new Member States (8.3% per year since 1995), and has accelerated in recent years, as EU enlargement and globalisation have stimulated road freight activity and led to a new (more western) orientation of trade flows. However, the decline in the relative share of rail freight does appear to have stopped: since 2003, rail freight transport has grown by 3.6% per year, similar to the growth rate of road transport.

1.40 In the passenger transport sector, the fastest growth has been in air transport (4.5% per year 1995-2007). Overall road transport volumes have increased by 1.6% per year since 1995. The rate of increase of car transport demand was much higher in the EU12 (4.6% per year since 1995) than in the EU15 (1.3% per year), due to:

- the initially lower levels of car ownership of new Member States (242 cars per 1000 inhabitants in 2000, about half that of EU15);

[7] There was a change in the data collection methodology in 2004 which explains the higher elasticity for this year.

[8] See 2006 study 'Competition and complementarity between air and high speed rail', Steer Davies Gleave for European Commission, for a more detailed discussion of this issue.

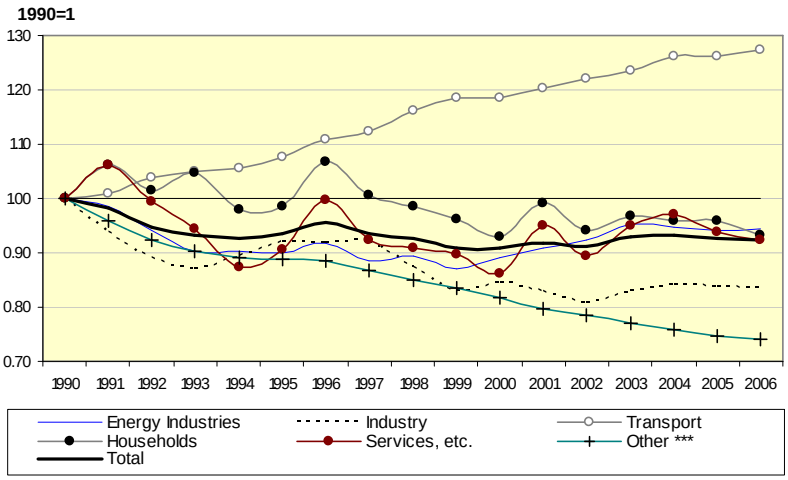
- strong economic growth; and
- in some cases, limited alternative modes.

1.41 Although the overall growth of passenger rail transport has been slow, high speed rail traffic has grown rapidly, from 33 million passenger kilometres to 92 million between 1995 and 2007. Rail traffic has increased significantly on certain corridors such as Madrid-Barcelona, where high speed lines have been constructed, and on corridors where the existing infrastructure has been upgraded, such as London-Manchester. However, these corridors have required very substantial investment, and it is difficult to assess the performance of rail on specific corridors in any detail, because of the lack of detailed traffic statistics.

### *Reducing transport greenhouse gas emissions*

1.42 In 2006 1,297 million tonnes of CO2 equivalents of GHG emissions come from the transport sector[9], corresponding to about a quarter of total GHG emissions from EU27 (with only energy industries accounting for a higher share, 30.9%). While all the other sectors experienced reduction in GHG emissions compared to 1990 levels, GHG emissions from transport have increased.

**FIGURE 1.3 TRENDS IN GHG EMISSIONS BY SECTOR, EU-27**

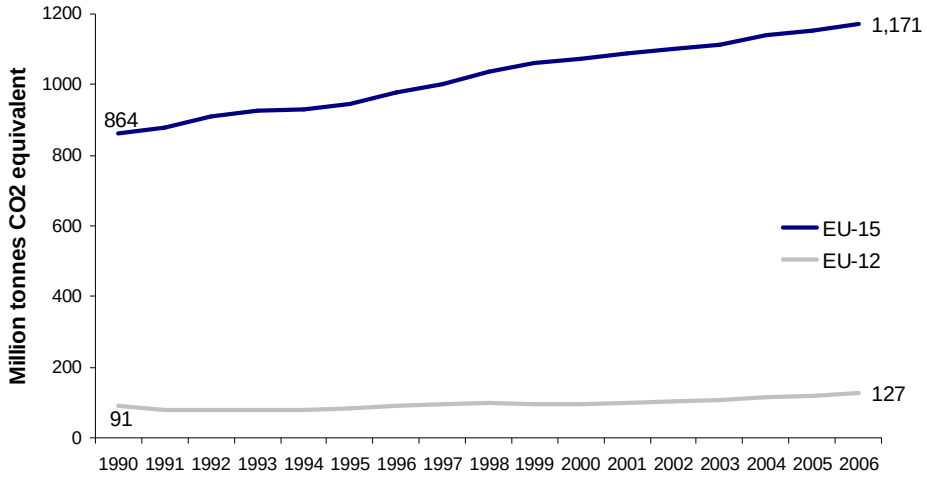



Source: Transport Statistical Pocketbook, 2009.

1.43 The following figure represents the trend in GHG emissions in the transport sector with separate indication of EU15 and EU12 New Member States. Reported data refer to total GHG measured in CO2 equivalent: on average, carbon dioxide (CO2) represents about 98% of total greenhouse gases released by transport, with a lower incidence only in the rail sector, where it accounts for 95% of gases. Figures showing the trend in GHG emissions by mode are reported in the Appendix.

[9] This figure include salso International Bunkers.

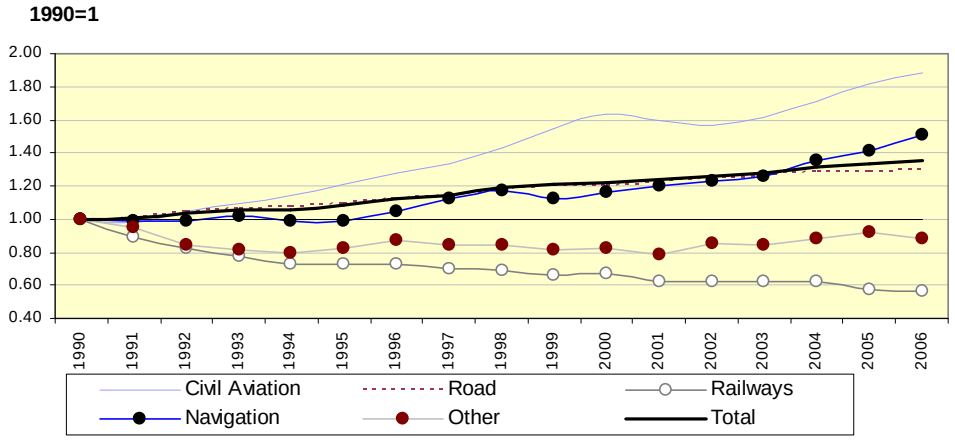
**FIGURE 1.4 GHG EMISSIONS FROM TRANSPORT: EU-15 AND EU-12**




Source: Transport Statistical Pocketbook, 2009.

1.44 Aviation is by far the fastest growing contributor to GHG emission from transport activities, with navigation coming after. The road sector still generated 71.2% of transport GHG emissions in 2006, despite improvements to fuel efficiency..

**FIGURE 1.5 TRENDS IN GHG EMISSIONS BY TRANSPORT MODE, EU-27**

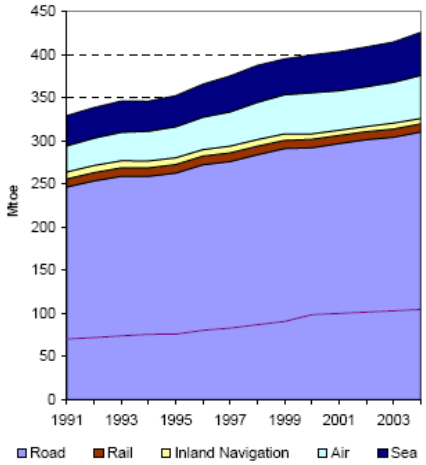



Source: Transport Statistical Pocketbook, 2009.

***Total energy consumption by transport***

1.45 In the European Economic Area, transport energy consumption increased by 29% between 1991 and 2004. It is one of the major energy consuming sectors, being responsible for about 34% of total energy consumption (all sectors) in 2004. Aviation is the fastest growing energy consumer, and road transport is the largest.

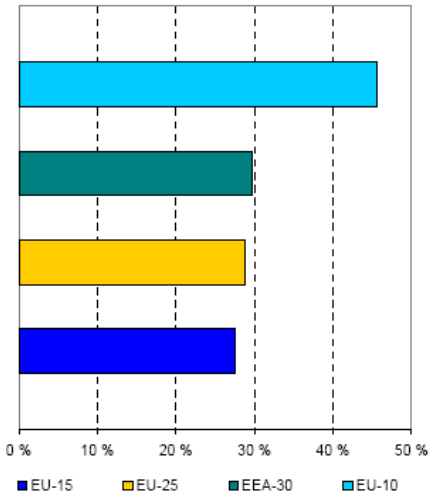
**FIGURE 1.6 TOTAL ENERGY CONSUMPTION IN TRANSPORT (EEA-30), 1991–2004 (MTOE)**




Source: EEA TERM 2006, Transport final energy consumption by mode. Note: The line dividing road transport distinguishes the share of freight (lower part) from passenger (upper part) transport

1.46 As for growth in energy consumption differentiated to region, all regions show an increase in growth for the 1991-2004 period compared to the 1990-2003 period. For the EU-15, EU-25 and EEA-30 the increase in growth varies between 1 and 3%. For the 10 new Member States the increase is far more significant, being 10%. This might be explained by a stronger economic growth in the new Member States.

**FIGURE 1.7 GROWTH IN TRANSPORT ENERGY CONSUMPTION BY REGION BETWEEN 1991–2004**




Source: EEA TERM 2006, Transport final energy consumption by mode

1.47 The following figure represents the trend in the share of final energy consumption of biofuels in the road sector in EU-27. The figure shows that overall EU Member States are far from meeting the current biofuels target. Additional data on biofuel production in the EU are provided in the Appendix.

**FIGURE 1.8 BIOFUELS IN ROAD TRANSPORT: EU-27**

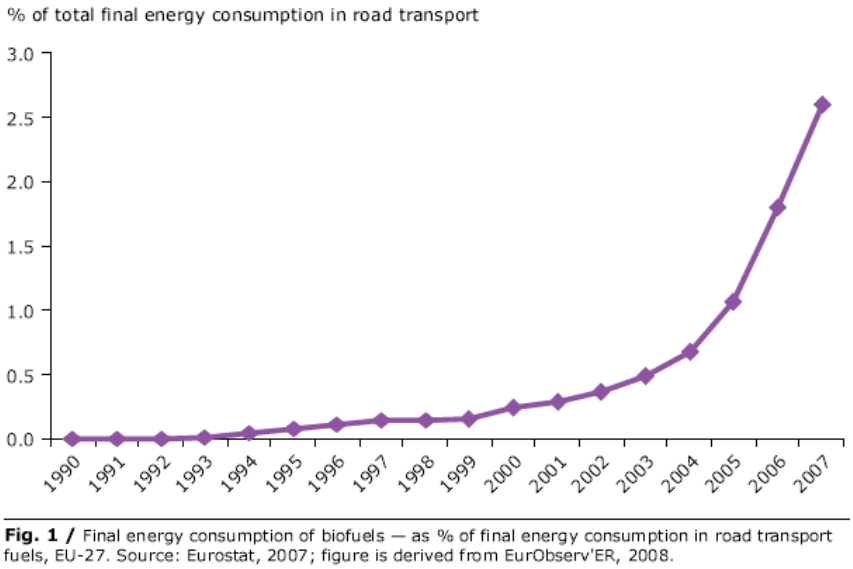


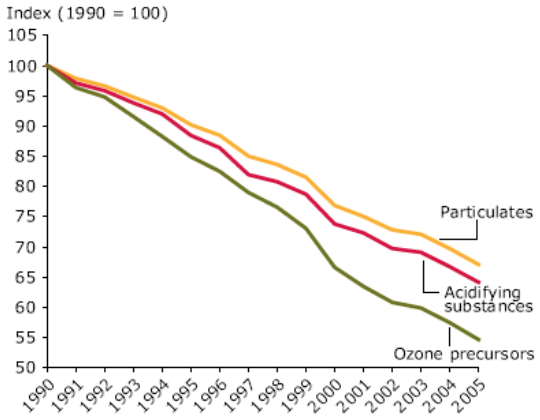

**Fig. 1 /** Final energy consumption of biofuels — as % of final energy consumption in road transport fuels, EU-27. Source: Eurostat, 2007; figure is derived from EurObserv'ER, 2008.

Source: EEA Environmental Signals 2009

### *Trends in polluting emissions*

1.48 There has been a reduction in other transport emissions in EEA Member States. Changes to vehicle design are helping to decouple these emissions from travel demand. Between 1990 and 2005, emissions of acidifying substances decreased by 36%, ozone precursors by 45% and particulates by 33%. In particular, road transport polluting emissions have reduced due to stricter standards (the EURO standards). Reductions can largely be attributed to advances in exhaust gas after-treatment devices together with improved fuel quality introduced since the early 1990s.

**FIGURE 1.9 TRANSPORT EMISSIONS OF AIR POLLUTANTS IN EEA MEMBER COUNTRIES**

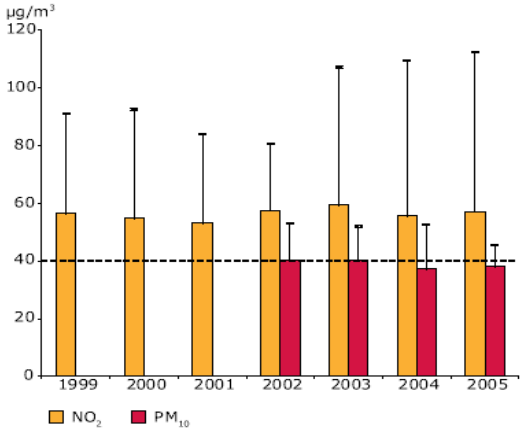



Source: EEA TERM 2007, Climate for a transport change

1.49 Data from selected measuring stations in urban agglomerations close to major traffic arteries indicate that the concentration of NO2 (2010 limit) and PM10 (2005 limit) are at or above the European air quality limits at these sites. Between 2000 and 2005, mean traffic concentrations have remained relatively stable at the selected measuring stations. The decrease in emissions shown in the figure below

does not appear to have had a statistically significant influence on air quality, as proved by the data on urban air quality reported in Appendix.

**FIGURE 1.10 ANNUAL AVERAGE MEAN NO2 AND PM10 CONCENTRATIONS AT TRAFFIC MONITORING STATIONS**




Source: EEA TERM 2007, Climate for a transport change

***Noise***

1.50 The European Environment Agency has recently published a detailed assessment of transport noise within its publication TERM 3/2009 "Transport at a crossroad". The following sections synthesise the analysis therein provided.

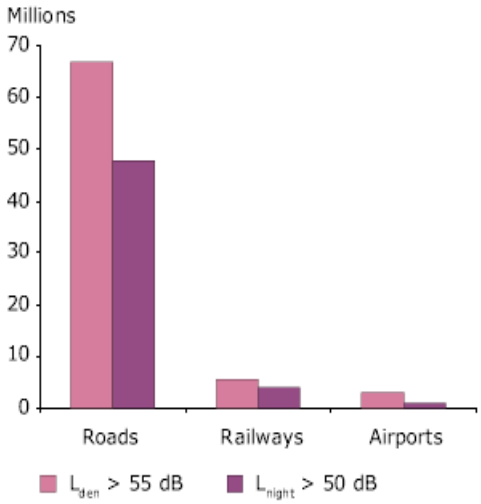
1.51 Until recently, European data on exposure to transport noise was scarce. Noise indicators and assessment methodologies were not harmonised across the EU and the ability to compare data between countries was difficult. For this reason, Directive 2002/49/EC on the assessment and management of environmental noise provided a unitary framework for collection of noise indicators in the EU[10].

1.52 Following the Directive's provisions, in 2007 EU Member States reported to the European Commission the first set of data on noise exposure in major agglomerations and along major infrastructures. The data comprised information on 162 agglomerations (with more than 250,000 inhabitants), roughly 82,000 km of major roads, approximately 12,000 km of major railways, and 74 major civil airports.

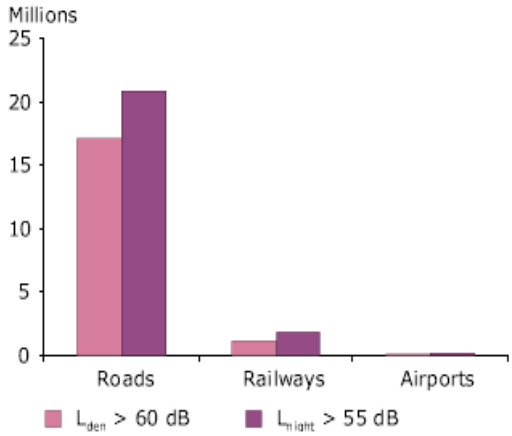
[10] As for the indicators, Directive 2002/49/EC established that two noise indicators — Lden and Lnight — should be used to elaborate mandatory den night strategic noise maps. Lnight is the annual long-term average noise level during the night (23.00–07.00). Lden is the annual long-term average noise level over 24 hours, combining the Lday, Levening (weighted by 5 dB) and Lnight (weighted by 10 dB) levels. Lday and Levening are the annual long-term average noise levels during the day (07.00–19.00) and evening (19.00–23.00).

**FIGURE 1.11 NOISE EXPOSURE IN AGGLOMERATION >250,000 INHABITANTS: EU27**

People affected by transport noise in agglomeration >250,000 inhabitants




People living in transport noise hot spots in agglomeration >250,000 inhabitants




Source: TERM 2008 3/2009, Transport at a crossroad, European Environment Agency

1.53 These data show that road noise is by far the largest source of noise: almost 67 million people (i.e. 55 % of the population living in towns with more than 250,000 inhabitants) are exposed to daily road noise levels exceeding 55 dB Lden (the lower benchmark for the combined noise indicator). Almost 48 million people are exposed to levels exceeding 50 dB Lnight, (the lower benchmark for night time noise), with 44% of them exposed to levels exceeding 55 dB Lnight, a level which has detrimental effects on health.

## Conclusions

### *The overall impact of the policy*

1.54 The objectives of the 2001 White Paper relating to decoupling of freight transport growth from GDP growth, and reduction in transport emissions, have not been achieved to date. The objective of decoupling passenger transport growth from GDP growth has been achieved, to the extent that demand growth is slower than GDP growth, but this was also the case before 2001 and there is no clear evidence that the relationship between transport growth and GDP growth has changed. There are a number of reasons why greater decoupling has not been achieved, including greater demand for passenger and freight transport due to globalisation and EU enlargement.

1.55 In addition, the objective of modal shift towards rail transport has not been achieved. However, the relative decline of rail freight does appear to have stopped, and rail has achieved significant growth on specific corridors where there has been investment in high speed rail infrastructure. It is difficult to assess this in detail, because rail operators usually do not publish route-specific traffic statistics.

1.56 However, there has been some progress towards meeting the objective set in the Mid-Term Review of decoupling the growth of transport from its negative effects. This primarily reflects progress on fuel efficiency, particularly of road vehicles.

Nonetheless, overall greenhouse gas emissions from transport have increased due to rapid growth in road, air and sea traffic. A substantial reduction in transport emissions would require a shift away from fossil fuels, but there has been little progress on this and few indications that it will occur in the short to medium term.

*Contemporary developments*

1.57 Some preliminary developments to be mentioned are:

- **Local air quality**. The New Air Quality Directive introduced targets for particulate matter PM2.5 as from 2010. The Directive obliges EU Member States to reduce exposure to PM2.5 in urban areas by an average of 20% by 2020 based on 2010 levels, and to bring exposure levels below 20 micrograms/m3 by 2015 (or, by 2010 where possible).

- **Noise**. Several actions are likely to be taken. A legislative proposal on rail noise was attached to Green Package with the intent to provide a uniform legislative framework on EU corridors and to promote significant abatements in the short-medium term. Further actions might be necessary to limit noise at EU airports as the directive on aircraft noise (Directive 2002/30/EC) has had limited effects and predictions show that number of people affected by noise will continue to grow. In 2009 the Commission is going to assess the effects of the directive on environmental noise (Directive 2002/49/EC) and might consider revising it. In addition, a new legislation that would make tyres quieter and more energy efficient is currently under discussion at the European Parliament.

- **External costs and pricing**. A legislative proposal to amend the heavy goods vehicles charging directive (Eurovignette Directive) was attached to the Green Package [COM(2008)433]. The proposal would provide Member States a framework to better vary charges according to the local pollution (air and noise) and congestion that the particular vehicle causes at the time it is used. The Commission has made a proposal for a Council Directive on passenger car taxation which is currently before the Council and Parliament [COM(2005) 261 final]. A "Strategy for the internalisation of external costs" was endorsed last year by the European Commission [COM(2008) 435].

- **Aviation and climate change**. A Directive incorporating aviation into the EU emissions trading scheme (EU ETS) entered into force on the 2nd of February 2009, obliging Member States to put in place appropriate legislation within a year. The Directive aims to cap GHG emissions from the aviation sector to 3% below the 2004-2006 levels in 2012, increasing to 5% for the 2013-2020 period. It requires all flights landing or taking off from EU airports will have to buy GHG allowances under the bloc's cap-and-trade system under the new directive. Trading officially begins in 2012, while Member States have a year to transpose the Directive into national law.

- **Energy taxation Directive (2003/96)**: the Commission is currently reviewing this Directive to facilitate more targeted and coherent use of energy taxation by integrating notably energy efficiency considerations and environmental aspects.

- **Covenant of Mayors** will bring together mayors of pioneering EU cities with the aim of exchanging and applying good practices improving energy efficiency significantly in the urban environment, where local action is essential.

- **Research**: the Commission's Strategic Energy Technology plan identified the main challenges for the next 10 years in order to meet the 2020 emissions targets for greenhouse gas reductions, as well as to meet the 2050 vision of a reduction of these emissions by 60-80%. These included the following transport-related challenges:
  - making second generation bio fuels competitive alternatives to fossil fuels, while respecting the sustainability of their production;
  - bringing to mass market more efficient energy conversion and end-use devices and systems in transport, such as fuel cells;
  - achieving a breakthrough in the cost-efficiency of energy storage;
  - developing the technologies and create the conditions to enable industry to commercialise hydrogen fuel cell vehicles.

***Lessons learnt and going forward***

1.58 EEA projections show that, with the measures agreed or in the pipeline, transport sector emissions will increase, and so further actions need to be taken.

1.59 A mix of policy options is available to reduce fuel consumption by transport or to limit its negative impacts, in particular: by reducing transport demand, by a shift to more fuel efficient transport modes, by improving transport management, by increasing energy efficiency of vehicles and by using renewable fuels (e.g. biofuels, or fuel cell or electric vehicles powered by renewable fuels).

1.60 Improving energy efficiency offers an excellent opportunity for transport GHG mitigation through 2030 and the EU should build on what has been done in the research and development of cleaner fuels and vehicles, and strengthen its efforts to support the development and adoption of new cleaner technologies in transport market. Reducing unitary emissions by passenger kilometre of the different transport modes is one of the key strategies to tackle Climate Change, as highlighted by a recent report of the IPCC. A recent study commissioned by the UK Government[11] goes in the same direction and lists feasible actions in the short, medium and long term to deliver low carbon cars.

1.61 On the cleaner fuels issue, the Commission should also report on the phenomenon of indirect land use change due to biofuels production and consider taking actions to reduce the negative impacts it produces.

1.62 However, vehicle efficiency and better fuel quality can deliver some but not all of the objectives set for sustainable transport. Thus, the CTP should also take account of the growing understanding of the effectiveness of measures aimed at encouraging sustainable travel choices (which in the UK has been termed "smarter choices" measures), as recently highlighted also by a EEA report[12]. They include workplace and school travel plans; personalised travel planning; information and marketing; travel awareness campaigns; teleworking; teleconferencing and home shopping. A UK Government review of international experience of these measures demonstrated

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11 HM Treasury, 'The King Review of low-carbon cars', 2008.

12 EEA Technical report N. 12/2008. Beyond transport policy – exploring and managing the external drivers of transport demand.

that they can in combination can deliver reductions in peak period urban traffic of about 21% and nationwide reductions in all traffic of about 11%.

1.63 More emphasis could be put on the internalisation of transport externalities. In this area, the EU could also exploit the possibility to use economic tools such as pricing and taxation instruments, as they usually have the advantage of being more economically efficient than other instruments (such as standards). Some progresses in this direction are represented by the inclusion of aviation in the ETS and by the debate on the revision of the Eurovignette Directive. The adoption of a common EU environmental framework for road vehicles registration and/or annual circulation taxation could also bring significant results.

1.64 As recently pointed out by the IPCC report mentioned above, the demand for vehicles, vehicle travel and fuel use are significantly price inelastic. As a result, large increases in prices or taxes are required to make major changes in transport emissions, which could raise social and political concerns. Nevertheless, acceptance could be raised once these instruments are shown as “intermediate/emergency” tools to be used towards the adoption of cleaner technologies and energy sources.

1.65 Further actions to tackle maritime GHG emissions need also to be considered: up to now the IMO has failed once again to seriously address greenhouse gas emissions from ships, though it was given this task under the Kyoto protocol. The EU can take initiatives on this issue as done for the aviation sector.

1.66 Much scope for improvements exists also in the urban transport sector, especially to tackle air quality and noise issues. Until now the EU has supported the diffusion of best practices, the introduction of innovative solutions and the financing of investments. Yet, more actions can be taken in this area, still complying with the “subsidiarity” principle.

1.67 In a longer-term perspective, the integration of land use and transport planning is a crucial element to manage the demand for transport in Europe's towns and cities. Spatial planning can facilitate walking, cycling and the use of public transport for the majority of travel purposes, thereby reducing the negative impacts on the environment of private vehicle use and provide social and economic benefits.

1.68 Finally, the availability of reliable and up-to-date transport data is a crucial element to define transport strategy and take actions to achieve the objectives of the CTP. Yet, though significant progresses have been made in this direction (TERM indicators is the most valuable one), there is still an acute lack of data on which to base transport policy, except in a sub-set of Member States.

# APPENDIX

# A

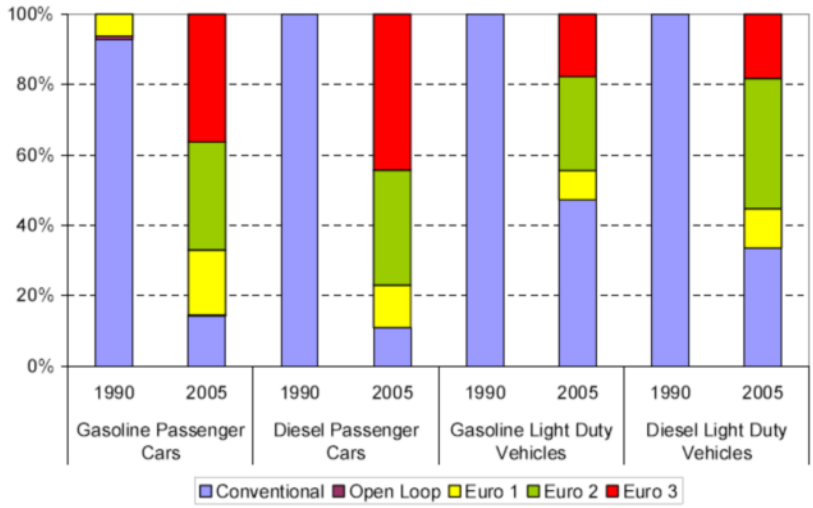
# ADDITIONAL QUANTITATIVE ANALYSIS

## A1. ADDITIONAL QUANTITATIVE ANALYSIS:

### *Euro emission standards*

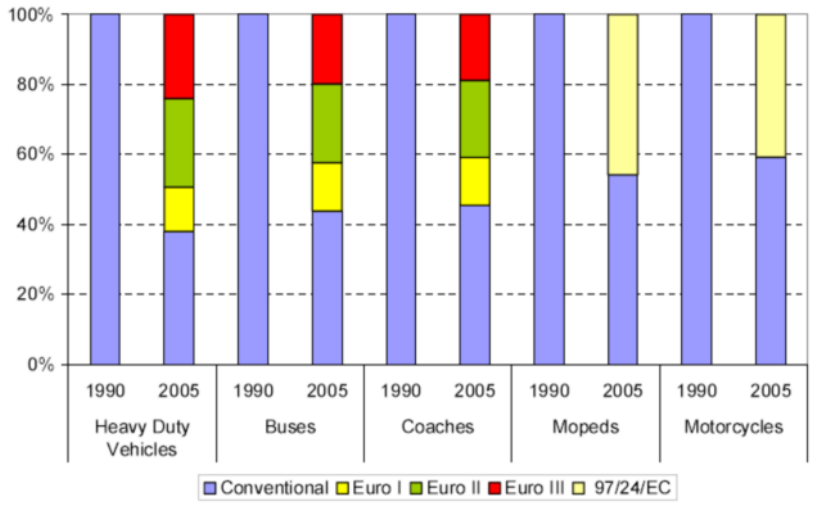
The following figures show an estimation of the composition of motor vehicles in the EU15 in 1990 and 2005, as reported by the EEA TERM 2006 N.34.

**FIGURE A1.1 ESTIMATED SHARE OF CONVENTIONAL, OPEN LOOP, EURO 1, EURO 2 AND EURO 3 GASOLINE AND DIESEL PASSENGER CARS AND LIGHT-DUTY VEHICLES IN THE EU15 IN 1990 AND 2005**



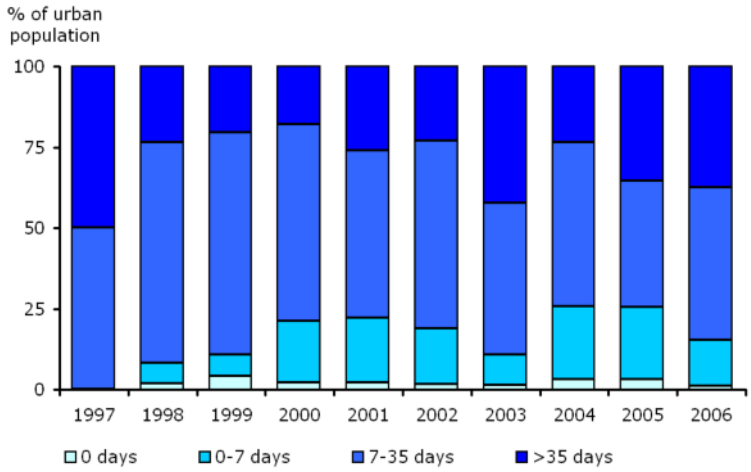

Source: EEA TERM 2006 34, Proportion of vehicle fleet meeting certain air and noise emission standards (by mode)

**FIGURE A1.2 ESTIMATED SHARE OF CONVENTIONAL, EURO I, EURO II AND EURO III HEAVY-DUTY VEHICLES, BUSES AND COACHES AND CONVENTIONAL AND 97/24/EC MOPEDS AND MOTORCYCLES IN EU15 IN 1990 AND 2005**



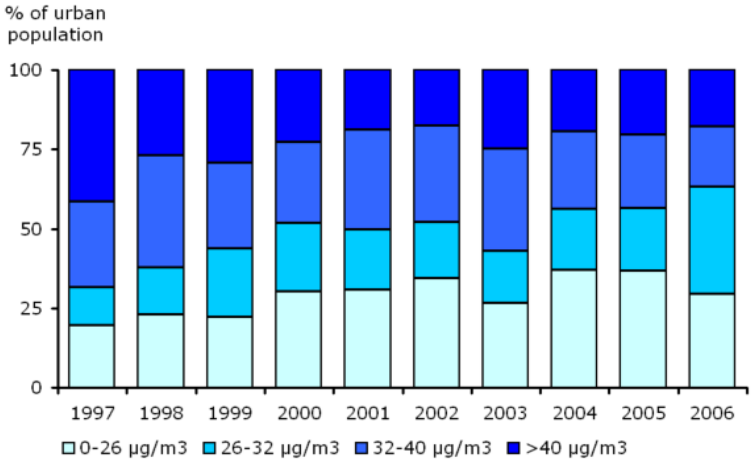

Source: EEA TERM 2006 34, Proportion of vehicle fleet meeting certain air and noise emission standards (by mode)

**FIGURE A1.3 PERCENTAGE OF POPULATION RESIDENT IN URBAN AREAS POTENTIALLY EXPOSED TO PM10 CONCENTRATION LEVELS EXCEEDING THE DAILY LIMIT VALUE, EEA COUNTRIES, 1997-2006**



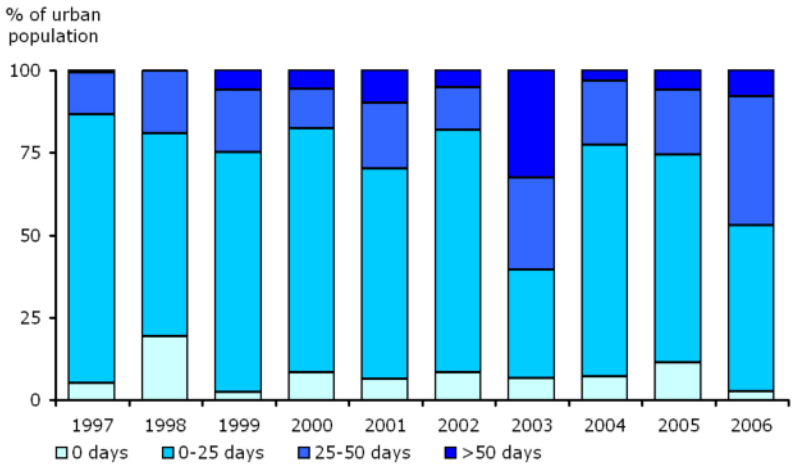

Source: CSI 004 - Exceedance of air quality limit values in urban areas, Dec 2008

**FIGURE A1.4 PERCENTAGE OF POPULATION RESIDENT IN URBAN AREAS POTENTIALLY EXPOSED TO NO2 CONCENTRATION LEVELS EXCEEDING THE ANNUAL LIMIT VALUE, EEA MEMBER COUNTRIES, 1997-2006**



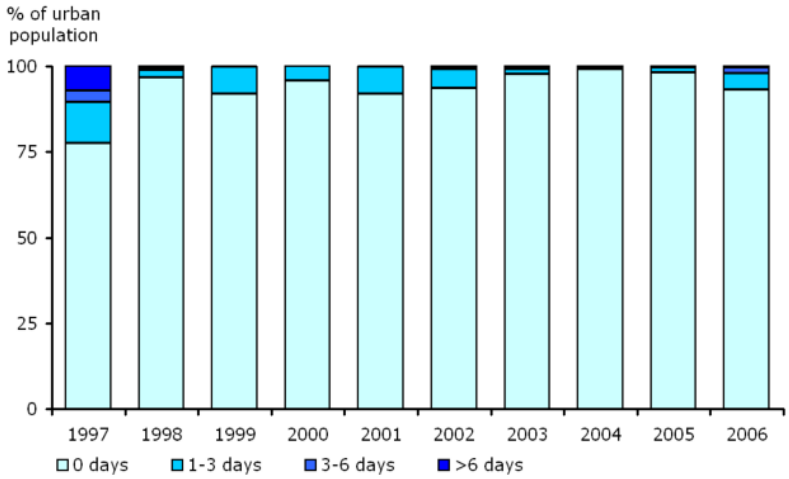

Source: CSI 004 - Exceedance of air quality limit values in urban areas, Dec 2008

**FIGURE A1.5 PERCENTAGE OF POPULATION RESIDENT IN URBAN AREAS POTENTIALLY EXPOSED TO O3 CONCENTRATION LEVELS OVER THE LONG-TERM OBJECTIVE FOR PROTECTION OF HUMAN HEALTH, EEA MEMBER COUNTRIES, 1997-2006**




Source: CSI 004 - Exceedance of air quality limit values in urban areas, Dec 2008

**FIGURE A1.6 PERCENTAGE OF POPULATION RESIDENT IN URBAN AREAS POTENTIALLY EXPOSED TO SO2 CONCENTRATION LEVELS EXCEEDING THE DAILY LIMIT VALUE, EEA MEMBER COUNTRIES, 1997-2006**



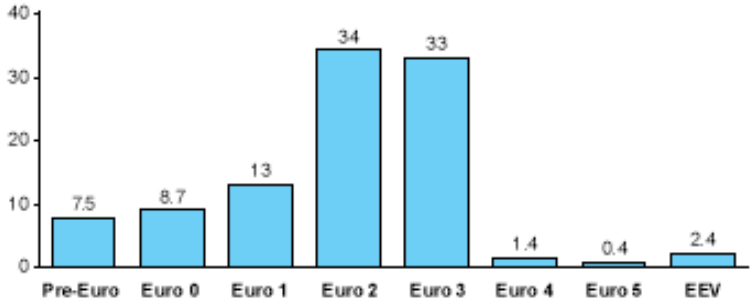

Source: CSI 004 - Exceedance of air quality limit values in urban areas, Dec 2008

***Promote the use of clean vehicles in urban public transport***

The UITP undertook a survey on the composition of the urban bus fleet in 171 cities of the European Union, whose results were published in 2007.

As shown by the following figures, in the sample, the most frequent bus categories are Euro 2 and Euro 3 which together represent 2/3 of the buses. Euro 2 is the most frequent standard in 11 countries, whereas Euro 3 is the most frequent in 8 countries. In most other countries, the most frequent category is of a lower Euro standard.

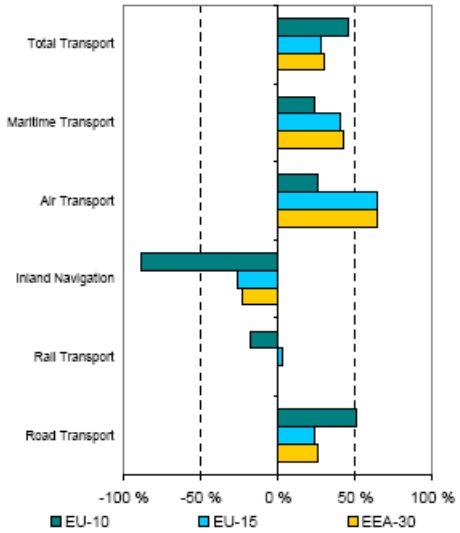
**FIGURE A1.7 DISTRIBUTION OF BUSES ACCORDING TO EURO STANDARD IN A SAMPLE OF EU27 CITIES (%)**




Source: UITP, Public Transport Statistics Report Issue

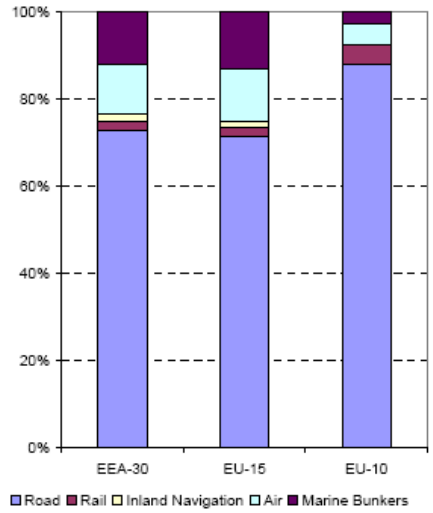
*Total energy consumption by transport mode and region*

**FIGURE A1.8 CHANGE IN FINAL ENERGY CONSUMPTION FROM 1991 TO 2004 BY TRANSPORT MODE**




Source: EEA TERM 2006, Transport final energy consumption by mode.

**FIGURE A1.9 DISTRIBUTION OF FINAL ENERGY CONSUMPTION OVER TRANSPORT MODES IN 2004**




Source: EEA TERM 2006, Transport final energy consumption by mode.

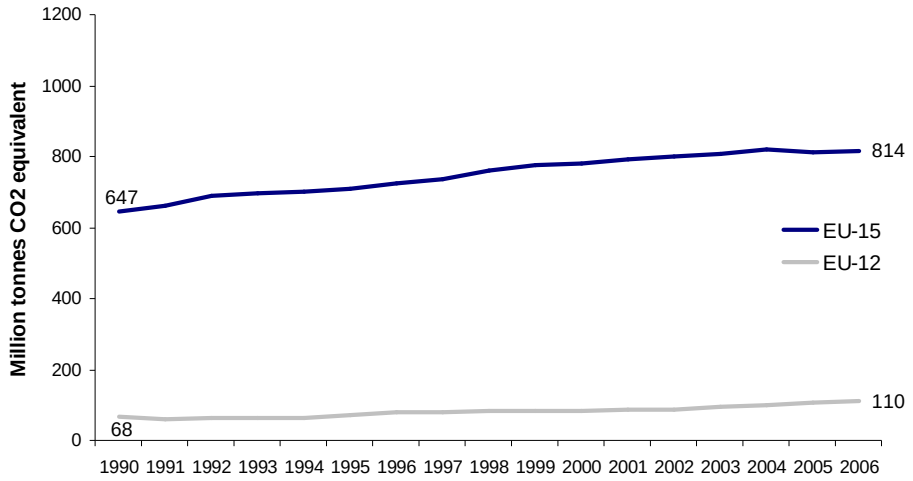
Road transport energy consumption has increased in both the old and new member states. According to TERM, in the EU15 this is mainly due to the fact car driving has become more affordable: consumer fuel prices have remained more or less on the level of 1990 through the 1990's, while incomes have increased in the same period.

In the new member states, west-European transport patterns have been adapted, increasing the demand for road fuel mainly for the following reasons: increase in demand for passenger transport affected by factors like development of housing far from city centers (urban sprawl) and poor quality public transport; changes in trade patterns, growth rates and mode of transport (a reconfiguration of trading patterns from eastward oriented - Russia - to westward oriented - Europe - and from bulk materials to manufactured goods led to an increase in the role of road transport, because road transport is flexible and the easiest mode to access European markets). However, the share of road transport is higher in the 10 new member states, as a result of the small share of air and sea shipping in transport energy consumption. Aviation generally is an expensive option for freight transport, and passenger aviation is not (yet) so much developed as in the EU-15 due to the less disposable income in the new member states. The low share of sea shipping for this region is geographically determined by general lack of coastal line.

***Reducing transport greenhouse gas emissions from road transport***

1.69 In 2006, in the EU-27, GHG emissions from road transport accounted for 71.3% of total GHG transport emissions, 88% of which were generated by EU-15.

**FIGURE A1.10 GHG EMISSIONS FROM ROAD TRANSPORT: EU-15 AND EU-12**

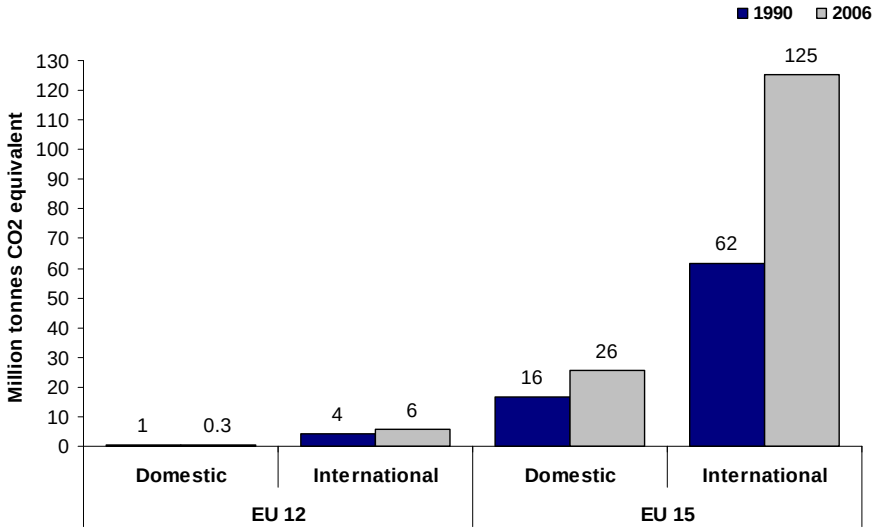



Source: Transport Statistical Pocketbook, 2009.

***Reducing transport greenhouse gas emissions from aviation***

1.70 In 2006, in the EU-27, GHG emissions from aviation accounted for 12.1% of total GHG transport emissions, 96% of which were generated by EU-15, in particular by international flights (whose emissions have doubled 1990 values).

**FIGURE A1.11 GHG EMISSIONS FROM AVIATION: EU-15 AND EU-12**

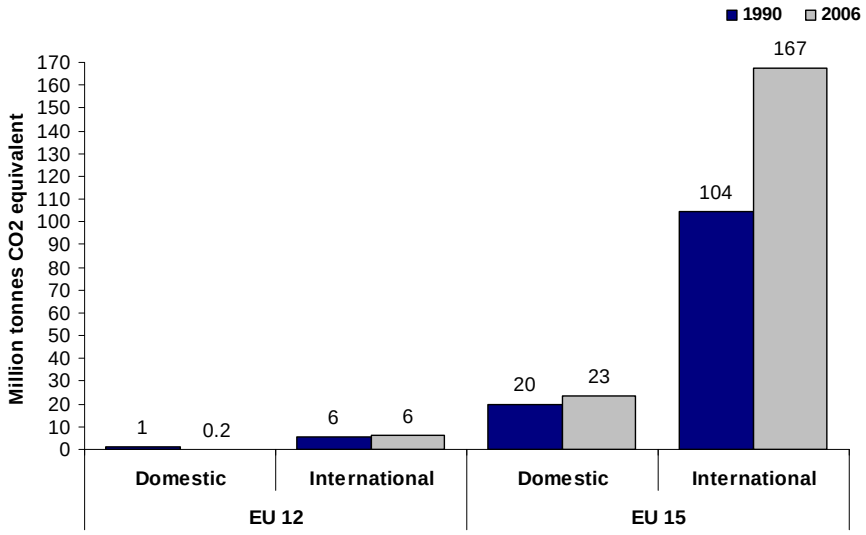



Source: Transport Statistical Pocketbook, 2009.

***Reducing transport greenhouse gas emissions from maritime***

1.71 In 2006, in the EU-27, GHG emissions from maritime transport accounted for 15.2% of total GHG transport emissions, 96.7% of which were generated by EU-15, in particular by international navigation (whose emissions at present are 60% above 1990 values).

**FIGURE A1.12 GHG EMISSIONS FROM MARITIME TRANSPORT: EU-15 AND EU-12**




Source: Transport Statistical Pocketbook, 2009.

### *EEA projections on EU-27 GHG emission reductions from transport*

The EEA estimated the ability of reaching the targets set for GHG emissions reduction through the measures currently available. In particular, three different 'targets' for the transport sector for 2020 have been investigated and reported in the table below. The targets are linked to the unilateral EU target of a 20% reduction and to the target band in the Bali roadmap (reached at the UNFCC meeting in Bali in December 2007) (25–40 %) in 2020, which brackets the position taken by the European Council that developed countries should reduce emissions by 30% in 2020. According to the EEA, in all the 'transport target' cases the transport measures agreed or in the pipeline fall short of delivering sufficient emission reductions. This explains why the agency calls for additional transport measures.

**FIGURE A1.13 EEA PROJECTIONS ON EU-27 GHG EMISSIONS REDUCTION**

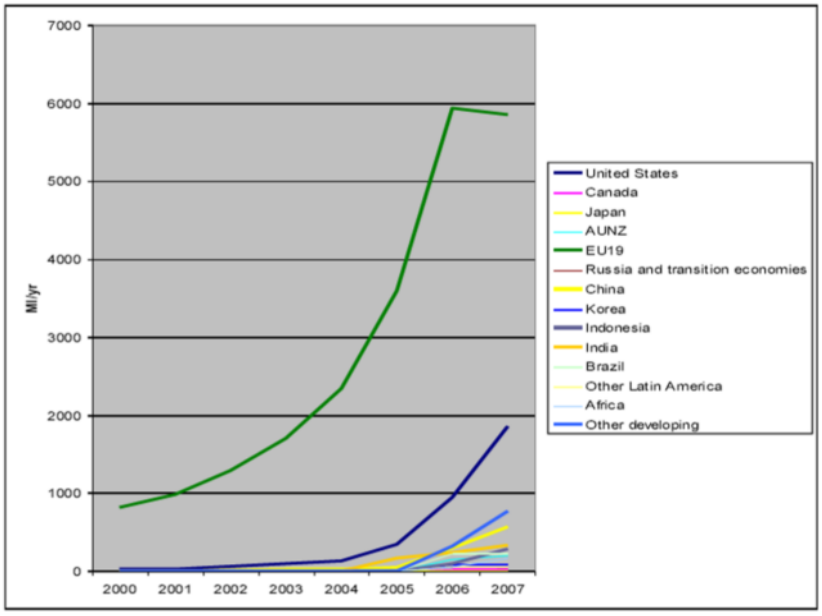
| **EU-27 greenhouse gas emission from transport (excl. air and maritime transport)** | | |
|---|---|---|
| 1990 emissions | 767 Mt $CO_2$-eq. | Reported emissions. |
| 2010 projections | 949 Mt $CO_2$-eq. | Projections made by EU Member States, taking the effect of existing and additional measures into account (EEA, 2007b). |
| 2020 projections | 1091 Mt $CO_2$-eq. | Assuming a 15 % growth in transport volume between 2010 and 2020 and no further reduction measures. This growth corresponds roughly to the annual growth rate in the period 1990–2005. |
| **Reduction measures agreed or under negotiation** | | |
| Amendment to Fuels Directive 98/70/EC | – 95 Mt $CO_2$-eq. | The proposed amendment foresees a reduction of life-cycle greenhouse gas emissions of about 10 % (compared to 2010) from gasoline and diesel production and use (92 % of total transport energy use). It does not cover vehicle efficiency.<br>Achievement of the 10 % biofuels target should deliver more than one third of the reduction. |
| Passenger vehicle efficiency legislation | – 125 Mt $CO_2$ eq | Assuming the proposed target of 130 g $CO_2$ per km in 2012 is met and that cars are replaced at the same rate as today, there will be an efficiency gain of 30 g $CO_2$ per km from current levels for the whole passenger vehicle fleet in. |
| **Additional emission reductions needed from supplementary measures to achieve indicative 2020 targets** | | |
| 2020 greenhouse gas emissions to meet 'energy package requirements' (825 Mt $CO_2$-equivalent) | – 50 Mt $CO_2$-eq. | A target of 825 Mt $CO_2$-equivalent is roughly equivalent to the target proposed in the energy and climate change package of an overall reduction in greenhouse gas emissions of 10 % from 2005 to 2020 for sectors outside the emission trading scheme, assuming an equal effort is made in all these sectors.<br>Aviation is excluded from these calculations as it is assumed that aviation will be part of the emission trading system. |
| 2020 greenhouse gas emissions to meet 'Bali roadmap lower end requirements' (767 Mt $CO_2$-equivalent) | – 105 Mt $CO_2$-eq. | A target of 767 Mt $CO_2$-equivalent is roughly equivalent to 25 to 30 % reduction in emission of greenhouse gases, depending on the allocation of reduction targets between sectors. This is the lower end of the target in the Bali roadmap.<br>Aviation is excluded from these calculations as it is assumed that aviation will be part of the emission trading system. |
| 2020 greenhouse gas emissions to meet 'Bali roadmap higher end requirements' (709 Mt $CO_2$-equivalent) | – 165 Mt $CO_2$-eq. | A target of 709 Mt $CO_2$-equivalent is roughly equivalent to 35 to 40 % reduction in emission of greenhouse gases, depending on the allocation of reduction targets between sectors. This is the higher end of the target in the Bali roadmap.<br>Aviation is excluded from these calculations as it is assumed that aviation will be part of the emission trading system. |

Source: EEA Report 1/2008, Climate for a transport change

### *Trends in biofuel production*

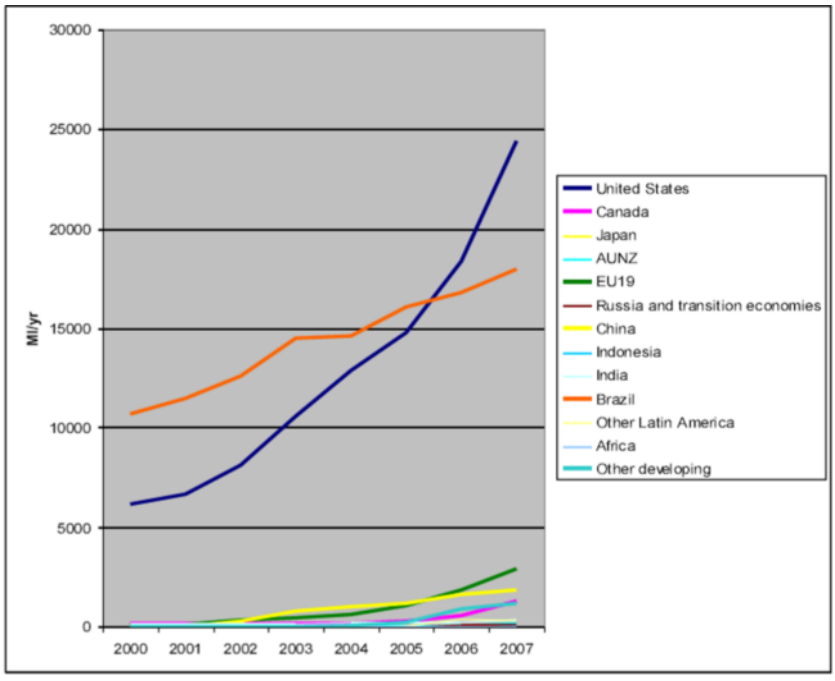
The EU is leading the world production of biodiesel, while other biofuels like ethanol are much less spread (differently from other countries like Brazil). Among EU Member States, Germany is the highest producer of biodiesel (and also the world's leading one), though recently a change in government policy to phase out excise tax exemptions for biodiesel due to the total cost has resulted in several plants closing.

**FIGURE A1.14 GLOBAL BIODIESEL PRODUCTION**



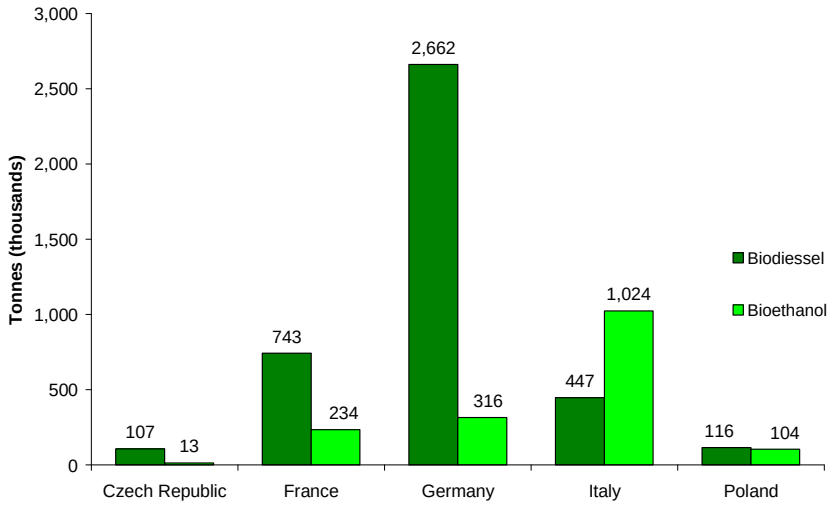

Source: IEA, From 1st to 2nd generation biofuel technologies, 2008

**FIGURE A1.15 GLOBAL BIOETHANOL PRODUCTION**




Source: IEA, From 1st to 2nd generation biofuel technologies, 2008

**FIGURE A1.16 BIOFUEL PRODUCTION FOR THE MAIN EU PRODUCERS IN 2006**




Source: EEA TERM 2008, Climate for transport change

***R&D in transport energy efficiency and in reduction of reliance on fossil fuels***

Hereafter significant achievements and ongoing initiatives relating to EU funded research programmes dealing with transport energy efficiency and reduction of reliance on fossil fuels are reported by mode of transport.

**TABLE A1.1 SIGNIFICANT ACHIEVEMENTS IN R&D IN TRANSPORT ENERGY EFFICIENCY AND IN REDUCTION OF RELIANCE ON FOSSIL FUELS**

| Mode | Results |
|---|---|
| **Aviation** | Past EU research programmes have supported a large number of relevant projects to tackle aviation emissions and this will continue in the 7th Research Framework Programme. The Clean Sky Initiative is certainly the most relevant one: it started in 2008, though calls have not been published yet, and is designed to demonstrate and validate the technology breakthroughs necessary to make major steps towards noise and emission reduction, as well as reduced fuel consumption. As such it should contribute to accelerating the introduction of green technologies in new generation aircraft. It will function as a Public Private Partnership with half of the €1.6 billion budget coming from EU funds and half from industry. In addition, approximately €1 billion will be dedicated to other collaborative research aimed to contributing to achieving reductions in fuel consumption (by hencing CO2 emissions by 50% per passenger kilometer) and NOX emissions (reduction target of 80% in landing and take-off according to ICAO standards and down to 5g/kg of fuel burnt in cruise). Other activities will be carried on within research on interoperability: the Atlantic Interoperability Initiative to Reduce Emissions (AIRE) aims to improve energy efficiency and reduce engine emissions by promoting the introduction of measures which are not currently allowed by existing air-traffic control methods. One of these measures is the introduction of continuous descent approaches that should allow to save between 200 and 400 kg of fuel per flight. |
| **Maritime** | FP6 assigned over €600 million of funding for marine related research under several thematic priorities such as “Environment”, “Sustainable Transport and Energy”, “Space”, “Biotechnology”, “Food Quality and Safety”, “International Cooperation” and “Research for Policy Support”. The WATERBORNE project is certainly one of the projects to be mentioned from FP6: an initiative of the Maritime Transport Community launched in 2005, it is a forum where all stakeholders from the waterborne (sea & inland) sector define and share a common medium and long term vision. This has produced a Vision 2020 document and a Strategic Research Agenda to turn the vision into reality. Under FP7, marine and maritime-related research topics are addressed in the following themes: "Food, Agriculture and Biotechnology", "Energy", "Environment", "Transport". Other marine and maritime-related topics are covered in the FP7 "Capacities" programme, in particular in relation to the "Region of Knowledge" initiative". To date (2007/2008) an estimated EC contribution of € 120 million has been allocated from FP7 to marine and maritime-related research projects |
| **Rail** | Research has been carried on also in the rail sector. For instance, the TRAINER project, aimed at encouraging train drivers to drive trains in a more energy efficient way. The project estimates that if the training programme were to be extended to all 150 000 EU train drivers, around 6.5 million tonnes of CO2 would be saved annually. |

| | |
|---|---|
| Road | The Commission is currently supporting a variety of research towards reaching the European Road Transport Research Advisory Council's research target of a 40% reduction in CO2 for new passenger vehicles by 2020 (i.e. 95g CO2/km). Some of the most relevant projects are: ECODRIVEN project, which aims to involve around 500 000 car, van, lorry and bus drivers in nine EU countries to optimise their driving behaviour from a safety and energy-efficient perspective. In so doing it aims to save 500 000 tonnes of CO2 and significant amounts of other emissions from road transport. The “Biofuels Cities" initiative supported Biofuel production and its use in captive fleets since early 2006 (and will run until the end of 2009). As part of the Intelligent Car Initiative the Commission is developing a methodology for measuring the impact of these ICT technologies on CO2. Once this is done it will develop an implementation plan for the most effective ICT technologies for vehicles. This could include promoting on-board technologies that provide drivers with real-time information about the road network and optimise a journey or the engine performance improving overall energy efficiency. The CLEVER (Compact Low-Emission Vehicles for urban transport) project has led to the development of a three-wheeled gas-powered prototype vehicle that carries two people in tandem, reaches almost 100 km/h and emits less than 60g/km of CO2.<br><br>A major hydrogen bus demonstration project (CUTE) will continue to demonstrate 27 hydrogen fuel cell buses and 14 new buses with hydrogen engines at seven locations in Europe and two in Australia and China. A new hydrogen fuel cell hybrid pre-commercial bus will be developed with much improved energy efficiency and emitting only water vapour. |