EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

CUTTING TRANSPORT CO_2 EMISSIONS

WHAT PROGRESS?

OECD

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EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT (ECMT)

The **European Conference of Ministers of Transport** (ECMT) is an inter-governmental organisation established by a Protocol signed in Brussels on 17 October 1953. It comprises the Ministers of Transport of 44 full Member countries: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, FRY Macedonia, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom. There are seven Associate member countries (Australia, Canada, Japan, Korea, Mexico, New Zealand and the United States) and one Observer country (Morocco).

The ECMT is a forum in which Ministers responsible for transport, and more specifically the inland transport, can co-operate on policy. Within this forum, Ministers can openly discuss current problems and agree upon joint approaches aimed at improving the use and ensuring the rational development of European transport systems.

At present, ECMT has a dual role. On one hand it helps to create an integrated transport system throughout the enlarged Europe that is economically efficient and meets environmental and safety standards. In order to achieve this, ECMT assists in building bridges between the European Union and the rest of the European continent at a political level. On the other hand, ECMT also develops reflections on long-term trends in the transport sector and, more specifically, studies the implications of globalisation on transport.

In January 2004, the ECMT and the Organisation for Economic Co-operation and Development (OECD) brought together their transport research capabilities by establishing the **Joint Transport Research Centre.** The Centre conducts co-operative research programmes that address all modes of inland transport and their intermodal linkages to support policy-making throughout Member countries.

Ministers at their Dublin Council in May 2006 agreed a major reform of ECMT designed to transform the organisation into a more global body dealing with all modes of transport. This new international transport forum will aim to attract greater attention to transport policy issues, and will hold one major annual event involving Ministers and key sectoral actors on themes of strategic importance.

Also available in French under the title:

Transports et émissions de CO_2

Quels progrès ?

Further information about the ECMT is available on Internet at the following address:

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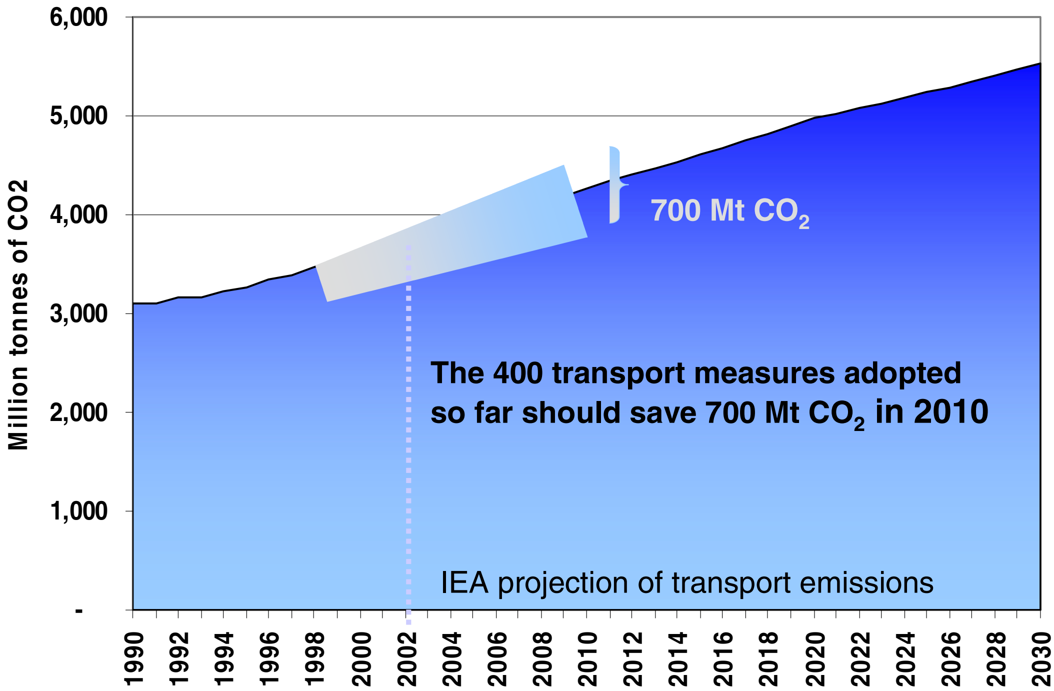
1. SUMMARY AND CONCLUSIONS

Introduction

This report reviews the progress ECMT and OECD countries have made in reducing transport sector CO_2 emissions and makes recommendations for the focus of future policies. National communications under the UN Framework Convention on Climate Change and other recent policy statements were used to assemble a database of over 400 abatement policies introduced or under development. This reveals that transport sector CO_2 emissions steadily increased over the last ten years despite significant efforts to cut them in some countries. Assuming real household disposable incomes continue to grow at a faster rate than the real cost of transport this trend is likely to continue. Slowing the growth of transport sector CO_2 emissions would require more government action and an increasingly pro-active role from transport sector industries in improving energy efficiency.

Figure 1.1. **OECD/ECMT transport sector emissions and the potential impact of policies identified**



Source: ECMT, based on World Energy Outlook 2004, IEA.

Analysis of the database suggests that measures so far adopted might cut 700 million tonnes from annual CO_2 emissions by 2010, just over half the projected increase in emissions between 1990 and 2010. The accompanying figure gives a crude indication of the significance of these savings, although some of the measures identified may have been included in the business as usual projection shown and the slope of the curve incorporating CO_2 savings is difficult to determine. Based on an analysis of the policies reported by national governments, official assessments of the effectiveness of national policies, and the more theoretical considerations examined in this report, the following conclusions are drawn.

How much should transport contribute

Cost-effectiveness (cost per tonne of CO_2 abated) is the fundamental determinant of which abatement policies to adopt and how much the transport sector should contribute towards economy-wide CO_2 abatement goals such as the 2008 – 2012 targets for Kyoto Protocol Annex I countries. It is important to achieve the required emissions reductions at the lowest overall cost to avoid damaging welfare and economic growth. Costs are minimised when the cost of saving an extra tonne of CO_2 is more or less equal for all measures in all sectors. Some of the potential measures for the transport sector have relatively low costs, others very high costs at the margin. This is also true of other sectors. By far the largest relatively low cost emission reductions are expected to be achieved in power and heat production. Transport and most other sectors are therefore expected to contribute correspondingly less to overall emissions reduction strategies. Nevertheless, the low cost transport sector measures identified below need to be implemented.

Cost- effectiveness

Carbon and fuel taxes are the ideal measures for addressing CO_2 emissions. They send clear signals and distort the economy less than any other approach. Fuel taxes already exist in all member countries and whilst changes in tax rates are sensitive politically, because they are highly visible, developing substitute policies usually increases costs significantly. Within the transport sector, policies currently tend to focus on some of the higher cost measures available, for example subsidies for biofuels, whilst some low cost measures are neglected. The focus should now switch to the lower cost options identified in the report submitted to Ministers, notably: regulation and labelling for some vehicle components, such as tyres, not included in standard tests of vehicle efficiency; support for eco-driving and for improved freight logistics; better use of differentiated vehicle taxes, particularly in markets where stringent but voluntary emissions standards apply; tightening of vehicle emissions standards in regions where they are relatively weak in order to benefit from the technology already developed for markets elsewhere; and as noted, fuel taxes.

Co-benefits

Many of the measures that reduce CO_2 emissions from transport are also sometimes proposed for improving the security of oil supply. Since road transport accounts for the largest part of oil product consumption in the economy such oil security measures focus increasingly on road vehicles and alternative fuels (notably biofuels and hydrogen). Some policies pursued primarily for mobility goals – congestion management and access to public transport for the purpose of social inclusion – can also yield CO_2 emissions reductions. Prioritising policies that yield co-benefits makes sense but is not a reason to ignore cost-effectiveness.

Fuel efficiency delivers most

The largest CO_2 abatement opportunities in the transport sector lie in initiatives to improve energy efficiency: improving the rated fuel efficiency of new vehicles as measured by vehicle certification testing; improving the efficiency of components and accessories not covered in current test procedures; and improving on-road vehicle performance. The most cost effective options include promoting fuel-efficient driving through training and feedback instrumentation, incentives for car buyers to chose lower emissions vehicles where stringent but voluntary emissions targets have been agreed with car manufacturers, and regulations for some currently unregulated vehicle components. No country has exploited all of the opportunities available. There is an optimal rate for improvements in energy efficiency, not easy to determine as the costs of the technology available are difficult to estimate – they generally start high and come down over time. Determining the appropriate level and rate of tightening for vehicle emissions standards is therefore complicated. Regulations for currently unregulated components could however steer the market to greater fuel economy at very little cost, for example by promoting the best performing tyres among those already available.

Differentiation of vehicle taxes top priority for Europe

Reform of vehicle taxation (purchase, registration and annual circulation taxes), so that it is based on a vehicle's specific CO_2 emissions and strongly differentiated, should be a top priority in Europe. This will maximise the abatement potential of existing voluntary CO_2 emission targets. Governments that have already differentiated taxation in this way are recommended to evaluate the effectiveness of their measures with a view to providing stronger incentives covering a broader range of the better performing vehicles (not just ultra low emission vehicles) to encourage sufficient numbers of consumers to purchase more efficient vehicles. Basing differentiation directly on CO_2 emissions in place of proxies such as engine size is also recommended.

Vehicle components

Vehicles components that are not tested for efficiency in certification procedures, such as tyres, air conditioners, alternators, lubricants and lights should be tested and labeled. There are large differences in efficiency between equivalent components currently on the market. Regulatory standards can be designed to steer consumers and manufacturers to the better performing components at low cost and can be designed also to promote technological improvement. An industry proposal for standards for energy efficient tyres is provided in the report submitted to Ministers. Tax incentives can be used to complement standards and can also be used to promote the uptake of non-standard equipment designed to improve fuel efficiency such as tyre inflation monitoring systems.

Fuel-efficient driving and logistics

Initiatives to promote fuel efficient driving, particularly through training programmes for both car and truck drivers offer significant cost-effective savings. In the freight sector these initiatives can usefully be coupled with voluntary programmes to improve both logistic organisation and driver behaviour. (Electronic km-charges for road use by trucks also provide strong incentives for more efficient logistic organisation – see below). For cars, tax incentives for fitting fuel efficiency feedback devices such as econometers and shift indicator lights proved highly effective in an extensive Dutch programme at the beginning of the decade.

Vehicle fuel efficiency standards

The USA, Japan and China regulate passenger car fuel efficiency, and Japan also regulates heavy duty vehicle fuel economy. The EU and its Member States together with Switzerland, Australia and Canada all employ voluntary targets for car manufacturers and importers. Japan has by far the most ambitious regulatory standards, but the EU voluntary targets are of a similar order. US standards are far less ambitious, with the exception of the new standards adopted by California in 2006. Regulatory and voluntary targets will need to be progressively tightened to maintain their value. Clearly the weaker targets can be brought closer to the tighter existing targets, despite differences in the types of vehicles on sale in each market. There will also be scope for tighter targets and standards in Europe and Japan as technology improves. The issue is the appropriate time scale for achieving new standards. Any tightening of targets in Europe should, however, go hand in hand with more differentiation of vehicle taxes, as set out in the 1995 Joint Declaration between ECMT, OICA and ACEA on CO_2 emissions from new passenger cars.

Heavy duty vehicles

Few governments have targeted the fuel efficiency of light and heavy trucks with these policies. For heavy duty vehicles, fuel is a major item in operating costs and fuel efficiency is therefore an important factor in the choice of vehicles purchased. The market thus already drives improvements but the smaller operators face cash flow and other constraints that limit their ability to respond to fuel price signals. Because a substantial and growing proportion of transport CO_2 emissions are accounted for by trucks, Japan began regulating emissions from heavy duty vehicles in 2006. All governments are encouraged to monitor the costs and benefits of the Japanese standards to determine if a similar approach would bring benefits in other countries.

Vans

Fuel accounts for a smaller proportion of overall costs in operating light commercial vehicles. A number of Governments have adopted standards for the fuel efficiency of government owned vehicles and the US has extended CAFÉ standards to light trucks. There may be an opportunity to target a larger number of vehicles by extending voluntary and regulatory standards in other countries to all light commercial vehicle models. A voluntary agreement with manufacturers in this respect was identified as a priority under the first European Climate Change Programme in 2000 but has not so far been developed.

Biofuels

Policies to promote biofuels are prominent in national emissions abatement strategies. Biofuels offer potentially significant CO_2 abatement opportunities but, with the exception of ethanol from sugar cane, most research concludes that the cost per tonne of CO_2 saved is high. The next generation of biofuels, utilising cellulose and lignin rather than just sugars and oils to produce fuels, may offer higher levels of abatement at lower cost although much uncertainty remains. Government support for research and development is indicated for the development of second generation fuels and, given the divergence of views on the cost effectiveness of all biofuels revealed during debate in the 2006 ECMT Council Session, it would be useful to prepare a more complete examination of estimates for the cost effectiveness of biofuels produced in OECD, ECMT and developing countries.

Support for biofuels

Government incentives for biofuels should be tied to well-to-wheels CO_2 efficiencies. Thus preferential tax rates, subsidies and quotas for biofuel blending should be calibrated to the benefits in terms of net CO_2 savings associated with each fuel. Development of an index of CO_2 savings by fuel type would be useful and if agreed internationally could help liberalise markets for new fuels.

Indexing incentives would also help avoid discrimination between feedstocks. Subsidies that support production of specific crops risk being counterproductive to emissions policies in the long run. It should also be noted that biofuels of all types yield the largest and most cost effective CO_2 emissions reductions when the biomass from which they are produced is employed to displace electricity production from fossil fuels, rather than transport fuels which require secondary processing.

Hydrogen

Hydrogen fuelled transport technologies attract significant research and development funds but they are not a CO_2 abatement policy option for the short or medium term. Hydrogen has to be produced using non fossil fuels (nuclear electricity, biomass or other renewable power) if it is to achieve CO_2 abatement. As with biofuels, abatement is maximised when these energy sources are employed directly for displacement of fossil fuelled electricity generation.

Policy mix

Examination of policies for CO_2 emissions reduction in the transport sector so far adopted by OECD/ECMT governments, in terms of the number of policies being pursued, reveals that countries place improving fuel efficiency and modal shift on an equal footing. Policies to promote alternative fuels have also been given a prominent role, while reducing demand for transport is largely ignored.

Modal shift

The large number of modal shift policies is believed to be the result of following a “co-benefits” approach to CO_2 abatement policy. That is, governments have selected abatement policies that also contribute to the achievement of other transport policy goals or wider objectives beyond the transport sector. This includes providing access to low cost public transport and reducing congestion. This is a valid approach to public policy and, indeed, was part of the recommendations of ECMT’s 1997 review of CO_2 emissions from transport. The present situation may, however, reflect an over-emphasis on the co-benefits approach. Modal shift policies are usually weak in terms of the quantity of CO_2 abated and have generally been inadequately assessed in national communications on CO_2 emissions policy. Modal shift measures can be effective when well targeted, particularly when integrated with demand management measures. They can not, however, form the corner-stone of effective CO_2 abatement policy and the prominence given to modal shift policies is at odds with indications that most modal shift policies achieve much lower abatement levels than measures focussing on fuel efficiency.

Core inland transport policies

It is therefore recommended that policies now focus on fuel-efficiency: for vehicles, vehicle components and on-road vehicle operation. Policies to promote alternative fuels carry a high cost and a modal shift, co-benefits dominated approach appears unlikely to achieve sufficient abatement in the transport sector. Whenever additional opportunities to reduce CO_2 emissions from the transport sector are sought, a first step should be to investigate whether the potential for improved fuel efficiency has been fully exploited, including through the use of fuel and carbon taxes.

Fuel taxes and emissions trading

Fuel tax increases and specific fuel carbon taxes are estimated to have had a powerful impact on emissions in the small number of countries reporting them as part of CO_2 policy, though of course all member governments employ fuel taxes to raise revenues. They have the highest impact of any of the reported CO_2 abatement measures. Political sensitivities currently prevent many countries from using fuel taxes to influence CO_2 emissions, despite their effectiveness. The potential of this approach needs to be kept under review, particularly as implementation costs are much lower than for substitute approaches, including schemes that trade emission permits.

Road pricing

The official estimates for the impact of the electronic truck km-charges introduced in Europe and the London Congestion Charge suggest they have significantly reduced emissions. Truck km-charges provide strong incentives to rationalise distribution systems and logistic organisation. Electronic charging for road use is expected to spread, albeit with the primarily aim of ensuring foreign vehicles contribute to road costs and managing congestion.

Traffic management and urban planning

Traffic management measures including congestion charges, traffic guidance systems and parking policies have an influence on CO_2 emissions but are not generally reported by national governments to be part of their CO_2 emissions policies. The same is true of efforts to integrate spatial planning with transport policy, which is fundamental to managing traffic growth without restricting the access to services that mobility provides. This appears mainly to be a consequence of the division of responsibilities between central and local government. Analysis to clarify the potential role for local government policies in reducing CO_2 emissions from transport appears warranted, even though fuel efficiency should remain the primary focus of national policy.

Walking and cycling

Policies towards walking, cycling and improving the urban environment to make non-motorised modes of transport safer, quicker and more attractive, are also neglected in national CO_2 policy reporting. They are an important part of policies to manage the demand for motorised transport and therefore influence CO_2 emissions. A small number of national governments do provide support to local governments to promote walking and cycling and include this support in reports on national CO_2 policies.

Maritime shipping

While shipping emits relatively low emissions of CO_2 per tonne km transported, ships nonetheless emit significant quantities of CO_2. Delegation of responsibility for reducing emissions to the UN International Maritime Organisation has not yielded many results so far, although guidelines on CO_2 indexing were agreed in 2005, incorporating both operational and ship design factors. Negotiations in the IMO have not yet begun to look at potential measures for reducing emissions cost effectively. It is recommended that maritime countries consider policy measures to reduce unitary CO_2

emissions from ships, building on the IMO CO_2 index. Harbour or fairway fees differentiated to promote the use of efficient engines are the tools most readily available.

Aviation

Aviation faces a similar situation. The UN International Civil Aviation Organisation was delegated responsibility for developing policies to reduce emissions from international aviation under the Kyoto Protocol. The difficulty of attributing these emissions to specific countries means they are not counted as part of national greenhouse gas inventories. So far ICAO member countries have not been able to agree on any concrete greenhouse gas abatement policies. They have, however, endorsed the concept of an open, international emissions trading system implemented through a voluntary scheme, or incorporation of international aviation into existing emissions trading systems. The European Commission has adopted a Communication indicating that it considers the incorporation of aviation into the European Union Emissions Trading System to be the best way forward. It aims to make a legislative proposal by the end of 2006. The total amount of allowances to be allocated to the aviation sector and the method for allocating allowances between operators will be key aspects in determining the effectiveness of emissions trading for reducing CO_2 emissions from aviation. A fuel tax (or CO_2 differentiated landing or km charge) would be less costly to operate and avoid problems in determining the initial allocation of permits.

Short and long term strategy

For the short and medium term, policies that target fuel efficiency offer most potential for reducing CO_2 emissions. The most effective measures available include fuel taxes, vehicle and component standards, differentiated vehicle taxation, support for eco-driving and incentives for more efficient logistic organisation, including point of use pricing for roads. For the long term, more integrated transport and spatial planning policies might contain demand for motorised transport. Ultimately higher cost energy sources, including clean energy carriers such as hydrogen and electricity, produced from renewable energy sources or from fossil fuels with carbon sequestration and storage, will be required if there are to be further cuts in transport sector CO_2 emissions. Major R&D programmes will be required to bring these technologies to commercial viability.

2. INTRODUCTION

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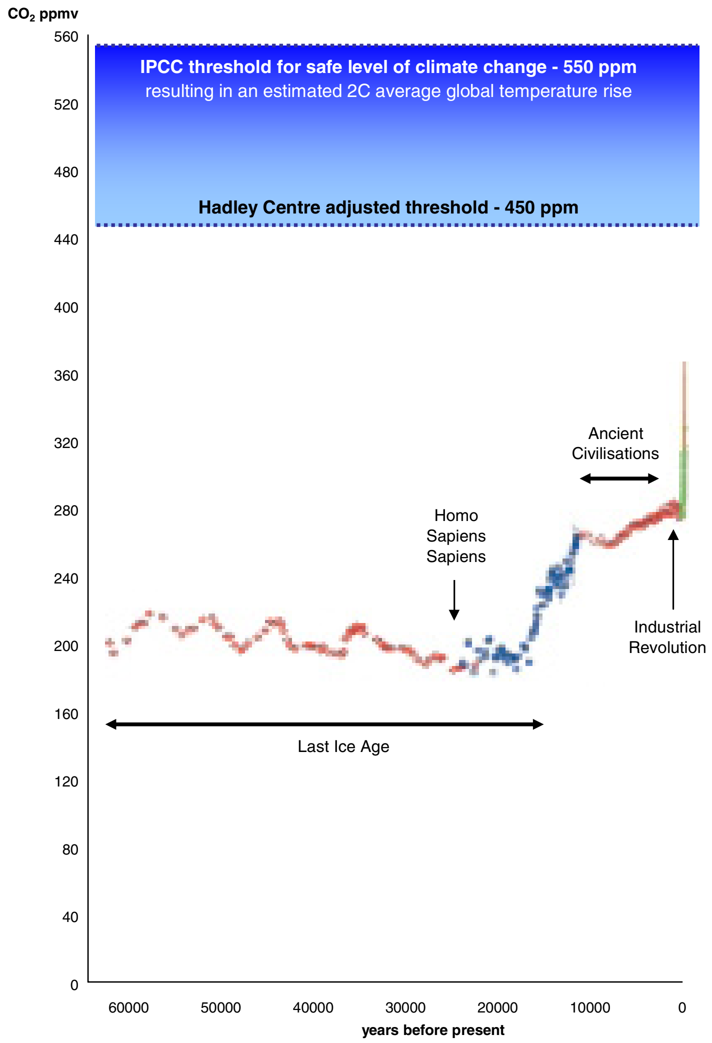
2.1 Climate change

If emissions of greenhouse gases, and in particular CO_2, continue unabated the enhanced greenhouse effect may alter the world's climate system irreversibly. According to the Inter-governmental Panel on Climate Change[1] (IPCC) an increase of more than two degrees Celsius in the global average surface temperature has the potential to cause significant damage to the eco-systems on which we are directly dependent.

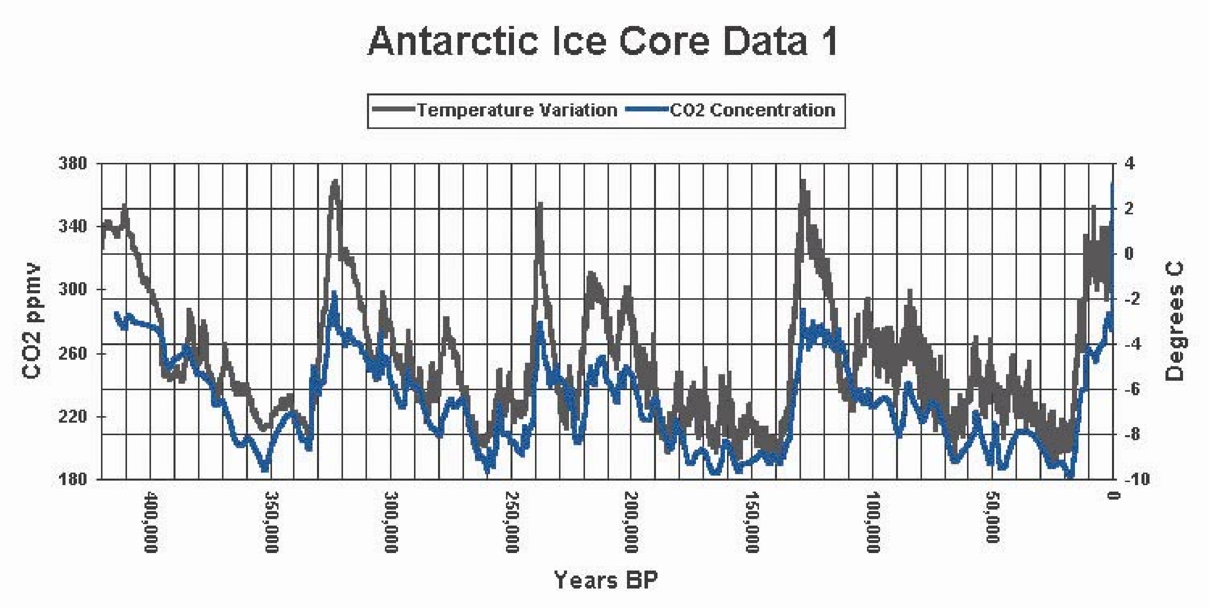
Figure 2.1. **Atmospheric carbon dioxide concentrations over the last 60 000 years**



Source: School of Environmental Science, UEA.

Trends in atmospheric CO_2 concentrations and temperatures are shown in figures 2.1 and 2.2. CO_2 concentrations are now at levels never recorded in over half a million years. This makes it difficult to predict the impact on climate. CO_2 levels will continue to rise and appear likely to overshoot the IPCC threshold by a considerable margin.

Figure 2.2. **Variations in temperature and atmospheric CO_2 concentrations over the last half million years**



Source: Historical Carbon Dioxide and Isotopic Temperature Records from Vostik Ice Cores, J.M. Barnola, D. Raynaud, C. Lorius, Laboratoire de Glaciologie et de Géophysique de l'Environnement, CNRS, France, and N.I. Barkov, Arctic and Antarctic Research Institute, Russia, http://cdiac.esd.ornl.gov/trends/co2/vostok.htm, http://cdiac.esd.ornl.gov/trends/temp/vostok/jouz_tem.htm

The global average surface temperature has increased by approximately 0.7°C since systematic measurements began around 1850. Establishing how much of this is due to greenhouse gas emissions, and how much the global average surface temperature can increase before unacceptable impacts occur, is an extremely complex task. It is not the role of this report to examine such calculations. Instead it takes politically agreed targets as the starting point for its analysis, for example the European Union's indicative long-term global temperature target of not more than 2°C above pre-industrial levels.[2] Estimates of the reduction in greenhouse gas emissions needed to meet this target range from 15 to 50% below 1990 levels by 2050.[3] To meet such targets, concerted action to reduce greenhouse gas emissions is urgently required and progress has indeed started.

2.2 The international policy context

In order to address anthropogenic effects on climate, the international community established the United Nations Framework Convention on Climate Change (UNFCCC) in May 1992. The Convention, which entered into force on 21 March 1994, has the following objective:

> *"…to achieve … stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system … within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."*[4]

With the accession of Turkey in 2004, all ECMT Member and Associate Member countries are now members of the UNFCCC and share this goal.

At the 3rd meeting of UNFCCC member countries in Kyoto, in 1997, international agreement was reached on a mechanism to reduce emissions of greenhouse gases in developed countries. Known as the Kyoto Protocol, the agreement's primary function is to establish targets for the reduction of emissions relative to 1990 levels in a so-called first commitment period between 2008 and 2012.

The Protocol became legally binding on 16 February 2005 after more than 55 Parties to the Framework Convention had ratified it, including sufficient industrialised countries listed in the Convention's Annex I to encompass 55% of that group's 1990 CO_2 emissions. 34 ECMT Member and Associate Member countries are now bound by challenging emissions targets.

A group of countries in the Asia- Pacific region, some signatories and some non-signatories to the Kyoto Protocol, launched a complementary initiative in 2005, the Asia-Pacific Partnership for Clean Development and Climate, designed also to contribute to the UNFCCC. This is intended to promote technology exchange but does not set targets.

A number of Governments are examining targets for periods beyond the Kyoto Protocol's first commitment period, many following an approach coined *containment and convergence*. This implies setting lower targets to contain emissions in developed countries and taking measures, including technology transfer, to foster economic growth at the same time as attenuating growth in CO_2 emissions in developing countries. The European Union has begun to set targets for this period, with Heads of State agreeing a flexible target band for 2020 but delaying agreement on proposed targets for 2050 until other developed countries set targets and developing countries make commitments with the EU under a *convergence* approach. Signatories to the UNFCCC agreed to start work on commitments for the post-Kyoto period (beyond 2012) when they met at the 11th Conference of the Parties in Montreal in December 2005.

Transport sector climate change policy was addressed explicitly at the 2005 G8 Summit in Gleneagles. The following agenda for surface transport was set out, with the nation's leaders pledging to encourage the development of cleaner, more efficient and lower-emitting vehicles, and pledging to promote their deployment, by[5]:

- "Adopting ambitious policies to encourage sales of such vehicles in our countries, including making use of public procurement.

- Reviewing existing standards for vehicle efficiency and identify best practice.

- Encouraging research, development and deployment in areas including cleaner gasoline and diesel technologies, biofuels, synthetic fuels, hybrid technology, battery performance and hydrogen powered fuel cell vehicles.

- Raising consumer awareness of the environmental impact of their vehicle choices, including through clear and consistent labelling for relevant energy consumption, efficiency and exhaust emissions data, and encouraging the provision of clearer information on the result of driving behaviour and choices for mode of transport."

The leaders also undertook to expand on these ideas at a conference on Environmentally Friendly Vehicles held in Birmingham in November 2005. This concluded that Governments have a responsibility to set the strategic direction for the development of environmentally friendly vehicles, requiring the implementation of integrated solutions that encompass vehicles, fuels, fiscal and tax systems. Japan's taxation framework and car labelling scheme was identified as an example for others to follow[6].

Table 2.1. **Kyoto Protocol: OECD and ECMT Member country commitments and Annex 1 country targets**

Country *** Annex 1 countries**	**Kyoto Protocol entered into force?**	**Commitment (percentage of base year**)**	**Member State targets under EU burden sharing agreement**
Albania	Yes		
Armenia	Yes		
Australia*	No	108	
Austria*	Yes	92	87
Azerbaijan	Yes		
Belarus*	Yes		
Belgium*	Yes	92	92.5
Bosnia-Herzegovina	No		
Bulgaria*	Yes	92	
Canada*	Yes	94	
Croatia*	No	95	
Czech Republic*	Yes	92	
Denmark*	Yes	92	79
Estonia*	Yes	92	
*European Community**	Yes	92	92
Finland*	Yes	92	100
France*	Yes	92	100
FYR Macedonia	Yes		
Georgia	Yes		
Germany*	Yes	92	79
Greece*	Yes	92	125
Hungary*	Yes	94	
Iceland*	Yes	110	
Ireland*	Yes	92	113
Italy*	Yes	92	93.5
Japan*	Yes	94	
Korea	No		
Latvia*	Yes	92	
Liechtenstein*	Yes	92	
Lithuania*	Yes	92	
Luxembourg*	Yes	92	72
Malta	Yes		

Mexico	Yes		
Moldova	No		
Monaco*	Yes	92	
Netherlands*	Yes	92	94
New Zealand*	Yes	100	
Norway*	Yes	101	
Poland*	Yes	94	
Portugal*	Yes	92	127
Romania*	Yes	92	
Russian Federation*	Yes	100	
Serbia and Montenegro	No		
Slovakia*	Yes	92	
Slovenia*	Yes	92	
Spain*	Yes	92	115
Sweden*	Yes	92	104
Switzerland*	Yes	92	
Turkey*	No	-	
Ukraine*	Yes	100	
United Kingdom*	Yes	92	87.5
United States*	No	93	

** 1990 except for Bulgaria (1988); Hungary (1985-87); Poland (1988); Romania (1989).

Sources:
UNFCCC° www.unfccc.int/essential_background/kyoto_protocol/items/3145.php;

EC °www.europa.eu.int/rapid/pressReleasesAction.do?reference=MEMO/02/120&format=HTML&aged=0&language=EN&guiLanguage=en.

Table 2.2. **EU CO_2 Emissions Reduction Targets**

EU Targets	Status
• 8% in first containment period	Kyoto protocol commitment
• 15 – 30% by 2020	Proposed by March 2005 Council of Environment Ministers, endorsed by March 2005 Summit of EU Heads of Government subject to positive cost-benefit and assessment
• 60 – 80% by 2050	March 2005 Council of Environment Ministers position, not endorsed by Heads of Government

2.3 Transport sector CO_2 emissions

CO_2 emissions from the transport sector attract the attention of both transport and climate change policymakers because of their share of overall emissions and their persistently strong growth.

According to the International Energy Agency[7] between 1990 and 2003, world CO_2 emissions from fuel combustion across all sectors increased by 4 360 million tonnes (21%). For OECD countries the increase was 1 850 million tonnes (16%), with annual growth rates averaging 1.2%. Annual growth rates were quite variable over this timeframe (between -0.25 and +3.4%). There is no discernable trend downward in the growth rates that might have indicated that CO_2 emissions were reaching a peak. Emissions from the OECD-ECMT region account for 62% of worldwide CO_2 emissions.

Transport sector emissions grew 1 412 million tonnes (31%) worldwide between 1990 and 2003, and increased 820 million tonnes (26%) in OECD countries. The OECD-ECMT region accounts for 71% of worldwide CO_2 emissions from transport.

Table 2.3 **CO_2 Emissions from fuel combustion (million tonnes of CO_2)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	% of world emissions in 2003
World	20 624	20 881	21 051	21 183	21 334	21 791	22 500	22 651	22 723	22 846	23 391	23 545	23 996	24 983	100
OECD/ECMT			14 555	14 451	14 292	14 375	14 705	14 749	14 724	14 821	15 171	15 146	15 224	15 509	62
OECD	11 407	11 450	11 528	11 627	11 824	11 945	12 352	12 533	12 564	12 668	12 978	12 931	13 019	13 257	53
Other ECMT			3 028	2 824	2 468	2 430	2 353	2 216	2 160	2 152	2 192	2 215	2 205	2 252	9
Rest of World			6 496	6 732	7 042	7 416	7 795	7 901	7 999	8 025	8 220	8 399	8 773	9 474	38

Note: All figures include international aviation and international maritime shipping.

Source: IEA (2005) CO_2 Emissions from Fuel Consumption.

Table 2.4 **Transport Sector CO_2 Emissions from Fuel Combustion (million tonnes of CO_2)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	% of world emissions in 2003
World	4 528	4 655	4 747	4 785	4 885	5 020	5 146	5 266	5 416	5 573	5 666	5 679	5 803	5 940	100
OECD/ECMT			3 611	3 604	3 657	3 719	3 800	3 855	3 956	4 055	4 110	4 100	4 176	4 242	71
OECD	3 116	3 122	3 212	3 266	3 359	3 440	3 527	3 591	3 668	3 773	3 838	3 814	3 881	3 936	66
Other ECMT			399	338	298	279	273	264	289	281	272	287	295	306	5
Rest of World			1 135	1 181	1 228	1 301	1 346	1 411	1 459	1 519	1 556	1 579	1 627	1 698	29

Note: All figures include international aviation and international maritime shipping.

Source: IEA (2005) CO_2 Emissions from Fuel Consumption.

Table 2.5 **Transport's Share of CO_2 Emissions from Fuel Combustion**

Region	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
World	22%	22%	23%	23%	23%	23%	23%	23%	24%	24%	24%	24%	24%	24%
OECD/ECMT			25%	25%	26%	26%	26%	26%	27%	27%	27%	27%	27%	27%
OECD	27%	27%	28%	28%	28%	29%	29%	29%	29%	30%	30%	29%	30%	30%
Other ECMT			13%	12%	12%	11%	12%	12%	13%	13%	12%	13%	13%	14%
Rest of World			17%	18%	17%	18%	17%	18%	18%	19%	19%	19%	19%	18%

Source: IEA (2005) CO_2 Emissions from Fuel Consumption.

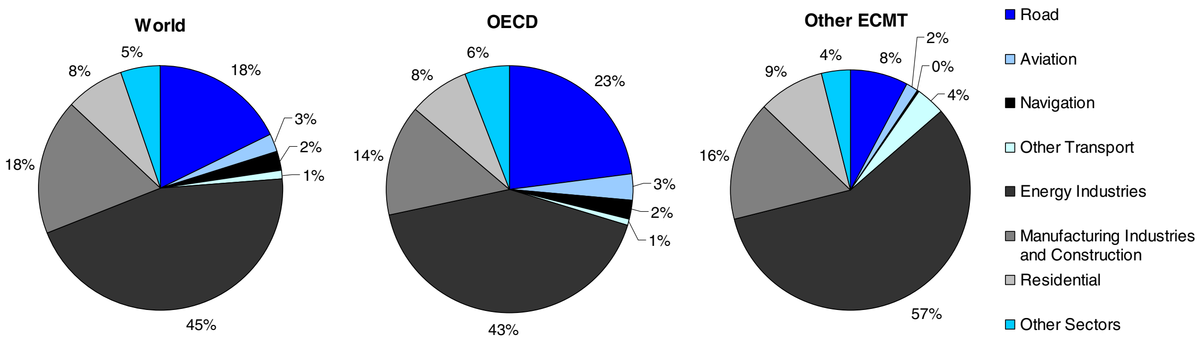
Transport's share of CO_2 emissions is gradually increasing in all regions of the world; its share of world emissions increased from 22% in 1990 to 24% in 2003. Transport's share is highest in the more developed countries of the OECD (30% in 2003).

Figures 2.3 to 2.6 show emissions trends by economic sector, separating transport emissions into several sub-divisions. Emissions from energy sector industries are grouped in a single entry; the great bulk of emissions here is attributable to electricity and heat production. Of the 45% of 2003 world emissions attributable to power and energy, 40% belongs to power and heat production and 5% to refining and other energy industries. Of this 5% less than half is attributable to the production of transport fuels. In the OECD region the pattern is similar; in Russia and the other non-OECD ECMT countries power and heat accounts for 53% of emissions with refining and other energy industries making up 4%.

The IEA projections to 2030 foresee the strongest growth in world emissions coming from the power and heat sector. In the OECD countries, in contrast, growth attenuates in this sector but remains strong in the transport sector. Nevertheless, at the end of the period energy industries still account for the bulk of emissions (39%) with transport accounting for 31% of total CO_2 emissions from fuel combustion.

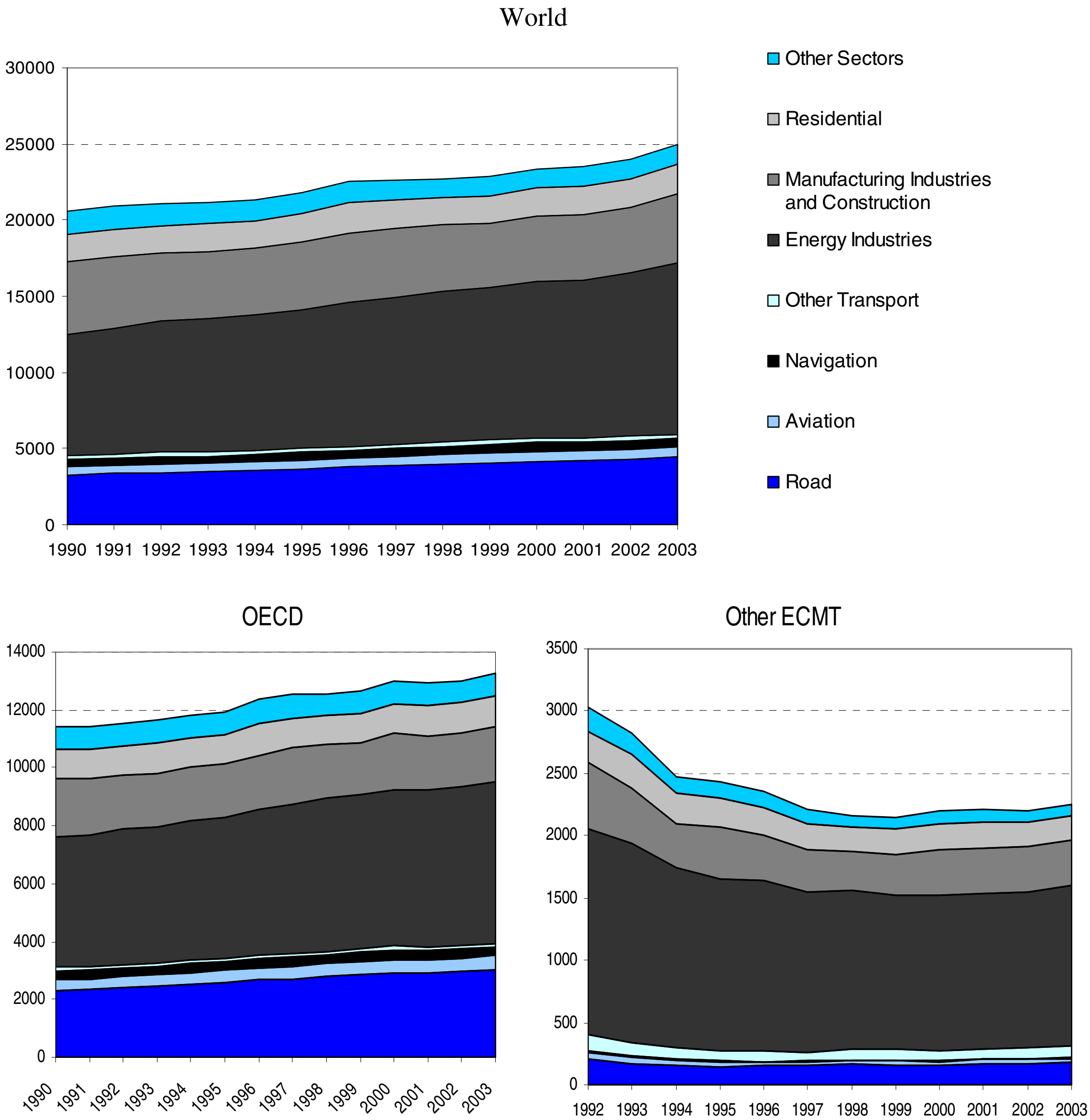
The split between transport services and other end users of energy in accounting for CO_2 emissions differs considerably between countries depending on the structure of the economy, the dominant types of industry and the efficiency with which firms and households use energy. The UK lies at the opposite end of the spectrum from Russia, with its service dominated economy and relatively high industrial energy efficiency, dominance of road transport for passenger and freight services and importance of maritime trade and international aviation. It *may* give an indication of the direction in which many ECMT and OECD economies are heading in terms of patterns of energy use and the transport sector's share of CO_2 emissions (see Figure 2.7).

Figure 2.3. **Transport's percentage share of CO_2 emissions from combustion in 2003**



Source: IEA (2005) CO_2 Emissions from Fuel Combustion.

Figure 2.4. **CO_2 Emissions trends by sector (millions of tonnes of CO_2)**

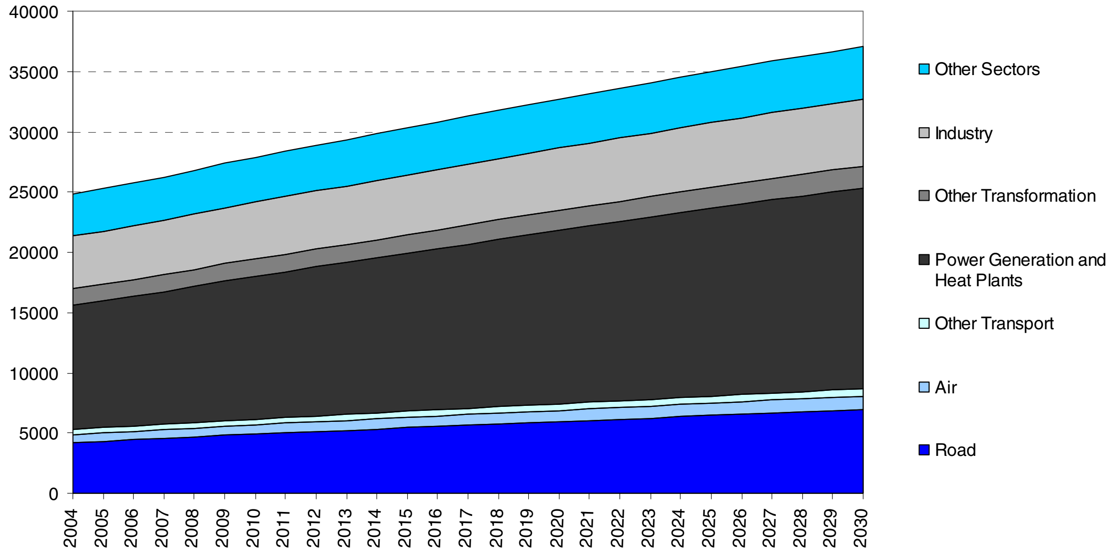


Other ECMT = Albania, Bulgaria, Malta, Romania, Armenia, Azerbaijan, Belarus, Estonia, Georgia, Latvia, Lithuania, Moldova, Russia, Ukraine, Bosnia Herzegovina, Croatia, FYR Macedonia, Serbia and Montenegro, Slovenia.

Aviation and navigation include international bunkers.

Source: IEA (2005) CO_2 Emissions from Fossil Fuel Combustion.

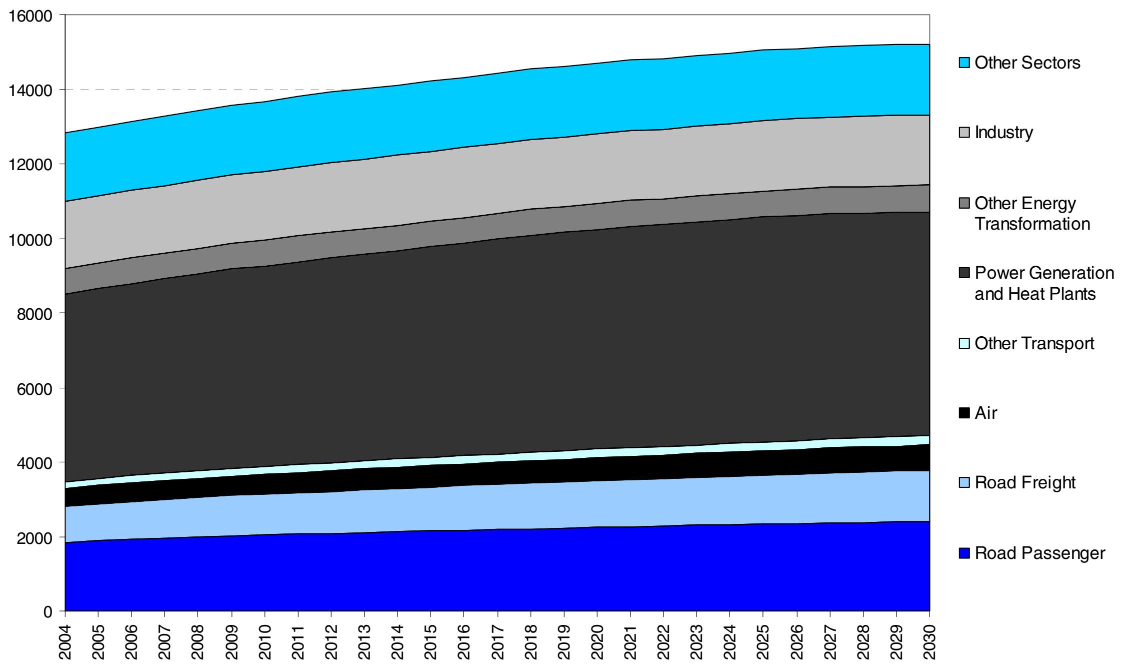
Figure 2.5. **Outlook for world emissions by sector – IEA base case projections (Million tonnes of CO_2)**



Note: Including international aviation and international maritime transport.

Source: Based on World Energy Outlook 2004, International Energy Agency.

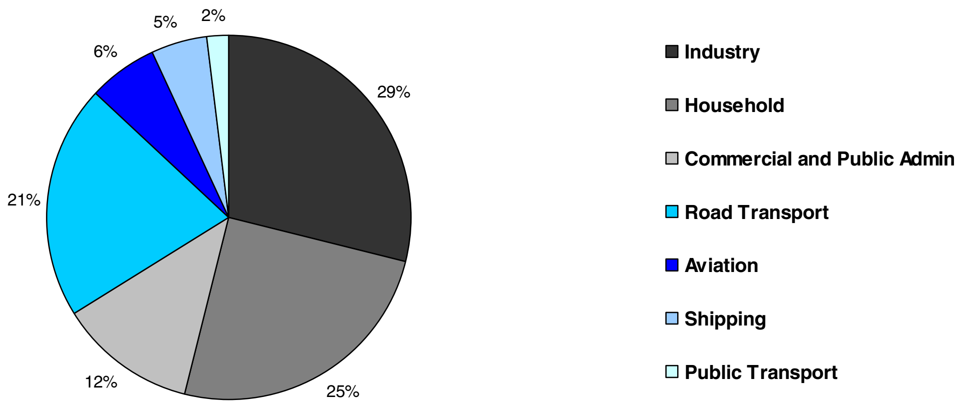
Figure 2.6. **Outlook for OECD emissions by sector – IEA base case projections (Million tonnes of CO_2)**



Note: Including international aviation but excluding international maritime transport.

Source: Based on World Energy Outlook 2004, International Energy Agency.

Figure 2.7. **Current UK CO_2 emissions by energy end-use sector**



Source: Tyndall Centre for Climate Change Research, *Decarbonising the UK.*

Within the transport sector, private and commercial road transport has accounted for the great majority of CO_2 emissions in most countries. The countries of the Commonwealth of Independent States (CIS) have so far proved the exception with the dominance of rail transport in much of that region. Passenger transport accounts for the largest part of road emissions,

For the future, growth in maritime shipping and especially aviation may condition transport sector emissions to a larger degree. The importance of the dynamics in the development of these modes has been masked to some extent by the general exclusion of international bunkers (i.e. fuel for international shipping and aviation) from many reports on energy consumption and CO_2 emissions. The projections shown here include international bunkers for both aviation and maritime shipping in the figure for world emissions. For OECD countries the data available includes international aviation but excludes international shipping.

Road transport emissions are split two thirds to passenger transport one third to freight at present in OECD countries as a whole. The same pattern holds for the European Union countries. Freight emissions have been growing somewhat faster than passenger emissions for some time and the trend is expected to continue. For the OECD, IEA modelling foresees a 64 to 36% passenger to freight split in 2030 (see figure 2.6). For the EU slightly higher freight growth and lower passenger growth is foreseen.

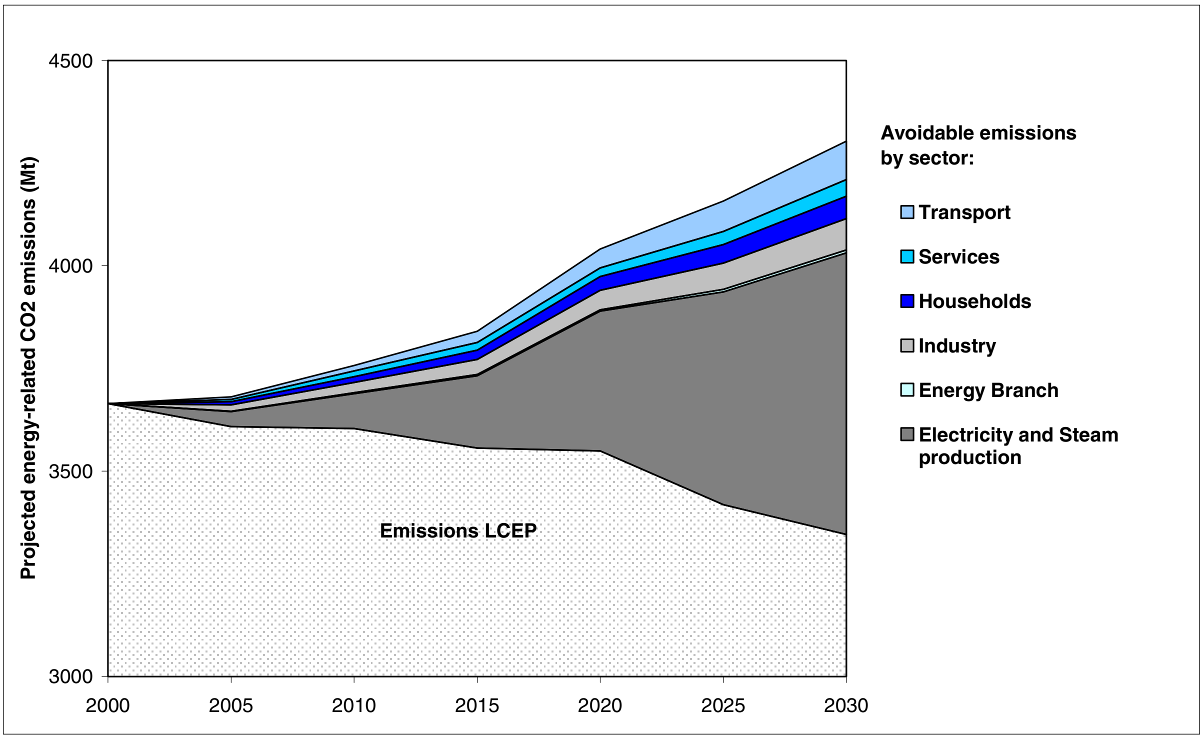
While business as usual scenarios such as the IEA projections in the accompanying figures see the relative modal shares for transport sector emissions little altered, longer term scenarios exploring aggressive abatement strategies in some cases envisage substitution of road transport fuels by hydrogen produced from nuclear or renewable electricity. Under these circumstances aviation, where such fuel substitution appears more difficult, then might grow to account for over two thirds of transport sector emissions. See for example scenarios developed by the Tyndall Centre (Tyndall Centre, 2005).

2.4 How much should the transport sector contribute?

While the transport sector accounts for around a quarter of total CO_2 emissions from fuel combustion, size is not the primary basis for selecting abatement measures in an economy. Cost-effectiveness is the most important factor. Some of the measures already adopted in the transport sector are expensive per tonne of CO_2 abated, costing upwards from Euros 100 per tonne. Some of the lowest cost opportunities for emission reductions in transport have not been exploited so far. The reasons for this are unclear and this report recommends focussing on some of them now – such as regulations for some vehicle components whose performance is not reflected in standard tests of vehicle fuel efficiency, better use of tax incentives for efficient vehicles, support for eco-driving and for the optimisation of freight logistics.

At the same time significant reductions in CO_2 emissions from ECMT countries are likely to be possible even if large cuts in transport sector emissions are not achieved. In a recent study (EEA, 2005), the European Environment Agency modelled a scenario in which CO_2 emissions in the EU were reduced to 11% below 1990 levels by 2030. The majority of these savings occurred as a result of a shift towards low or non-carbon fuels in the electricity generation sector. In this scenario transport sector emissions grew to 46% above 1990 levels (20% above 2000 levels).

Figure 2.8. **Energy related CO_2 emissions EU 25 (Mt)**



EEA projections showing total emissions in a low carbon scenario (lower area of the graph, coloured white) together with the contribution from each sector to reducing emissions from the business as usual trend.

Source: EEA 2005.

The EEA study concludes that if CO_2 were to be priced throughout the economy, through a system of tradable permits or a carbon tax, then the most promising and cost-effective ways to achieve emission reductions would all be found in the power sector, mainly through fuel shifts (an increase of wind power, biomass and combined heat and power generation). Carbon pricing is unlikely to stimulate fuel efficiency measures in Europe's transport sector because of the limited scope for additional actions beyond those taken in response to the voluntary targets agreed with vehicle manufacturers that the EEA assumes will be tightened over time.

A low price elasticity is assumed for the transport sector, leading to continued growth in CO_2 emissions from both passenger and freight transport, albeit at a slower rate than growth in traffic. It is not clear whether higher elasticities, which are appropriate for longer term responses to prices (Goodwin 2003), would increase the role for transport sector efficiency measures in the EEA scenarios. Long run elasticities are also likely to be higher than short run elasticities in other sectors. It should be noted that if oil security were factored into the EEA's analysis transport measures might figure more prominently because road transport accounts for such a high proportion of total oil consumption.

A number of ex-ante studies conclude that efficiency measures exist in the transport sector that are more cost effective than measures in other sectors, whilst other studies find transport sector efficiency measures highly uncompetitive (CE, 2006). There is a large body of literature estimating costs for fuel economy measures but remarkably little agreement in the findings. In particular, there is debate whether the benefits of fuel economy measures (i.e. saved fuel) outweigh the costs. While some studies (i.e. Greene, D.L. and Schafer, A., 2003; NRC, 2002; Department for Transport, 2003; T&E, 2005) indicate that net costs will be negative (i.e. measures for fuel economy would generate net benefits), other studies indicate moderate to substantial costs for fuel economy measures (EC, 2004; ACEA, 2006). There are a number of factors that explain these apparently contradictory results.

Fuel economy measures cover a range of approaches including engine modification, drive train modification and lowering the weight of cars, and fuel efficiency can be stimulated by three distinct types of measures:

- Type 1 - technical adaptations in vehicle design, such as downsizing, engine port injection, direct injection, hybrid drives, etc.
- Type 2 - behavioral changes in driving, i.e. more fuel efficient driving.
- Type 3 - behavioral changes in purchasing automobiles (consumers switch to smaller or lighter or more fuel efficient vehicles such as diesel engines).

In general, technical adaptations in engine and vehicle design tend to generate net costs while behavioral changes tend to generate net benefits. Some measures to promote efficient vehicle components (the performance of which is not reflected in tests of fuel efficiency for vehicle certification) are also expected to generate net benefits (ECMT/IEA 2005).

Several studies estimate the costs[8] of moving the European new car fleet average from 140 gCO_2/km (the current 2008 target agreed with industry) to 120 gCO_2/km (the target envisaged by EU Environment Ministers). These studies cover only vehicle technology improvements, mainly engine technologies. IEEP/TNO/CAIR (2005) investigated cost-curves for six car types in a report for the EC. A wide range of cost estimates were generated, depending on the scenarios adopted for the phasing in of different technologies, but as a general conclusion the authors state that for the most cost-effective scenarios the average CO_2 abatement costs are between 34 and 71 Euro/tonne. At the margin (i.e. moving from 121 to 120 g/km) costs were estimated to reach 175 /t.

These findings are in line with the results reported by the EC in a 2004 Communication (COM(2004)78) that provide an overview of various technical measures in engine design that can be taken in order to lower CO_2 emissions. It found that average costs could reach 50 /tonne for reducing average new car fleet emissions from the level in 2005 (160 g/km) by 25% to 120 g/km in 2015, after accounting for expected "autonomous" technology developments. The study also defined a more rational package of measures that would lower costs to 15 /tonne and still result in a net reduction in emissions of nearly 20%.

ACEA (Association des Constructeurs Européennes d'Automobiles) estimates the average costs of moving to a 120 g/km target at 400 to 540 /t (ACEA 2006)[9].

Such results are at first sight contradicted by other studies (Capros, 1998; Greene and Schafer, 2003; NRC, 2002) that conclude that net benefits can be expected from fuel economy measures. However, closer inspection reveals that these studies mainly focus on Type 3 measures; i.e. promoting smaller cars and a switch to diesel engines.

Type 2 measures also tend to generate net benefits. An ex-post evaluation of Dutch climate change policies by CE (De Bruyn, 2005) showed that information campaigns aiming at improving driving behaviour have been very cost-effective, even though the total effect has been small.

Although no study to date compares type 1, 2 and 3 measures, the existing studies suggest that policies oriented at Type 2 and 3 measures tend to be more cost-effective than policies oriented at Type 1 measures but Type 1 measures can potentially deliver more abatement.

It should be noted that type 1 measures are characterised by steep marginal increases in cost-functions. Both IEEP/TNO/CAIR (2005) and EC (2004) show that there exists a range of technical measures that can be implemented at costs below 20 /tonne. However, the IEEP/TNO study concludes that the marginal costs of setting a 120 g/km target today could be as high as 140-180 /tonne. Costs depend in part on the pace of change that regulations impose. And another study, TNO/IEEP (2004), concludes that a policy setting progressive targets in stages is more cost-effective than policies setting very low targets somewhere in the distant future.

It is unclear how far costs can be expected to decline in the long run due to technological developments. Some researchers expect that due to developments of alternative propulsion technologies cost curves may shift downwards cyclicly (ACEEE, 1998) and (US-DOE, 2000). Technological breakthroughs are difficult to include in cost-effectiveness analysis but there does appear to be a general trend to overestimate costs ex-ante (CE 2006).

Cost effectiveness estimates for measures to promote the efficeincy of heavy duty vehicles and non-road modes of transport are scarce, even though feasible CO_2 reduction measures have been identified. For example, in the maritime sector (Marintek, 2000) has shown that there is significant potential to reduce emissions of CO_2 with technical and operational measures. It would be adviseable to compare the costs of fuel efficiency measures for passenger cars with fuel efficiency measures for road freight transport and for other transport modes in developing transport sector emission reduction strategies.

The figures reported here underline the importance for transport policy of targeting the more cost effective efficiency options available first[10], as well as comparing the costs of measures across all sectors of the economy.

One ex-post study of the cost effectiveness of CO_2 abatement measures across sectors is available, undertaken by CE in 2005 for the government of the Netherlands (see table 2.6). This shows much lower costs for the transport sector measures implemented than measures adopted in any of the other sectors. It is important to note, however, that the transport measures implemented during the period reviewed, 1999-2003, mainly involved support for fuel efficient driving, through training, information and subsidies for in-car instrumentation (type 2 measures). Very few technical vehicle efficiency measures were introduced. At the same time the measures taken in the power sector were clearly not the most cost-effective available.

Table 2.6. **Cost effectiveness of national climate policy measures in the Netherlands, 1993-2003 (/t CO_2, 2004 prices)**

Built Environment	Agriculture	Transport	Industry	Renewable Energy	Non-CO_2	National Total
20 – 70	2 – 20	-30 – -25	15 – 30	100 – 300	10	40 – 90

Source: De Bruyn *et al.*, Evaluation of cost-effectiveness of Dutch domestic climate policy. CE Delft, 2005.

Cost-effectiveness is the fundamental determinant of which abatement policies to adopt and how much the transport sector should contribute towards economy-wide CO_2 abatement goals such as the 2008 – 2012 targets for Kyoto Protocol Annex I countries. Other factors are relevant but do not have a clear cut effect in arguing for more, or less, measures in the transport sector than strictly cost effective.

The impact of CO_2 policies on the international competitiveness of industries and economies has a number of dimensions.

- Manufacturers of energy intensive products are vulnerable to losing competitiveness as a result of unilateral or regional measures to reduce CO_2 emissions that result in large increases in production costs. Faced with the prospect of industry relocating to other countries, governments generally exempt these industries from emissions trading systems, carbon taxes and so on. Other industries, including transport sector businesses, are less vulnerable to this kind of competitive pressure. Vehicle manufacturing is less energy intensive than producing aluminium, steel, cement or paper and vehicle standards can be applied equally to domestic and imported vehicles.

- Fuel bills and vehicle prices, both of which can be influenced by CO_2 policies, are major cost items for transport sector businesses such as road haulage and bus operation. These industries are not, however, subject to delocalisation of employment to the same degree as energy intensive industries. That is not to say that economic activity in these sectors is immune to CO_2 emissions policies but they are less vulnerable than energy intensive industries.

- Large differences in average new vehicle efficiency standards fragment global markets and impede the ability of manufacturers to compete in each other's home markets. This reduces economies of scale in the production of vehicles by constraining the size of the market in which each model can compete. The consumer clearly loses in this situation. For manufacturers the situation is complicated. Most face handicaps in competing outside their main market but many enjoy protection in their home market as a result of this fragmentation of markets.

Some energy intensive industries receive assistance through exemption from carbon taxes and emissions trading schemes. This argues for specific measures to be designed for these industries to reduce their CO_2 emissions (for example support for R&D for more efficient production processes) not for abandoning the principle of basing emission reduction strategies on economy wide cost effectiveness. Seeking emissions cuts from all sectors (power, industry, transport, household, commercial) may be necessary to ensure economy wide emission targets are respected but relatively low cost measures are available in most of them.

The costs to the economy of not following a strategy that seeks to implement abatement measures in order of cost-effectiveness across the whole economy can be high. Albrecht (2002) reports figures from modelling work on Germany by Capros (see Capros 1999) suggesting that the marginal costs of reaching the Kyoto target are multiplied tenfold if each sector cuts emissions by the same percentage rather than following a burden sharing approach where energy and industry sectors take a higher share of abatement and marginal costs are equalised throughout the economy.

2.5 ECMT's previous work on climate change

ECMT regards finding and implementing appropriate climate change policy solutions as one of the most important environmental issues for the transport sector. ECMT's work in the area began in 1989 when, in a resolution on transport and environment, Ministers set as a priority that "*a full range of possible measures that can be taken to reduce transport's contribution to the greenhouse effect be set out together with the costs and practical problems of implementing them.*" A subsequent 1991 resolution recommended that regulations on maximum vehicle power-to-weight ratios combined with reinforcing taxation on vehicles and fuels be the focus of future policy development.

In 1995, Ministers agreed with car manufacturing industry representatives OICA and ACEA a Declaration on reducing carbon dioxide emissions from passenger vehicles in ECMT countries. The objectives of the Declaration are:

- To substantially and continuously reduce the fuel consumption of new cars sold in ECMT countries.

- To manage vehicle use so as to achieve tangible and steady reductions in their total CO_2 emissions.

The agreement committed the industry to bringing significantly more fuel-efficient vehicles to market and Governments to using economic instruments, environmental regulations, information and other measures to influence the market for, and to encourage the use of, fuel-efficient vehicles. (See Annex 3 for full text of the agreement).

In 1997, ECMT published a review of CO_2 policies in member countries recommending, inter alia that:

- Countries should take a more strategic approach to CO_2 abatement (cost-effective packages, integrated into economy-wide measures, balancing of CO_2 objectives with other key transport policy goals).

- Countries should try and establish a better understanding of the actual impact on CO_2 emissions of specific policy measures.

- Countries should seek win-win style solutions in the short-term – including, for example, stricter speed limit enforcement, tighter vehicle inspection systems, information campaigns and education to improve driver behaviour, efficient structures of fuel and vehicle taxation, better fleet management and improved vehicle loading factors.

The present report reviews progress since 1997 and develops policy recommendations in the light of what has and has not been achieved.

2.6 Outline of report

The report presents the results of a review of ECMT Member and Associate Member countries' policies to reduce CO_2 emissions from the transport sector. The main aim of the review was twofold:

- To assess the effectiveness of Member and Associate Member governments in developing policies to reduce transport sector CO_2 emissions.

- To recommend constructive ways forward for further policy development.

The report is divided into six sections:

- Section one, summary and conclusions.

- Section two, introduction.

- Section three discusses the mechanisms available to governments for reducing CO_2 emissions.

- Section four assesses the performance of Member and Associate Member countries in reducing CO_2 emissions as well as the effectiveness of different approaches to CO_2 abatement.

- Section five outlines some of the more promising policy options for the future, as well as offering some cautions on a few perhaps over-promoted options.

- Details of the CO_2 policy review and summary information by country are presented in chapter six of the report.

NOTES

1. An organisation established by World Meteorological Organisation and UN Environment Programme to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation.

2. European Council, 2002. *Decision on the sixth Community environment action programme*. Decision 1600/2002/EC, July 2002.

3. European Environment Agency, 2005. *Climate change and a European low-carbon energy system.*

4. United Nations (1992), *United Nations Framework Convention on Climate Change.* United Nations, New York.

5. Text shortened and emphasis added.

6. See the Summary by Chairman Simon Webb, UK Department for Transport livegroup.co.uk/efvc.

7. IEA (2005) *CO2 emissions from fuel combustion*.

8. All of these studies estimate costs to society: that is they take account of fuel savings to consumers. IEEP/TNO/CAIR and ACEA use a 5% discount rate, which over-estimates typical consumer perceptions of the value of future fuel savings, but this is partly compensated for as both use oil price assumptions below world prices in the first quarter of 2006.

9. Biofuels are estimated to cost from 200 to 500 /t, see (CE 2006).

10. Including tightening vehicle emissions and fuel efficiency standards in countries where they are relatively weak. There should be opportunities to import technologies developed for markets subject to more stringent regulations, at low cost.

3. THE MECHANISMS FOR REDUCING TRANSPORT SECTOR CO_2 EMISSIONS

A wide range of policy options that can reduce growth in transport sector CO_2 emissions is available to governments. This report uses a two dimensional framework based on "**impact type**" (Section 3.1) and "**policy approach**" to categorise these policies.

3.1 Policies by impact type

Table 3.1 describes each of the four impact types for policies that can influence transport sector CO_2 emissions.

The four impact types are often interdependent and policies can affect one impact type positively but have negative side-effects on another. The negative side-effects are, however, generally unlikely to outweigh the main effects and in this report generally only the primary impact type of each policy is considered in order to keep the analysis simple.

Nevertheless, accurate estimates of potential CO_2 savings can only be made when the effect of a policy on all four types of impact is considered. For example, diesel engines currently offer significantly better fuel efficiency than petrol engines, but diesel has a higher CO_2 intensity than petrol – so a policy promoting diesel vehicles might not necessarily achieve any CO_2 abatement. One car currently on the market is available with either a petrol or diesel engine. With roughly comparable performance, fuel efficiency for the diesel engine is 4.8 litre/100 km and for the petrol engine 7.2 litres/100 km. In this example the diesel vehicle is still the better option when CO_2 intensity is taken into consideration as it produces 126 grams of CO_2 per kilometre compared with the petrol version's 169 g CO_2/km. Other cases can be less clear cut.

One instrument, carbon tax (fuel tax based on the carbon content of each fuel), is immune from these complications as it is directly correlated to emissions of CO_2. Moreover, the price signal a carbon tax produces has an influence in each of the four impact fields identified, allowing least cost abatement options to be exploited first and optimising the emissions reduction strategy. A carbon tax is thus the first instrument to consider in such a strategy. Political sensitivities over fuel taxation have, however, led governments to develop a long list of alternative, if theoretically inferior, instruments.

3.2 Policy strengths and weaknesses by impact type

This section briefly explores some of the issues that characterise policies according to impact type. As well as providing the rationale for some of the evaluation undertaken later on, this provides a brief summary of the main issues for policymakers considering new transport sector CO_2 abatement strategies.

Table 3.1 **Description of the four impact types, with policy examples**

Impact Type	Description	Policy Examples
Demand	Demand represents the total transport activity or the total movement of goods and people within an economy. Demand for passenger transport is measured in passenger-kilometres. Demand for freight transport is measured in tonne-kilometres. If the level of demand is reduced, without adverse effects on the other impact types, CO_2 emissions are reduced proportionately.	Urban planning regulations that discourage the development of sprawl and for example disfavour development of "commuter suburbs" and promote "mixed development" in which people are more likely to live closer to their work, shops or schools.
Energy Intensity (fuel efficiency)	Energy intensity is the measure of how much energy is required to move one passenger-kilometre or one tonne-kilometre. It is measured in megajoules (MJ) per tonne-kilometre or per passenger-kilometre. Energy intensity can be reduced by improving the technical fuel efficiency of a vehicle (fuel use per kilometre) or by increasing load factors, making greater use of the vehicle's transport capacity. If energy intensity is reduced there will be a saving in energy. Since virtually all energy consumption in the transport sector results in CO_2 emissions a reduction in energy intensity will, therefore, result in a reduction in emissions.	Differentiation of annual circulation tax to provide incentives for purchasing more fuel efficient cars.
Carbon Intensity of alternative fuels	Carbon intensity is measured in grams of CO_2 emitted per mega-joule of energy consumption, well-to-wheel (i.e. all the CO_2 emissions associated with producing the fuel used, as well as direct emissions when a vehicle is driven). Carbon intensity can be reduced either by replacing non-renewable fuels with renewable substitutes, or by switching to fuels with a lower carbon to hydrogen ratio, for example substituting natural gas for oil. Fuels with a low carbon to hydrogen ratio produce less CO_2 during combustion for the same power output. CO_2 emissions from combustion of fuels produced from renewable feedstocks such as biofuels make no net contribution to the atmospheric concentration of CO_2 if as much CO_2 is absorbed in growing the crops as in processing them and burning the fuel produced. Biofuels can have very low or zero carbon intensities but this is not always the case.	A CO_2 tax on transport fuels (a tax that increases as carbon intensity increases) would provide a financial incentive to purchase fuels with lower carbon intensity.
Modal Split	Modal split refers to the market share of each mode of transport. It is measured as on the basis of a percentage of total transport activity. Some modes of transport are less carbon and energy intensive than others for an equivalent journey. If these trips can be switched to a less energy intensive mode and CO_2 emissions reduced.	Subsidies for energy efficient modes of transport where they compete with less efficient alternatives.

3.2.1 Demand

> *The physical volume of movement (as measured by … [passenger] or tonne kilometres) should not be treated as an objective in its own right, but only insofar as it develops a better quality of life and more efficient economies. In current circumstances, transport is sometimes a 'victim of its own success', with excessive traffic causing environmental damage and economic inefficiency, and undermining the value of infrastructure investment. In these circumstances, managing transport demand is a legitimate and necessary activity of Governments…*
>
> (Goodwin, ECMT 2003)

As the conclusions to the ECMT conference *Managing the Fundamental Drivers of Transport Demand,* quoted in the paragraph above, suggest there are situations in which managing transport demand to reduce CO_2 emissions is required. There have been very few government initiatives to date that attempt purely to reduce demand, as the review of measures in the Annex to this report shows. "Managing demand" is mentioned in the description of many of the policies reported, but they generally concern modal shift rather than attempts to reduce overall growth in transport activity. Those policies that do attempt to reduce demand tend to fall into one of the following three categories:

- Regulation of spatial planning.
- Use of pricing signals to reduce demand.
- Addressing information barriers.

The **regulation of spatial planning** is sometimes reported as a transport sector CO_2 abatement policy. But as Güller notes (p. 59, ECMT 2003), "*land use and zoning plans per se are not able to drive transport demand to an environmentally sound path*". In the same report, (p. 134) Goodwin notes that "*If land use planning proceeds without consideration of prices and transport facilities, well intentioned policies can be undermined. For example, plans to locate homes and workplaces reasonably close together are intended to reduce average journey distances. But if the relative prices and service quality of public transport and car use encourage journeys by car, with widely scattered origins and destinations, the overall effect may be the opposite of what is intended, and journey distances can increase. However, if the objectives of land-use planning are reinforced by the transport provisions, planning can have rapid and positive effects.*"

On its own, regulation of spatial planning is not sufficient to steer CO_2 emissions but it can play an important role when it is part of an integrated package of transport pricing and modal shift policies, as the example of Zurich reviewed in some detail in ECMT 2003 demonstrates. Because of this, the analysis of spatial planning policies in later sections of the current report only attributes CO_2 emissions reductions to planning policies that are explicitly combined with other measures. At the same time very few governments included spatial planning measures in their submissions on national CO_2 policies.

The **use of price signals to manage demand for transport.** Taxes on transport, and the way in which they are levied, have a profound influence on the way traffic and infrastructure develop and play a fundamental role in conditioning the impact and effectiveness of almost all government policies towards transport. Demand for transport services is economically rational when the willingness of individuals and businesses to pay for trips/freight movements exceeds the social (private plus external) marginal costs of each trip. For road transport in particular, willingness to pay is largely determined in relation to the taxes and charges levied on transport. When these do not match the external part of costs, transport demand is either excessive or suppressed. To provide firms and individuals with accurate pricing signals, charges need to be levied close to the point of use of transport infrastructure. The largest element of taxation in most countries is fuel tax. Whilst closely correlated with km driven and CO_2 emissions, fuel tax is very poorly correlated with the largest categories of external cost: accidents and congestion. Without better targeted road pricing, interventions to manage congestion or influence modal split will be less than fully successful. Without better pricing, many investments in infrastructure and subsidies to public transport may be wasted and confidence in the outcomes of a wide range of policies undermined.

In 2003 the EMCT Council of Ministers adopted the report *Reforming Transport Taxes.* This answered key political concerns about adjusting transport taxes towards efficient levels: how large would changes in taxes and charges be; which classes of activity would be charged more, which less; how would the revenues that result compare with existing revenues; how might the approach to setting efficient taxes be affected by investment policy; how will more optimal pricing affect demand for investment in infrastructure. The results foresaw lower prices for the use of rural roads and substantially higher prices for the use of congested parts of the road network, especially in urban areas. For other modes the pattern of changes expected differs from country to country, depending on the current pattern of taxes, charges and subsidies.

A number of significant road pricing reforms have been introduced in ECMT and OECD countries in recent years that illustrate the potential for reducing CO_2 emissions when pricing, planning, modal shift and regulatory instruments are combined. Introduction of the Heavy Vehicle Fee in Switzerland in 2001 combined with increasing the weight limit for trucks and subsidies for rail freight operations and infrastructure investments financed from the fee halted growth in the number of trucks crossing the Swiss Alps. CO_2 emissions have been cut by switching from the old flat fee and 28 tonne limit to the new km charge and 40 tonne limit and for example will be 6-8% lower in 2007 compared with projections under the old regime[1]. The London Congestion Charge is estimated by Transport for London to have cut CO_2 emissions by 20% from traffic within the charging zone.[2] Germany estimates that its LKW Maut electronic road use charge for trucks on motorways will, two years on from its introduction in 2005, reduce CO_2 emissions by 5 Mt pa. The impact of road pricing on CO_2 emissions is in part determined by whether it is accompanied by compensatory reductions in fuel tax. These will reduce the impact on CO_2 emissions.

Policies to reduce information barriers tend to focus on the idea that there is a certain amount of transport activity, in both passenger and freight transport that is unnecessary. The majority of this unnecessary transport activity is expected to result from inefficient routing of vehicles, although some initiatives targeting travel behaviour have achieved reductions in vehicle kilometres by encouraging participants to combine two or more trips into just one trip.

Perhaps the most effective way to reduce the amount of inefficient routing is the use of information technology (sometimes referred to as Intelligent Transport Systems or ITS). Route planning and guidance software can be used to find the most efficient routes and is beginning to enter widespread commercial use in both the passenger and freight industries. With mobile communications technology this guidance software can be linked to information systems that enable the route to be updated in response to real time information on traffic conditions or even parking availability.

The Turin 5T project (ECMT, 2000), is an early example of this kind of approach, it was restricted to Turin's central city area. Among many other features the project included variable message road signs displaying recommended routes and congested areas to avoid. The CO_2 savings were estimated to be around 10% of emissions from the segment of the market being targeted. Not all of this 10% reduction is attributable to measures to reduce demand but it might be regarded as an upper limit for this type of approach. This level of impact is only likely to occur in quite large cities, perhaps limiting the overall potential of this approach to reducing emissions to an order of magnitude around 1-2% of total transport CO_2 emissions. Efforts by governments to take advantage of this potential focus on investment in ITS systems and associated information campaigns.

The potential to reduce unnecessary travel by trucks may be higher than it is for cars. A large proportion of car drivers trips are between the same origin and destination, giving plenty of opportunity to find the most efficient route. Truck drivers, however, are more likely to be travelling between a wide range of origins and destinations. While many truck drivers and route planners do have far greater knowledge of routes than car drivers, computer routing software has been shown to consistently plan routes more efficiently. Quantifying the potential is difficult but McKinnon (2003) estimated it to be between 5 to 10%. It should be noted that the shortest route between two points is not necessarily the most environmentally friendly route – it may require travelling on congested roads or through sensitive urban areas. Any government initiatives to promote better route planning should be integrated with efforts to increase load factors (see next section). Given the inherent cost savings available to truck operators, modest education/publicity campaigns should be sufficient to stimulate uptake of these technologies. The likely behaviour of very small operators is not well understood in this context and the potential for emissions reductions through this route may be limited in countries where small operators dominate the market.

3.2.2 Efficiency

Efficiency, or energy intensity, can be separated into three components:

- **Technical fuel efficiency** – determined by the efficiency of the engine and the physical characteristics of the vehicle.

- **On-road fuel efficiency** – determined by how efficiently the driver uses the vehicle, and by traffic and road conditions.

- **Load factor and occupancy rate** – the percentage of available capacity that is being utilised on average. Making better use of available capacity results in lower energy intensity because each extra person or tonne of freight requires a proportionally smaller increase in energy use.

The potential for improvements in the **technical fuel efficiency** of road vehicles depends mainly on improvements in the efficiency of the internal combustion engine, at least in the short to medium term. Various other technological innovations such as hybridisation[3], use of lightweight materials and improved aerodynamics also have a role to play.

A number of studies have investigated what the potential improvements in technical fuel efficiency might be in the short to medium term. A recent industry funded study (WBCSD, 2004) suggested that combined engine and non-engine developments, in non-hybrid vehicles, could improve technical fuel efficiency by around 20% above current best practice diesel cars by 2030. Research undertaken for the UK government (Ricardo, 2003) has suggested that hybrids might offer a 45% improvement on current best practice by 2012.

Two factors mean that the benefits of these technical fuel efficiency gains will only filter through slowly. Firstly, a step-wise evolution in technology is "*likely to be the only approach compatible with the business-model and corporate philosophies of the car industry*" as Ricardo Notes. Secondly, the rate of turnover of the car fleet is quite slow – the average age of cars in the EU-15 is around 7.6 years[4] (EEA, 2003b). Consumer preferences will influence how quickly these technical fuel efficiency improvements are felt. If consumers buy larger or more powerful vehicles the fleet average fuel efficiency could actually worsen.

Improvements in technical fuel efficiency can be expensive. Table 3.2 sets out a possible technology pathway outlined by Ricardo (2003), with the associated improvement in fuel efficiency (given in CO_2 emissions per kilometre) and increases in the cost of the vehicles and the cost of the implied CO_2 savings.

Table 3.2 **The fuel efficiency improvements (given in grams of CO_2 per kilometre) and cost of vehicles in the technology pathway outlined in Ricardo (2003)**

Step	Year	Description and technologies	Fuel Efficiency (grams CO_2/km)	Cost of Vehicle	Estimated cost per tonne of CO_2*
Baseline	Base	Baseline vehicle: 1.9 litre, direct injection diesel, engine power 82 kW, vehicle mass 1 351 kg.	152	22 129	
1.	Base + 1	Step 1 adds a stop-start system engine system, and respects Euro4 emission standards. • Belt alternator starter on 12V standard electrical system, • 6 speed manual transmission	145	22 468	- 79
2.	Base + 4	Step 2 adds improved battery and motor systems to allow a basic level of regenerative braking for production in 2007. Euro 4. • Engine downsized to 1.6 litre. • 42V starter/motor/generator (belt driven, with dual 42V/12V electrical architecture system). • VRLA battery. • 6 speed manual transmission with dual clutch. • DC/DC converter.	117	23 420	- 168
3.	Base + 7	Further improvements to the battery and motor systems to allow significant levels of regenerative braking. In addition, the engine has been downsized to 1.2 litres. This vehicle achieves Euro 5 emission levels through use of a small diesel particulate filter (DPF) and a small lean NO_x trap (LNT). • 42v starter/motor/generator - crankshaft mounted, permanent magnet with dual 42v/12v electrical architecture system. • Nickel Metal hydride battery. • Engine downsized to 1.2 litre with power rating over 63 kW/litre.	100	25 087	232

Step	Year	Description and technologies	Fuel Efficiency (grams CO_2/km)	Cost of Vehicle	Estimated cost per tonne of CO_2*
4.	Base + 11	Develops a parallel diesel hybrid with excellent fuel economy. Advanced electric motor and battery technology is combined with a small diesel engine (Euro 5 using DPF and LNT). • High voltage, high power motor and generator (permanent magnet). • Li-Ion battery at high voltage. • Engine downsized to 1 litre with high power ratings (over 63 kW.litre). • A slightly smaller speed range. • Light weight materials. • Torque sharing transmission.	83	27 343	448

* Estimates for net cost of CO_2 abatement (cost of vehicle upgrade minus value of fuel savings) calculated by ECMT assuming an average of 16 000 kilometres driven per year and a 10 year vehicle lifetime. The value of fuel savings were calculated in relation to average EU25 diesel prices in mid 2005 (1 Euro per litre).

Source: Ricardo 2003.

The IEA and ECMT recently undertook a joint study analysing the difference between technical fuel efficiency and **on-road fuel efficiency** (IEA/ECMT 2005). The study found that the current official fuel efficiency tests in both the EU and the US do not accurately reflect actual on-road fuel efficiency and that a number of relatively low-cost technologies are available to improve fuel efficiency that have not been introduced because they show no benefit on the usual fuel efficiency test cycles. The potential to improve average on-road fuel efficiency at low cost was found to be between 10-15%. Governments are reluctant to adapt existing test procedures, not least because manufacturers have optimised production to respect current test standards, and it is far from simple to develop test procedures that would reflect all relevant factors. Nevertheless policy options are available to improve on-road fuel efficiency and include modest fiscal incentives or voluntary agreements to install specific technologies and government support for driver training programmes. When fuel savings to the driver are taken into account, most of the relevant technologies (for example, more efficient alternators and air-conditioners, dual cooling circuits, tyre inflation monitors and gear change indicators for manual transmissions) were found to have a "negative cost" per tonne of CO_2 reduced. If governments were able to introduce these technologies through voluntary agreements or regulations, benefits would outweigh the costs. Driver training programmes, supported with simple in-car instrumentation, were also found to be very cost effective – around 9 EUR/tonne of CO_2 in the Netherlands.

Table 3.3 **CO_2 abatement cost per tonne, diesel vehicle, European driving assumptions**

Ambient Temperatures Traffic Conditions	**Cold**		**Hot**	
	Dense	**Light**	**Dense**	**Light**
Shift Indicator Light (manual transmission)	-$443	-$398	-$443	-$398
Tyres Inflation Monitor	-$313	-$313	-$313	-$313
Low Rolling Resistance Tyres	-$145	-$327	-$145	-$327
Driver Training	-$285	-$435	-$285	-$435
Efficient Air Conditioners	NA	NA	-$323	-$135
Dual Cooling Circuits	-$285	-$285	-$60	-$60
Efficient Alternators	-$370	-$229	-$229	$52
Heat Pumps for A/C	NA	NA	-$229	$52
0W-5W/20 Oils	-$229	$52	$52	$52
Heat Battery	-$173	$502	NA	NA
Idle Stop/Start (assumes 42V system)	$474	NA	-$18	NA
Electric Water Pump	-$159	$193	$193	$896
Adaptive Cruise Control	$1 833	-$42	$1 833	-$42

Source: ECMT/IEA, *Making cars more fuel efficient,* OECD Paris 2005.

The potential to influence **load factors and occupancy rates** varies greatly between modes and markets. The potential to improve occupancy rates in the potentially less energy intensive modes, such as rail and buses, is largely dictated by the ability to attract greater patronage (see modal split section below for further discussion). For the more energy intensive modes (i.e. cars and trucks) consolidating existing movements of people and goods into fewer vehicles may in some cases be possible. Of course, the potential is not simply the difference between the current situation and a scenario in which all vehicles are running at 100% capacity. In the first instance a number of operational factors limit how much transport activity can be consolidated.

The most important operational factor is the origin and destination – two people can not car-pool together if they live and work in completely different places. The second operational factor is time – both the journey's time length and deadlines (for both arrival and departure). Operational factors for the freight sector include vehicle compatibility (e.g. the freight might need to be refrigerated) and vehicle capacity.

The most important market barrier is lack of information – for example, a freight operator may be unaware of potential clients who could fill an "empty backload", or a commuter may not be aware that a neighbour works in an adjacent building and would make an excellent car-pooling partner. Nevertheless data from the UK Department for Transport shows empty running decreased from 34% of total truck kilometres in 1973 to 26% in 2001 (see Alan McKinnon's paper in the ECMT report, *Managing the fundamental drivers of transport demand,* OECD 2003).

A recent study (McKinnon, Ge & McClelland, 2004) analysed, inter alia, the potential to reduce empty backloading in the UK food supply chain. The study shows that if you simply match origin and destination (of freight needs and empty trucks) empty running could be further reduced by 13.7% (on a kilometre basis) although an analysis of factors such as vehicle compatibility, vehicle capacity and scheduling would reduce this potential. While this study did not estimate the cost effectiveness of the CO_2 savings that would result, it is highly like that the benefits would outweigh the costs at a societal level.

The overall amount of freight movements is determined by the overall logistics of production and distribution. The globalisation of sourcing raw materials and components and distributing finished goods together with a regional consolidation of distribution centres to reduce inventory costs has greatly increased freight movements. Both the distances carried and the number of movements between plants and distribution hubs and satellites have increased markedly.

Although governments can address the information barriers identified, for example by subsidising car pool matching service (commercial internet based services already provide this service nationally for freight operators in many countries) regulatory intervention appears unlikely to be successful in significantly influencing transport logistics. The main policy lever here is fiscal. Increases in transport costs relative to other production costs can have a powerful impact in shaping the organisation of freight logistics. Bleijenberg (ECMT 2003) estimates roughly half of the increase in freight tonne-kilometres was driven by reductions in transport costs over recent decades. Similarly the fuel price increases in 2005 had a noticeable effect in stimulating car pooling in the US.

3.2.3 Carbon intensity of alternative fuels

It is theoretically possible to run the transport system on fuels that have a carbon intensity of zero. If such fuels were to completely replace oil products, all transport sector CO_2 emissions would be eliminated. Hydrogen fuel cell-powered vehicles, running on hydrogen produced from water using renewably generated electricity would achieve this. While feasible at a theoretical level, economic and technical considerations mean such a transport system is unlikely to be developed in all but the very long term.[5] Accelerated introduction of hydrogen could become driven by a geopolitical imperative to cut dependence on oil from unstable political regimes but is not close to offering cost effective emissions abatement. It is generally accepted that oil will play the dominant role in fuelling the transport sector well into the foreseeable future.[6]

Key features that limit the development of alternative fuels at present include:

- The relatively low cost of petrol and diesel, notwithstanding the increase in oil prices in 2005[7].
- The lack of an existing market for some alternatives (therefore making investment more risky).
- The lack of a distribution infrastructure for gaseous fuels.

Fuels with lower carbon intensity than petrol and diesel bear a significantly higher cost. Biofuels in IEA member countries, for example, can be up to 3 times the price of petroleum-based fuels (IEA, 2004)[8] and the European Commission has suggested that the price of oil would need to reach and remain at 70 EUR per barrel before biofuels would become cost-competitive in the EU (EC, 2001). Oil prices peaked at 50 EUR a barrel in 2005. This price differential makes the cost of CO_2 abatement with biofuels very high, the IEA (2004) estimates the current cost of CO_2 abatement from ethanol in IEA countries is between 200 and 500 USD (150 and 400 EUR) per tonne of CO_2.

The potential for CO_2 abatement from biofuels does appear to be significant, for example, Johnson (2002, cited in IEA, 2004) suggests that, by 2020, biofuels supply could be sufficient to meet a 10% gasoline and 3% diesel "blending"[9] target. However, a much greater understanding of the broader environmental (in particular on biodiversity) impacts of increased production of biofuels is necessary before national governments take further significant steps to encourage demand. While European governments are beginning to form an understanding of the environmental impacts that would occur as a result of domestic production, far less is known about the impacts of imports from developing countries.

The next generation of biofuels are expected to be significantly cheaper and produce much less carbon dioxide under life-cycle analysis than conventional production of biodiesel and ethanol. These include ethanol from woody biomass and from the cellulose that makes up most of plant mass (rather than just the sugars) and diesel from celulosic biomass using Fischer-Tropsch conversion.

3.2.4 Modal split

The potential for CO_2 savings from modal shift may have a role to play in meeting emissions abatement targets but savings are likely to be small and relatively expensive.

The potential CO_2 savings available from policies that encourage modal shift are, in the first instance, determined by the relative energy intensities of each mode of transport. The table below sets out recent energy intensity indicators from the European Environment Agency for the EU-15 countries. The EEA has chosen to report intensity on a CO_2 basis (i.e. grams of CO_2 per passenger kilometre or per tonne kilometre) to take account of the different fuels used by different modes.

This information shows very clearly that the dominant modes of transport (passenger cars and road freight) are the most energy intensive surface transport modes. However, the CO_2 abatement achievable by modal shift initiatives depends on a number of further factors.

For freight in particular these modal comparisons are insufficiently detailed. It is more accurate to compare the energy intensities of moving different types of freight (particularly different densities – kg/m^3) over a range of different distances and over the whole journey, from origin to destination (since freight moved by rail or by ship almost invariably needs to be moved from or to rail-heads or ports by trucks – often under conditions that prevent consolidation of loads). In such analysis the differences between modes is considerably reduced and may be overturned.

Table 3.4 **Passenger transport energy intensity in EU-15 countries in 2000 (EEA, 2003)**

Mode	Energy intensity (grams of CO_2/t-km)
Maritime	43.5
Rail	43.7
Road	118.4
Passenger cars	126.2
Two-wheelers	83.5
Buses	66.1
Coaches	34.3

Table 3.5 **Freight transport energy intensity in EU-15 countries in 2000 (EEA, 2003)**

Mode	Energy intensity (grams of CO_2/t-km)
Shipping – inland	30.9
Shipping – maritime	13.9
Rail	22.8
Road	123.1
Light duty vehicles	397.4
Heavy duty vehicles	92.0

The capacity of alternative modes to absorb the size of modal change required to achieve a significant reduction in CO_2 emissions is also relevant. The less energy intensive transport modes tend to have small market shares and even a small change in market share thus represents a large increase in the amount of transport activity for these modes. For example, a 5% per year increase in EU-15 rail freight between 2005 and 2010 would be required to achieve a 1% reduction in CO_2 emissions.[10] Growth rates in EU-15 rail freight during the 1990's averaged 0.9% per annum. There is under-utilised capacity on much of the European rail network, but outside Central and Eastern Europe this tends to be on peripheral parts of the system where demand is declining. Resources for maintenance and renewal have been concentrated on the core network with the result that secondary and peripheral lines are old. Running additional trains on these lines is likely to be associated with high track maintenance costs. On the core networks investment in new capacity would be required to meet a substantial increase in traffic, and this would have to be funded from public budgets under current pricing arrangements[11]. To an extent the ability of rail to substitute for road is limited by its much more limited territorial coverage (rail infrastructure is much more expensive to build, maintain and operate than roads). For transport by inland waterways the geographical limitations are even more pronounced.

The potential for modal shift is also limited by whether the alternative can supply the same level of service as passengers and freight currently receive. Time is very important in passenger markets and most freight markets (journey time, punctuality and reliability) and comfort levels are important in the passenger market. Behavioural barriers are quite significant in the passenger market. These factors are summarised in the tendency for cross-modal elasticities to be quite low. For example, Goodwin shows that whilst a 10% decrease in public transport fares can, in the long run increase public transport patronage between 5 – 9% (or more in some markets), however, only 10 – 50% of this increase is likely to be drawn from car use (Goodwin, 2003), with most of the rest from pedestrians and cyclists switching to public transport.

Despite these caveats, where capacity for modal shift does exist and barriers can be overcome, experience suggests small CO_2 savings can be achieved very cost-effectively. For example, State-level governments in Australia are planning a behaviour change initiative to encourage modal shift away from single-occupancy car trips that will target 180 000 households between 2008 and 2012. Based on existing large-scale programmes in Australia, it is estimated the initiative will save approximately 1.2 Mt CO_2 over the four years of the programme at a cost of around 9 EUR per tonne of CO_2 avoided (Pramberg, 2004). That represents 0.3% of Australia's transport sector projected greenhouse gas emissions in 2010 (AGO, 2002).

Switzerland also provides examples of well targeted modal shift polices implemented by local governments, for example the "Fahrleistungs modell" developed in Berne which sets a cap for the car trips generated by new shopping malls and similar developments. When monitoring reveals excess car kms, either the operator of the new development takes measures to persuade customers to use public transport, walk, cycle or car share or pays a tax to fund local government measures to the same end.

3.3 The policy approach

The largest potential and most cost effective CO_2 abatement opportunities appear to lie in actions to reduce energy intensity. Significant CO_2 savings might be achieved by reducing carbon intensity but most of these savings are likely to be at a higher cost. Policies promoting a less energy intensive modal structure appear to offer only a very limited potential, although since they can be cost-effective governments should take up the opportunities available. Demand management policies appear to offer reasonable potential though for some cost-effectiveness is not clear. More efficient pricing of transport infrastructure use would enhance the effectiveness of many abatement measures, and probably result of itself in lower overall CO_2 emissions but political acceptability is a key issue for this tool.

These conclusions are supported by the recent CO_2 benchmarking exercise undertaken by the Dutch Ministry of Transport and others (COWI & ECN, 2003). The results of that study are summarised in the table below, with a second column added to facilitate comparison with the approach used in the present report.

To exert an influence on one of the impact types identified, governments must alter one or more of the technical, economic or social factors that condition the current environment. This can be achieved through any of the standard policy approaches. Each policy reviewed in this report is characterised by the policy tool and impact type. The policies adopted by Member countries are discussed in the chapters that follow, with each measure characterised according to the nature of the intervention, categorised as follows:

- **Fiscal** – includes tax policies, fees, charges, refunds and subsidies.
- **Investment** – public sector investment.
- **Regulation** – mandatory standards (regulatory reform has also been included in this category).
- **Voluntary agreements** – essentially a regulatory approach.
- **Information and education** – includes demonstration and information dissemination as well as marketing and behaviour change measures.

Table 3.6 **Summary of results from Dutch CO_2 benchmarking study (COWI & ECN, 2003)**

Instrument	Impact Type	CO_2 effect	Cost-effectiveness
CO_2 emissions standards	Energy intensity – technical fuel efficiency	>5%	High
Eco-driving	Energy intensity – on-road fuel efficiency	2-5%	High
Speed limit enforcement	Energy intensity – on-road fuel efficiency	2-5%	High
Fuel tax	Energy intensity – technical and on-road fuel efficiency	<5%	High
Freight logistics	Energy intensity – on-road fuel efficiency	<5%	High
CO_2 differentiation of vehicle taxation	Energy intensity – technical fuel efficiency	2-5%	Varies
Road pricing	Demand	>5%	Medium
Stimulation of biofuels	Carbon intensity	>5%	Low
Modal shift – public	Modal shift	<2%	Low
Modal shift – freight	Modal shift	<2%	Medium
Tradable CO_2 permits	All	<2%	High

Some policies reported by governments and considered unlikely to have any significant impact on CO_2 emissions in the medium term are nevertheless important policies in the long-run and have been included under the following headings:

- **Research and Development** – policies that encourage and finance research and development.
- **Policy Process** – e.g. strategy development.

NOTES

1. Ueli Balmer, Federal Office for Spatial Development, Switzerland, *The Window of Opportunity,* ECMT International Conference Managing Transport Demand Through User Charges: Experience to Date www.cemt.org/topics/environment.

2. Transport for London, *Central London Congestion Charging Impacts Monitoring, Third Annual Report,* April 2005.

3. Usually using an electric motor/generator in combination with an internal combustion engine to power the vehicle.

4. Based on data for 1999.

5. See Section 5.10 for a wider discussion on hydrogen and also Section 5.6 for a discussion on biofuels which will play an important role in reducing carbon intensity in the nearer future.

6. For example, the Mobility 2030 study suggests that petrol and diesel will remain the primary transport sector fuels until at least 2030 (WBCSD, 2004).

7. Rising demand, from China in particular, war in the Middle East, and hurricanes in the Gulf of Mexico contributed to increasing prices but a shortage of refining capacity was the major factor. The oil industry does not appear to expect this situation to persist as no significant investments in new refineries are planned.

8. This study cautions against over-emphasizing the classification of biofuels as expensive, since many have significant non-market benefits which could mean the net-benefits to society are positive.

9. Where the biofuels are blended with existing petroleum based fuels and the resulting fuel can be used in existing internal combustion engines.

10. ECMT estimate.

11. See *Railway Reform and Charging for the Use of Infrastructure*, ECMT 2005.

4. REVIEW OF MEMBER COUNTRIES' POLICIES

This section reviews the progress member and associate member countries have made in reducing CO_2 emissions from the transport sector. Three progressively more detailed levels have been examined:

- The combined response of ECMT member and associate member countries.
- The response of individual countries.
- The individual policies and measures applied.

Central to this review has been the compilation of both emissions statistics and information on abatement policies. While the emissions statistics were available from both the UNFCCC[1] and the IEA no comparable resource exists for abatement policies. ECMT used national communications to the UNFCCC, more recent policy documentation (where available) and national Government input through ECMT and OECD committees to assemble a database of over 400 CO_2 abatement policies introduced or under or under development. These are summarised in **Chapter 6**.

4.1 Results at an OECD / ECMT level

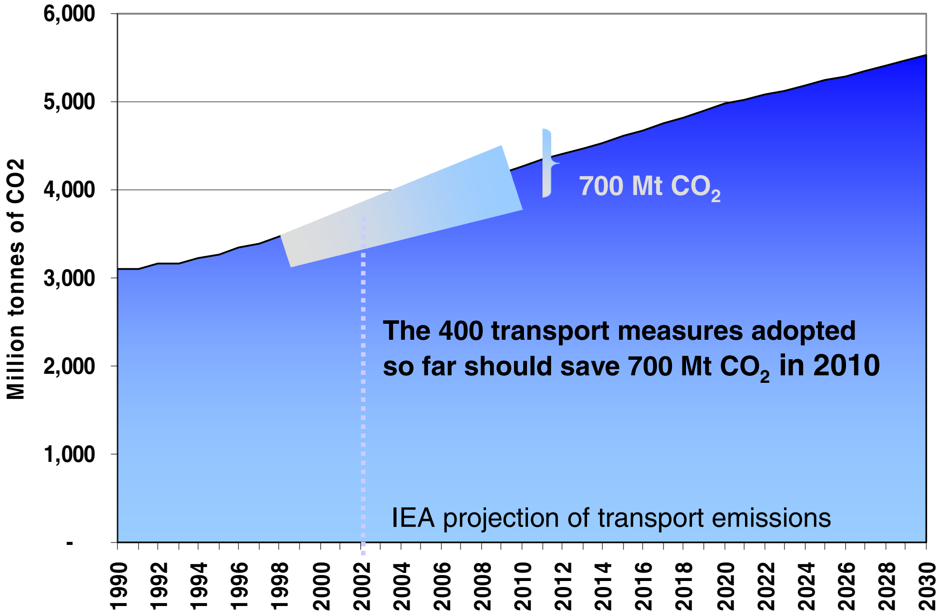
Although some countries have made significant efforts to cut transport sector CO_2 emissions, the policies introduced by ECMT governments to reduce CO_2 emissions have not prevented emissions from the transport sector from steadily increasing over the last ten years. Assuming real household disposable incomes continue to grow at a faster rate than the real cost of transport these trends are likely to continue until well into the future. Assuming economic growth of around 3% per annum between 2002 and 2030 and taking into account technology improvements the IEA's World Energy Outlook projects transport sector CO_2 emissions in ECMT countries will grow at around 1.9% per annum between 2002 and 2010. This raises the very real possibility of 2010 transport sector CO_2 emissions from ECMT/OECD countries being 1.2 billion tonnes higher than 1990 levels.

The IEA includes an "alternative" scenario in its WEO projections that envisages slightly more aggressive pursuit of policies to improve vehicle fuel efficiency, increase sales of alternative-fuelled vehicles and fuels and measures to reduce or manage transport demand. Even in this scenario, however, 2010 transport sector CO_2 emissions in ECMT countries would still be 1 billion tonnes higher than in 1990.

The database of abatement policies includes the estimates **national governments** have made of the potential savings that could result from the policies in place or planned for introduction before 2010. Combined, the quantified potential savings reach 300 – 360 million tonnes of CO_2 in 2010. This range, however, only includes around 60% of the plausible abatement policies reported in the Database. For the other 40% of policies governments have not reported any quantified abatement estimate. ECMT estimates suggest that, at most, a further 370 million tonnes of CO_2 emissions might be avoided.

Therefore, under the assumption that the abatement potential predicted by countries' ex ante analysis is accurate, the maximum savings ECMT countries might achieve by 2010 is perhaps 700 Mt, somewhat over half the projected increase in transport sector CO_2 emission (from 1990 levels). This is crudely illustrated in figure 4.1.

Figure 4.1. **Potential impact of policies identified on projected transport emissions for OECD/ECMT region**



Note: The figure is only intended to give an approximate indication of the significance of the abatement measures discussed. Some of the measures identified may have been included in the business as usual projection shown, and the slope of the curve for emissions with abatement incorporated is difficult to determine from the present analysis.

Source: ECMT based on World Energy Outlook 2004, IEA.

Where policies are clearly unlikely to reduce CO_2 emissions (e.g. where "building new roads" is reported as a measure) or include an implausible estimate of potential abatement, or where it is not possible to identify a specific action (e.g. a policy to "improve fuel efficiency" with no indication of how this will be achieved), these policies are excluded from the remainder of the analysis.

4.2 Country level progress

The best way to evaluate the effectiveness of a country's policy response to the objective of reducing transport sector CO_2 emissions would be to compare trends in transport sector emissions and ex post analysis of specific measures taken by governments. The ex post analysis would enable the effectiveness of individual policy measures to be determined, while the analysis of emissions trends would indicate whether the package of measures was effective overall.

Trends in emissions are available for all ECMT countries. However, it is very difficult to ascertain the contribution of individual government policies to these trends because there is a dearth of ex post analysis – only two policies, the fuel duty escalator and company car tax reform both from the United Kingdom, appear to have been analysed on this basis.

The second best solution is to look at ex ante instead of ex post analysis. As mentioned above, ex ante analysis has only been undertaken for around 60% of policies and the variability in the quality of the analysis render assessment of many countries' performance on this basis impossible.

The quantitative information available could be combined with emission's trends and more qualitative analysis to indicate which countries have adopted the more effective sets of policies but the criteria for assessment are inevitably somewhat subjective.

A more objective approach is to check if countries have targeted a core set of the most effective measures identified in the impact analysis below. Table 4.1 indicates which countries have implemented measures from a selected core list of the policies recommended in this report.

Countries indicated with "∆" have implemented the widest range of recommended fuel efficiency measures (that is, with relatively high effectiveness and/or low cost) including vehicle tax differentiation and addressing both passenger and freight road transport, covering:

- Improved fuel efficiency in cars through differentiated vehicle taxation, complementing a voluntary agreement with manufacturers.
- Regulation, labelling or fiscal incentives for fuel-efficient car components.
- Improvements in operational efficiency of vehicles on the road through eco-driving training or fiscal incentives for supporting instrumentation in cars or trucks and voluntary agreements for improved trucking logistics.
- Fuel efficiency regulations for light or heavy trucks.
- Managing demand through electronic truck km-charges or congestion charges.

It should be noted that the ideal instrument for managing CO_2 emissions is fuel tax as it can be indexed[2] precisely to CO_2 emissions and is cheap to administer. Its main draw back is that fuel taxes are employed for a multitude of purposes, not least raising revenue. This makes application for managing CO_2 emissions politically difficult (thus fuel tax was not included in the criteria for selecting the countries with the most complete set of policies). Very few countries now report fuel taxes as part of CO_2 abatement policy. Germany and the United Kingdom abandoned earlier policies with large estimated impacts on CO_2 emissions. Some current policies, such as in Ireland, are designed primarily to eliminate differences in taxation with neighbouring countries and the problems with tank tourism and illegal imports that can induce. Demand management measures interact with fuel tax policy through their effects on generalised transport costs. Thus the impact of Austria's heavy goods vehicle km-charge and its specific CO_2 abatement policies is masked by its low diesel taxes, which brings large numbers of foreign vehicles across its borders to refuel. This shows up in steeply increasing CO_2 emissions (calculated on the basis of fuel deliveries) in its national statistics.

It should also be noted that because the national communications on CO_2 policies, on which this review is based, generally omit information on local government measures – such as integrated spatial planning and transport policies, protection of space for pedestrians and cyclists and investment in traffic management and guidance systems – these fundamental aspects to managing CO_2 emissions are neglected in the analysis summarised in table 4.1.

Also note that biofuels are not incorporated in the criteria for selecting the countries with most complete set of policies (indicated by "∆"), despite the effectiveness of regulatory blending requirements, because of the relatively high cost of conventional biofuels per tonne of CO_2 abated. Biofuels support is however recorded in table 4.1 for completeness. Tables 4.4 and 6.2 describe the effectiveness of the complete range of policies reviewed.

Table 4.1 **Implementation of core abatement policy measures for the transport sector**

	Fuel efficiency - Passenger cars / Light duty trucks							**Fuel efficiency - Heavy duty vehicles**						**Carbon intensity**		
	Fuel taxation	Emissions regulation	Voluntary agreement with vehicle manufacturers	Vehicle tax differentiation	Efficiency of vehicle components - Regulation, fiscal or information	Devices for on-road fuel efficiency - Regulation or fiscal	Information and education encouraging fuel efficient driving	Fiscal demand management	Emissions regulation	Efficiency of vehicle components - Regulation, fiscal or information	Devices for on-road fuel efficiency - Regulation or information	Voluntary agreement with freight operators	Information and education - Fuel efficient driving or logistics	Regulatory	Fiscal - Fuel taxation	Fiscal - Vehicle taxation
Albania																
Armenia																
Australia			✓												✓	
Austria			✓	☑				☑					☑	✓	✓	Δ
Azerbaijan																
Belarus																
Belgium			✓	☑			☑									
Bosnia Herzegovina																
Bulgaria																
Canada			✓				☑			☑	☑	✖	☑		✓	
Croatia																
Czech Republic							☑							☒	✓	
Denmark			✓	☑	☑		☑			☑					✓	Δ
Estonia															✓	
European Union	✓		✓	✖							☑					
Finland			✓	✖	☑		☑			☑		☑	☑	☒		
France	✓		✓				☑						☑	✓	✓	
FYR Macedonia																
Georgia																
Germany			✓	☑			☑	☑							✓	✓ Δ
Greece			✓	☑												
Hungary															✓	
Iceland					☑					☑						
Ireland	✓		✓	☑								☑			✓	
Italy			✓	☑											✓	

	Carbon intensity			Fuel efficiency - Heavy duty vehicles						Fuel efficiency - Passenger cars / Light duty trucks						
	Fiscal - Vehicle taxation	Fiscal - Fuel taxation	Regulatory	Information and education - Fuel efficient driving or logistics	Voluntary agreement with freight operators	Devices for on-road fuel efficiency - Regulation or information	Efficiency of vehicle components - Regulation, fiscal or information	Emissions regulation	Fiscal demand management	Information and education encouraging fuel efficient driving	Devices for on-road fuel efficiency - Regulation or fiscal	Efficiency of vehicle components - Regulation, fiscal or information	Vehicle tax differentiation	Voluntary agreement with vehicle manufacturers	Emissions regulation	Fuel taxation
Japan	◁ ⊠					⇲		⇲	×				⇲		↘	
Korea																
Latvia		⊠														
Liechtenstein	↘															
Lithuania		↘														
Luxembourg													⇲	↘		
Malta																
Mexico																
Moldova																
Netherlands		⊠	⊠	⇲						⇲	⇲		↘	↘		
New Zealand																
Norway	↘						⇲					⇲	⇲			↘
Poland																
Portugal		⊠												↘		
Romania																
Russia																
Serbia & Montenegro																
Slovakia		⊠														
Slovenia		↘	⊠													↘
Spain	◁	⊠		⇲						⇲			⇲	↘		
Sweden	↘	↘		×			⇲			×		⇲	×	↘		↘
Switzerland	◁	⊠							⇲	⇲			⇲	↘		
Turkey																
Ukraine																
United Kingdom	◁	↘	⊠	⇲						⇲			⇲	↘		⊠
United States of America		↘			⇲								⇲		↘	

	Fuel efficiency - Passenger cars / Light duty trucks							Fuel efficiency - Heavy duty vehicles						Carbon intensity		
	Fuel taxation	Emissions regulation	Voluntary agreement with vehicle manufacturers	Vehicle tax differentiation	Efficiency of vehicle components - Regulation, fiscal or information	Devices for on-road fuel efficiency - Regulation or fiscal	Information and education encouraging fuel efficient driving	Fiscal demand management	Emissions regulation	Efficiency of vehicle components - Regulation, fiscal or information	Devices for on-road fuel efficiency - Regulation or information	Voluntary agreement with freight operators	Information and education - Fuel efficient driving or logistics	Regulatory	Fiscal - Fuel taxation	Fiscal - Vehicle taxation
USA - Alaska															✓	
USA - California		✓			☑											
USA - Hawaii														☒		
USA - Idaho															✓	
USA - Iowa															✓	
USA - Maryland				☑												
USA - Minnesota														✓		
USA - Montana														✓		
USA –New Jersey																
USA - New York				☑												
USA - Oregon				☑												
USA – South Dakota															✓	
USA - Utah																
USA - Washington																

Key

☑	Recommended core measure implemented
×	Recommended core measure planned
✓	Other measure implemented
☒	Other measure planned
Δ	Countries with measure including vehicle tax differentiation and addressing both passenger and freight road transport

4.3 Analysis of policies by impact type

The lack of ex post analysis of policies means it is only possible to learn from countries expectations and not from the actual results achieved by the policies implemented. This section proceeds on the basis that, while this is not an ideal situation, some useful information can still be obtained. This section firstly explores the expectations by "impact type" to see whether it is possible to ascertain whether national analysis shows that one impact type is likely to achieve greater results than another. Next, the combined effect of impact types and policy approaches is analysed.

It is important to acknowledge the inherent weakness of this approach – if countries have not properly considered a particular impact type it will not receive favourable attention in the following analysis. As a result it is important that the theoretical discussions of both impact type and policy approach (Section 2) are kept in mind when developing conclusions about future policy developments.

Table 4.2 summarises the status and impact type of the policies listed in the database. In addition to the policies listed here there are around 30 policies that have not been counted because they are classed as either research and development or a "policy process" (e.g. a change in legislation which makes it possible to introduce a certain initiative but does not implement a specific measure). Both are very important elements of government action on CO_2 emissions but because they do not result in any direct CO_2 savings they are excluded from further analysis.

The policies listed in the last column ("Inadequately Defined") are those referred to in Text Box 1. They are considered extremely unlikely to reduce CO_2 emissions because they exert no influence on one of the technical, economic or social factors which determine the current level of emissions.

Fuel efficiency measures are separated into two categories for clarity: technical efficiency includes regulations prescribing vehicle performance, the EU's voluntary agreements with passenger car manufacturers, etc.; on-road efficiency covers, for example, voluntary agreements with freight transport operators to improve their logistical organisation and encourage drivers to achieve better fuel economy.

Table 4.2 **Status of policies reported, by impact type**

Impact Type	Active	No Longer Active	Planned	Under Investigation	Implausible or Inadequately Defined	Total
Carbon Intensity	43	1	17	3	7	71
Demand	7	0	5	6	6	24
Fuel Efficiency - Technical	60	4	12	9	18	103
Fuel Efficiency - On-road	31	1	5	0	31	68
Modal Shift	51	0	15	2	46	114
Other	2	1	2	0	19	25
Policy process and R&D*	24	0	5	2	0	31
Total	218	7	61	22	127	436

* These indirect policies were not included in the semi-quantitative analysis that follows.

Table 4.3 shows the expected "percentage impact" of policies adopted by ECMT and OECD governments according to their impact type. The "percentage impact" is calculated as the average of the expected abatement potential for 2010 (e.g. 5 Mt CO_2 from an energy intensity policy) for countries that have submitted quantitative abatement estimates. Of course the abatement potential of a policy is intrinsically linked to the size of the transport sector it is applied to – a policy promoting efficient freight logistics in the UK might save 5 Mt CO_2 in 2010 but in Belgium it might only save 2 Mt CO_2. The impacts are therefore presented as percentages of the 2002 transport sector CO_2 emissions from the country concerned.[3] Columns two and three in the table indicate the number of countries and the number of policies being pursued in the different impact type categories. **All** plausible policies are included in this table – where abatement estimates are not available they have been estimated on the basis of the "percentage impacts" achieved by other similar policies.

Table 4.3 **Average "impact" of policies based on countries' projections of expected CO_2 savings in 2010**

Impact Type	Number of Countries with Active Polices	Number of Active Policies with quantifiable impacts	Number of Active Policies with quantified estimate	Average "Percentage Impact" (including estimates for planned and discontinued policies)	CO_2 Savings from Active Policies in 2010 (Million tonnes)**
Carbon Intensity	31*	43	11	1.57%	102
Demand	5	7	4	1.63%	12
Fuel Efficiency – Technical	28*	60	15	3.39%	323
Fuel Efficiency – On-road	20*	31	11	1.85%	114
Modal Shift***	28	51	14	1.21%	67

* The EU is included as if it were a single country where the policy was introduced across Member States through an EU Directive.

** Note that this column includes abatement from policies that were not quantified by national governments but for which ECMT was able to estimate abatement.

*** Promotion of walking and cycling is included under the heading modal shift; 12 countries report such policies, whilst all 28 include policies to promote motorised modes.

It is clear from the results shown in Tables 4.2 and 4.3 that, in terms of the number of policies being pursued, countries place improving technical fuel efficiency and optimising the modal mix on an equal footing. Policies to reduce carbon intensity and to improve on-road fuel efficiency have also been given a prominent role, while reducing demand is largely overlooked. The number of planned policies in Table 4.3 shows an increasing focus on carbon intensity, mainly biofuels, and a continued focus on influencing modal split, while more technical fuel efficiency policies may be some way off (9 measures under investigation).

The large number of modal shift policies is believed to be the result of following a "co-benefits approach" to CO_2 abatement policy in the transport sector. That is, governments have selected abatement policies that also contribute to the achievement of other transport policy goals (or wider other government objectives), in particular access to low cost public transport and reducing congestion. This is a sensible approach to public policy and, indeed, was part of the recommendations of ECMT's 1997 review of CO_2 emissions from transport. The present situation may, however, reflect an over-emphasis on the co-benefits approach.

For example, the prominence given to modal shift policies is somewhat at odds with the average "percentage impact" results shown in Table 4.3. These indicate that modal shift policies tend to achieve only a third the impact of a fuel efficiency policy and three quarters of the impact of a carbon intensity policy. The end result is played out in the final column of the table, where fuel efficiency (both technical and on-road) policies are expected to contribute 437 million tonnes of CO_2 abatement in 2010 relative to the 67 million tonnes expected from modal shift policies. Carbon intensity policies are also expected to result in greater abatement than modal shift policies, from a smaller number of policies. (See however the remarks at the end of section 5.5 on Urban policies – integration of spatial planning and transport policies, modal shift, walking and cycling and land value taxation).

It is therefore recommend that all countries adopt at least two "core business" CO_2 abatement policies – one fuel efficiency policy and one carbon intensity policy. A co-benefits dominated approach appears unlikely to achieve sufficient abatement in the transport sector. It might reasonably be concluded from this level of analysis that when further opportunities to reduce CO_2 emissions from the transport sector are sought a first step should be to investigate whether the potential for improved fuel efficiency has been exhausted yet.

4.4 Performance of policies implemented

In this section, CO_2 abatement policies are ranked through an analysis of the average "percentage impact" achieved, both according the impact type (e.g. fuel efficiency) and the policy approach employed (e.g. voluntary agreement). A total of 22 different combinations are currently employed by OECD and ECMT governments, the top seven by average "impact" (scoring over 2%) are shown in Table 4.4 – they account for around 40% of the total estimated abatement derived from national *ex ante* assessments and from ECMT estimates for the remaining plausible policies. Details of all 22 different combinations can be found in Chapter 6, Table 6.2. The tables also indicate the number of countries that have implemented each measure and the percentage of 2002 OECD/ECMT region CO_2 emissions that these groups of countries account for.

Table 4.4 **Ranking of the most effective combination of impact type and policy approach (full list in table 6.2)**

Rank	Impact type and policy approach (with examples)	Average "Percentage Impact"	Range of "Percentage Impact"	Number of Countries	Percent of OECD/ECMT CO_2 Emissions Accounted for by these Countries	CO2 Savings from Active Policies in 2010 (Million tonnes)***
1	Utilising increases in fuel excise taxation to improve technical fuel efficiency, e.g.: • The Fuel Duty Escalator in the UK and the Ecological Taxation initiative in Germany (both no longer active). • Gradual increases in excise tax in Ireland to prevent bunkering of fuel.	7.1%	3.7% - 15.4%	6*	23%	62
2	Improve technical fuel efficiency using voluntary agreements: • EU agreements with European, Korean + Japanese vehicle manufacturers on improving fuel efficiency. • Agreements in Australia, Canada and Switzerland.	4.6%	0.7% - 9.6%	4*	29%	86
3	Improve technical fuel efficiency through fiscal incentives**, e.g.: • Circulation tax for cars in Austria differentiated by engine power. • Danish car purchase tax differentiated by fuel consumption and fuel type.	4.0%	3.2% - 4.5%	14*	69%	22
4	Improving on-road fuel efficiency through information and education, e.g.: • Eco-driving campaigns for car and truck drivers.	2.8%	0.5% - 3.95%	11	18%	60
5	Reducing carbon intensity of fuels through regulation: • Biofuel blending obligations.	2.6%	2.5% - 2.8%	3	4%	4
6	Improving technical fuel efficiency through information, e.g.: • EU vehicle fuel efficiency labelling Directive.	2.2%	0.5% - 3.4%	14*	30%	16
7	Reducing demand for travel through fiscal measures: • Swiss, German and Austrian truck km-charges. • Sweden's tax on private use of company cars.	2.1%	0.2% - 3.5%	4	6%	12

* The EU is included as if it were a single country where an EU Directive prescribes a policy.
** The company car tax differentiation in the UK and tax incentives for Japanese TopRunner cars are excluded here as they apply only to very small sections of the car market. Nevertheless the impact ratings for these measures are 2% and 1% respectively.
*** Note that this column includes abatement from policies that were not quantified by national governments but for which ECMT was able to estimate abatement.

4.4.1 Improving fuel efficiency through increasing fuel excise tax

The impact type/policy approach combination that ranks the highest in terms of "percentage impact" is improving fuel efficiency through fiscal incentives on fuels – i.e. the regular increase of excise duties levied on transport fuels. This approach is being pursued by 4 countries (Ireland, Norway, Slovenia and Sweden) representing just 1% of ECMT/OECD CO_2 emissions. The United Kingdom also plans increases in fuel duty in line with inflation but has twice delayed planned increases as a result of rising pre-tax oil prices. It should be noted that Ireland is increasing its fuel taxes primarily to reduce fuel tourism and smuggling across the border with the UK. An EU Directive sets a floor for fuel taxes to prevent excessive tax competition between Member States, but its impact on CO_2 emissions is limited as it forced only a very small number of countries to raise tax rates. France also reports fuel tax policy as contributing to its climate change policies but in this case the objective is to promote sales of diesel cars through a large differential between diesel and petrol taxes.

In addition to providing an incentive for increased technical fuel efficiency, this type of policy is also likely to create an incentive for increased on-road fuel efficiency and decreased demand for transport. In a review of elasticities of demand for transport Goodwin (2004) found that, if the price of fuel were to increase by 10% and be sustained at that level, then the…

"*…volume of traffic will fall by roundly 1% within about a year, building up to a reduction of about 3% in the longer run (about 5 years or so).*

Volume of fuel consumed will fall by about 2.5% within a year, building up to a reduction of over 6% in the longer run."

A further consequence of the price rise was found to be that

"…Efficiency of the use of fuel rises by about 1.5% within a year, and around 4% in the longer run."

In addition to the 4 countries currently pursuing this impact type/policy approach combination three other countries (Denmark, Germany and the United Kingdom) previously applied this approach to rather greater effect, but have since discontinued their policies. This type of policy is particularly effective if it adjusts excise duties annually, as was the case in the UK, in order to keep the cost of transport in line with increases in real incomes. The potential for fuel carbon taxes to influence consumption is theoretically largest where current fuel taxes (levied for whatever purpose) are below the average for the OECD/ECMT region.

The experience of the UK fuel duty escalator, introduced in 1993 and frozen in 2000, and opposition to increases in Germany's eco-tax demonstrates the political difficulties involved with policies that operate through fuel taxes. Public acceptability is unlikely to cease to be a constraint on the use of fuel carbon taxes for the foreseeable future. There remain, however, some special cases where increases in fuel excise tax are to be expected: to prevent trucks carrying large quantities of fuel in spare tanks across borders; and similarly to prevent "fuel tourism" in the passenger sector.

4.4.2 Vehicle fuel efficiency voluntary agreements and regulations

The impact type/policy approach combination that ranks second highest in terms of "percentage impact" is improving fuel efficiency through voluntary agreements with car manufacturers, importers and distributors to improve the fuel efficiency of new cars. This approach is being pursued by the EU (with European, Japanese and Korean manufacturers) and 3 countries Australia, Canada and Switzerland.

Similar policies, which use regulation instead of voluntary agreements, are already in place in

Japan and the USA – these do not appear in Table 4.4 as the relatively weak standards in the USA with its large market bring down the average impact for efficiency standards.

Taking voluntary and regulatory standards together, 80% of CO_2 emissions from ECMT countries are targeted. Furthermore, the countries that contribute the remaining 20% of ECMT CO_2 emissions source the vast majority of their vehicles from one of the countries covered by a voluntary agreement or a regulation. These countries will, however, need to ensure that they do not become a dumping ground for less efficient vehicles.

4.4.3 Improving vehicle fuel efficiency through fiscal incentives

CO_2 differentiated vehicle taxation can play an important complimentary role to voluntary agreements and regulations that require manufacturers to improve fuel efficiency. The primary influence of the latter policies is to ensure a specific vehicle is designed for greater fuel efficiency than it would otherwise have had. They do not tend to have a significant influence on the make up of the vehicle fleet – for example, on the size of vehicle consumers purchase. This has meant that change in fashions, such as the trend towards sports utility vehicles (SUVs) and increasing power to weight ratios, have significantly reduced the impact of improvements in specific fuel efficiency. Differentiated vehicle taxation can be an effective mechanism of influencing such trends and would also make achieving the targets set under voluntary agreements easier for industry to meet by encouraging consumers to buy the best performing models.

Table 4.5 provides details of the differentiated vehicle taxes currently in place in ECMT countries, all of which cover only cars.

Table 4.5 **Vehicle taxes on cars, differentiated according to CO_2 emissions or similar**

Country	Status	Purchase Tax	Circulation Tax	Company Car Tax
Austria	Active	Fuel consumption	Engine Power	
Belgium	Active	Engine Volume	Engine Volume	
Canada	Active	Tax unknown, base is fuel consumption or CO_2		
Denmark	Active	Fuel consumption (with petrol/diesel differentiation)		
Finland	Planned	Unknown	Unknown	
Germany	Active		Engine volume, with petrol/diesel differentiation	
Ireland	Active	Engine volume		
Italy	Planned	Engine power		
Luxembourg	Active	Engine volume		
Japan	Active	Unknown		
Netherlands	Planned	CO_2 emissions		
Norway	Active	Engine power and volume; vehicle weight		
Poland	Unknown	CO_2 emissions		
United Kingdom	Active		CO_2 emissions	CO_2 emissions (purchase tax)
United States*	Active	Fuel efficiency (only over a threshold of 10.4 litres/100 km)		

Note: * The so-called Gas Guzzler Tax in the US has received considerable criticism for its failure to include SUVs.

Improving vehicle fuel efficiency through fiscal incentives ranks third in the impact type/policy table above. There is considerable potential for differentiating vehicle taxes in more countries, improving the basis for differentiation, increasing the range of vehicles subject to incentives and increasing the size of the incentives created.

Only five of the measures listed in table 4.5 use CO_2 emissions as the basis for differentiation (or fuel consumption adjusted for petrol and diesel engines). As section 5.1 shows this is a more effective approach than basing differentiation on a proxy such as engine displacement or power or weight.

A number of schemes differentiate taxes above or below a certain threshold. For example the US Gas Guzzler Tax applies if rated fuel consumption exceeds 10.4 litres per 100 km. In Japan a tax reduction applies only to a small number of the most efficient cars.

4.4.4 Improving on-road fuel efficiency through information and education

Improving on-road fuel efficiency through information and education achieves 4th place in the impact type/policy approach ranking. Significant opportunities appear to exist to expand initiatives in this area. Only 11 OECD/ECMT countries have initiatives in place and many of them focus on either passenger cars or road freight, but not both.

Initiatives in this area should focus on the very cost effective Eco-Driving programmes for car drivers, pioneered by the Netherlands, and on initiatives to improve logistics management and the fuel economy achieved by truck drivers.

For cars, tax incentives for fitting fuel efficiency feedback devices such as econometers and shift indicator lights proved highly effective in an extensive Dutch programme at the beginning of the decade, currently suspended.

4.4.5 Reducing carbon intensity of fuels through regulation

Regulations to reduce the carbon intensity of fuels through biofuel blending are increasingly widespread – especially among European Union countries attempting to meet the requirements of Directive 2003/30/EC. So far only two countries have introduced such policies, however at least eight are planning to or seriously investigating the option. Minimum ethanol blending regulations have also been introduced in the US States of Minnesota and Montana.

The initiatives proposed vary from country to country. The main feature in common is the introduction of a legal obligation on fuel supply companies to ensure that biofuels account for a certain percentage of their total fuel supply on the national market[4]. Obligations are already in place in France and Austria and will come into force shortly Slovenia (2006), the Czech Republic (2007) and the Netherlands (2007). The UK and Germany have recently said that they will introduce blending obligations (EC, 2005).

Biofuel obligations have the advantage over subsidies for the production of specific biofuel feedstocks or for processing plants in that they can be made neutral as to which types of biofuel are promoted (although in practice they are sometimes designed to target a specific fuel and feedstock). Subsidiary regulations can be designed to provide incentives for companies to move towards second generation biofuels that are expected to be much more cost effective than conventional biofuels (see discussion in Section 5.4). “Carbon certification” would enable governments to set targets on the basis of fossil carbon saved (based on well to wheels analysis) rather than on volume or the energy content of fuels. "Sustainability certification" would go further and assess whether the entire production chain was sustainable – attempting to prevent deforestation and negative biodiversity impacts.

To an extent, biofuel obligations are constrained by the limits fuel quality standards place on the blending of ethanol and biodiesel with conventional transport fuels, limiting blends to 5% in Europe, 10% in North America, Australia and New Zealand and 20% in Minnesota and Japan. In the longer term as second generation biofuels become available these restrictions should be lifted.

The impact type/policy approach combination of reducing carbon intensity through fiscal incentives is ranked 8th in terms of "percentage impact" (scoring just under 2%). 18 countries already utilise this type of initiative, generally via a reduction on the excise duty applied to biofuels in order to make them cost competitive with petrol and diesel from fossil fuels.

There may be opportunities to increase the abatement achieved through conventional biofuels by encouraging trade in those that perform best under "well to wheels" analysis, for example by removing import duties, rather than promoting production of relatively poorly performing fuels locally. The best performing conventional fuel is ethanol from sugar cane (which converts sunlight to sugars relatively efficiently) in Brazil where the production process has been optimised using cane waste to fuel refineries. At the same time guarantees may need to be sought that production of imported fuels produced from these and other crops such as palm oil do not result in environmental damage in the countries of production, including the destruction of forests.

Governments should in any case try to avoid policies that structurally lock them into promoting the production of specific crops that could become a barrier to commercialising lower carbon second generation fuels produced from cellulose and woody biomass and from agricultural and forestry wastes.

4.4.6 Improving technical fuel efficiency through information

Provision of information on the fuel efficiency of vehicles and vehicle components ranks 6th in terms of the effectiveness of measures implemented in OECD and ECMT countries. 11 countries have introduced these measures, most involving the labelling of vehicles. An EU Directive requires this of Member States but implementation is so far partial and rather inconsistent. Each country uses a different label, rating vehicles according to different parameters and with a mix of approaches combining best absolute performance with best in vehicle class. A uniform label of the kind developed for consumer white goods would be more effective, not least on the supply side since manufacturers market vehicles internationally. The FIA Foundation has attempted to correct this failure with its own Eco Test, publishing the performance of vehicles across Europe with its own protocol. Vehicle labelling systems should be linked to differentiated vehicle taxes for maximum effect.

A small number countries label the environmental performance of vehicle components for the after-sales market. Scandinavian countries use the Nordic Swan label to indicate the best tyres on a combined index covering rolling resistance (CO_2 emissions, noise and safety).

4.4.7 Reducing demand for travel through fiscal measures

The impact type/policy approach combination of reducing demand through fiscal incentives achieves a percentage "impact" of just over 2% – making it the 7th ranked combination. However, this result is based almost entirely on Germany's forecasting of the effects of its distance based toll for trucks, the LKW Maut, introduced in 2005. A similar scheme in Switzerland has been in place longer (since 2001). Swiss CO_2 emissions from trucks are estimated to be 6-8% lower in 2007 than would have been the case without the 2001 change in regime; half of this is attributed to the charge and half to a change in maximum weight limit for trucks. The impact of road pricing depends greatly on the size of the charges – the Swiss charges are significantly higher than the German charges – this is also an important factor in determining the cost-effectiveness of such systems.

NOTES

1. See www.unfccc.int

2. Approximate figures for kilogrammes of CO_2 emitted per litre of fuel consumed with current engines are: diesel 2.6; gasoline 2.4; sugar beet and grain ethanol 1.4; rapeseed biodiesel 1.3; sugar cane ethanol 0.3 (central estimates for a wide range in the case of biofuels). Sources: CONCAWE, EUCAR and ECJRC 2003a; IEA 2005 (biofuels).

3. It would be preferable to use the forecast 2010 emissions for the transport sector, however, this information can not be obtained for all countries.

4. Note that this is not a requirement to blend a certain percentage of biofuels into each litre of conventional petrol or diesel.

5. POLICY OPTIONS FOR THE FUTURE

5.1 Differentiated vehicle taxation

As noted in Section 1.5, ECMT ministers agreed in a 1991 resolution that industry efforts to improve the fuel efficiency of new cars should be reinforced by suitable vehicle taxation. In July 2005, the European Commission proposed in a draft Directive on passenger car related taxes[1] that would substantially shift the tax base towards specific CO_2 emissions. Under the proposal registration and purchase taxes would be phased out over a five to ten year period in favour of annual circulation taxes. Member states would have to derive 25% of total car tax revenues from CO_2-based elements by 31 December 2008. The figure will then rise to 50% by 2010. The draft Directive is currently before Council. Differentiation of taxes on the basis of CO_2 emissions will help achieve the full potential of EU voluntary vehicle efficiency targets. At the same time purchase and registration taxes have more influence on consumer choice than annual circulation taxes. Consumers tend to discount future costs and savings heavily in their purchase decisions.

A study undertaken for the European Commission's Directorate-General for Environment analysed the potential for CO_2 differentiated taxation to reduce the CO_2 emissions from new cars "*Fiscal measures to reduce CO_2 emissions from new passenger cars*" (COWI A/S, 2002). It was found that the average emissions of new passenger cars could be reduced by about 5% on average by 2008 if existing tax bases were converted to a CO_2 differentiated system – without increasing government revenues. This gain would not require an increase in the proportion of new diesel cars nor any vehicle downsizing (i.e. purchasing of cars with smaller capacity engines). Furthermore, it did not include any changes to company car taxation schemes in the analysis.[2] See below for more information on this study and the impacts that might result from the various different designs of a CO_2 differentiated taxation system.

Based on the known impacts of existing schemes, ECMT estimates that if all member and associate member countries were to take up best practice CO_2 differentiated vehicle taxation, additional CO_2 abatement of the order of 80 million tonnes per annum might be achieved by 2010 or shortly thereafter.

A second study, "*Impacts from CO_2 differentiated vehicle taxes*" (Naturvårdsverket, 2002) explores the introduction of differentiated vehicle taxation in Sweden. This provides useful insight into whether governments should introduce a new tax or reform existing taxes. It explores the introduction of CO_2 differentiated vehicle taxation in Sweden using two mechanisms:

- The introduction of a **new vehicle registration** tax including both a value dependent element (10% of the value of the car) and a CO_2 dependent element (880 SEK (approximately 94 EUR) for each gram of CO_2 per kilometre above the specified reference level).

- The addition of a (revenue neutral) CO_2 element to the **existing circulation tax**, set at 44 SEK (approximately 5 EUR) for each gram of CO_2 per kilometre above the reference level.

The CO_2 elements in both taxes were allowed to be negative (i.e. to provide an incentive for cars below the reference level as well as a penalty for cars above the reference level), but were not allowed to reduce the tax below zero (i.e. subsidies were not permissible).

The study found that the new vehicle registration tax would produce more favourable CO_2 abatement – reducing total CO_2 emissions from the car fleet by approximately 5% per annum after

20 years or just over 1% per annum after 5 years. The circulation tax would lead to a smaller reduction of approximately 2% per annum after 20 years, and about 0.5% per annum after 5 years.

While the introduction of a registration tax was found to provide greater CO_2 benefits, the study also showed it would have negative effects:

- It would increase the vehicle age (since the rate of scrapping was reduced).
- It would reduce the size of the car fleet, which would incur a substantial welfare loss.[3]

As a result of the reduced size of the car fleet and the consequent welfare loss, the introduction of a new registration tax would have a greater cost to society than it would have benefits. In contrast, the introduction of a CO_2 element to the existing circulation tax (in a revenue neutral manner) would produce greater benefits than costs.

The obvious conclusion to be drawn from this study is that CO_2 differentiated vehicle taxes are only likely to be cost-effective, from a societal perspective, if they are introduced in a revenue neutral fashion. Of course, this does not rule out incorporating CO_2 differentiation into a new tax (or increases to an existing tax) if it is being introduced for another reason, such as increasing government revenues. In fact, in this situation it would be even more imperative that the new tax, or tax increase, was introduced via CO_2 differentiation. Otherwise the increased average age of the vehicle fleet could result in an *increase* in CO_2 emissions.

The COWI study applied a vehicle choice model across nine European Union countries to determine the impact that various changes in vehicle taxation would have on the specific CO_2 emissions (i.e. grams of CO_2 per kilometre) of vehicles being purchased. Three key boundary conditions were placed on the analysis – there was to be no increase in the proportion of diesel cars being sold, no downsizing of the engines in the vehicles being sold and no effect on government revenues (based on 1999 data). The model was then applied to three different scenarios:

- Scenario 1: The enhanced differentiation of existing taxes.
- Scenario 2: The addition of a CO_2 element to existing taxes.
- Scenario 3: The replacement of existing taxes with pure CO_2 differentiated taxes.

Table 5.1 below shows the results of this analysis. In virtually every case the replacement of existing taxes with a pure CO2 differentiated tax is the most effective option. However, it is also obvious that when the tax base is already closely related to specific CO_2 emissions the benefits of switching to a pure CO_2 tax base are not significant (see Chapter 6 for more information on the tax bases and rates used in these countries). For example, Denmark's circulation tax is currently based on fuel consumption (i.e. litres per 100 kilometres) with a differentiation for petrol and diesel and Scenario 3 only improves performance by one tenth of a percentage point over Scenario 1. Similarly, the gains in Germany from converting the existing circulation tax, which is based on engine volume with a petrol/diesel differentiation, to a pure CO_2 differentiated tax are small.

Table 5.1 **Percentage reduction in grams of CO_2 per kilometre in 2008 for the different scenarios modelled**

	Belgium	Germany	Denmark	Italy	Nether -lands	Portugal	Sweden	Finland	UK*
Scenario 1: Enhanced differentiation of existing taxes									
Registration tax	2.5	-	3.3	-	3.6	1.8	-	2.5	-
Circulation tax	2.4	4.4	5.4	2.7	3.6	1.9	2.4	0.1	4.8
Scenario 2: Adding a CO_2 element to existing taxes									
Registration tax	3.3	-	4.6	3.0	3.4	2.1	-	2.8	-
Circulation tax	2.9	4.4	5.0	3.3	4.0	2.1	3.2	3.1	-
Scenario 3: Purely CO_2 differentiated taxes									
Registration tax	3.5	-	8.4	1.8	5.5	3.2	-	4.3	-
Circulation tax	4.2	5.0	5.5	4.1	6.0	2.3	3.9	3.5	4.7
Combination	5.1	4.9	8.5	4.0	7.0	3.3	3.8	4.3	4.5

Note *"*In interpreting the results, it should be noted that the UK circulation tax is already explicitly related to CO2 emissions. Therefore, the results provided from the calculations serve to illustrate the order-of-magnitude additional CO2 reductions that could be provided by strengthening the relation and the progression of the tax in the UK. Given the existing CO2 relation of the tax system in the UK, the results from the various scenarios for the UK simply presents the implications of applying the three different underlying functional relations.*" (p16. COWI, 2002).

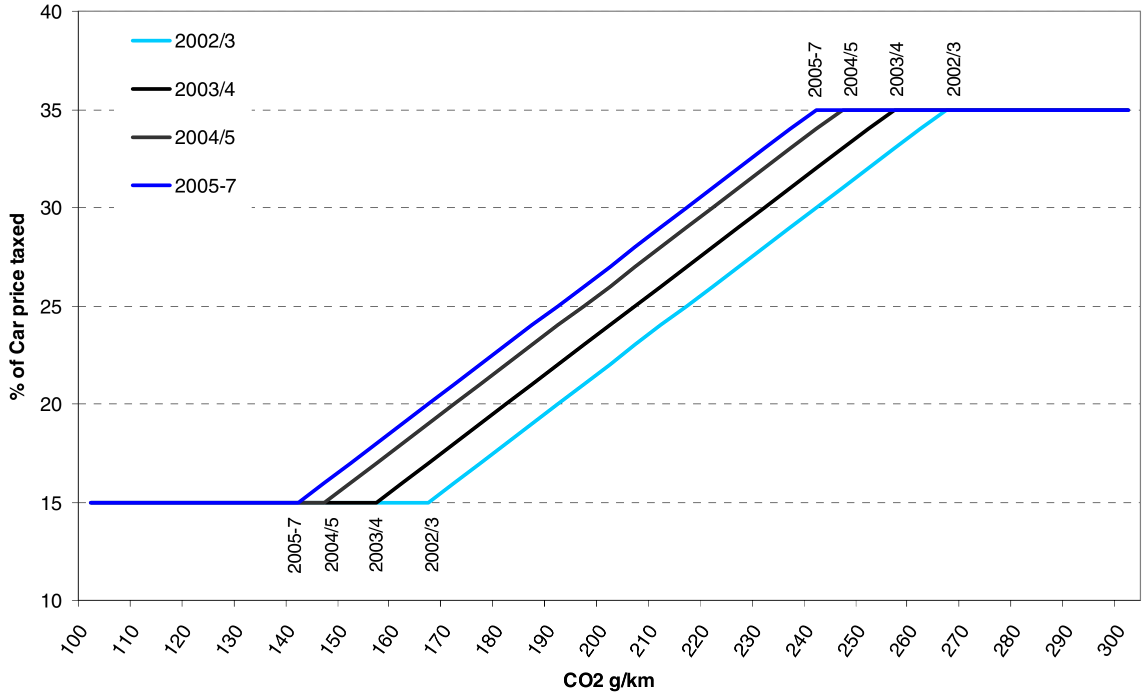
Source: COWI 2002.

The United Kingdom already differentiates its tax on company cars according to CO_2 emissions across the full range of vehicle types on the market. This provides a model for tax differentiation and the results are highly visible (see Figures 5.1 and 5.2). Company cars are now on average more fuel efficient than private cars in the UK, the reverse of the situation that prevails elsewhere. Incentives were strengthened in the government's 2006 Budget.

It should be noted that as company cars account for only a relatively small part of the car market, the impact of the UK's differentiated company car taxation calculated as a percentage of the countries transport sector emissions is limited (1.98%) and not therefore included in the calculation of the average effectiveness of vehicle tax differentiation rates in Chapter 4. The same is true of the tax incentives available to Japanese "Top-Runner" vehicles (1.03%) because these are limited to a very few top performing models.

The UK has also differentiated vehicle excise duty (annual circulation tax) according to CO_2 emissions. (This tax is included in the analysis in chapter 4). To strengthen environmental incentives the Government increased the differentiation of the tax in its 2006 Budget, reducing rates for better than average vehicles, reducing the rate to zero for the small number of cars with the lowest carbon emissions and creating a new higher tax category for the worst performing vehicles (see Figure 5.3).

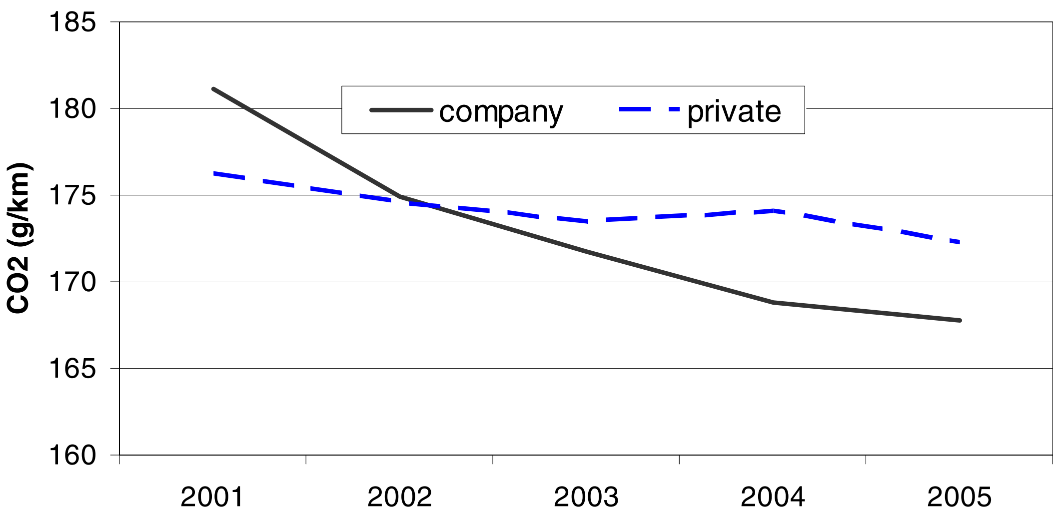
Figure 5.1. **Company car tax differentiation in the United Kingdom**



Add 3% if car runs solely on diesel to a maximum of 35%.

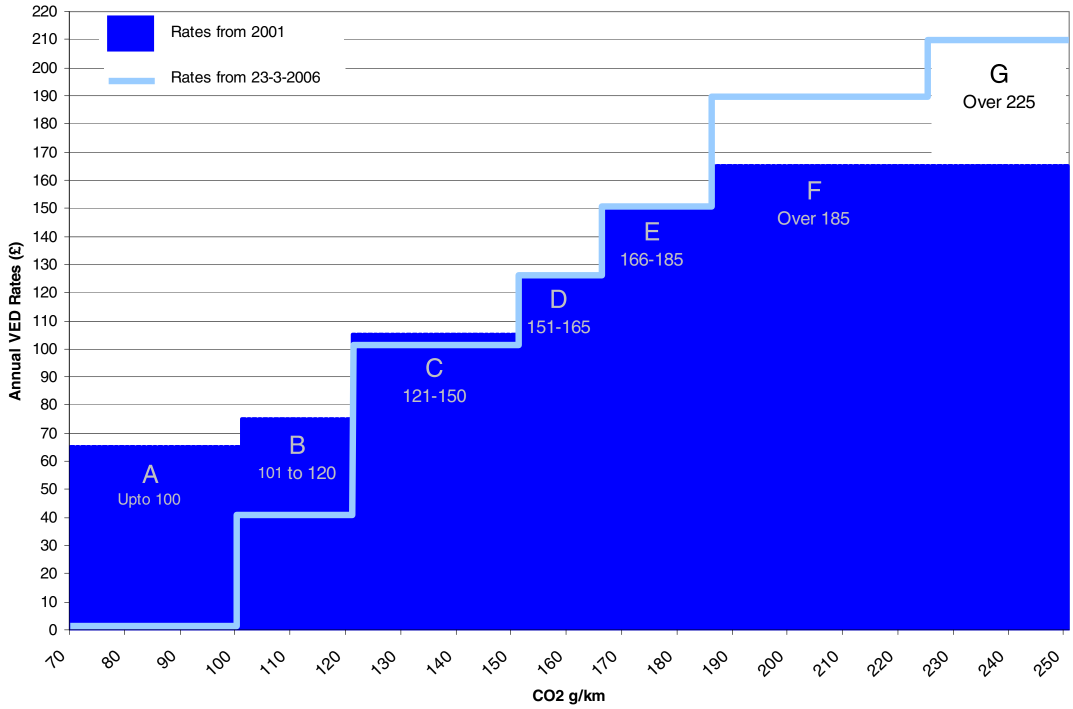
Source: Department for Transport.

Figure 5.2. **New car average CO_2 emissions in the United Kingdom**



Source: Driver Vehicle Licensing Agency.

Figure 5.3. **Differentiation of annual circulation tax for private cars in the United Kingdom**



Rates for petrol cars shown. For Diesel fuelled cars, add £10 to tax in Band A to E, and £5 to Band F (adjustments in 2006 unknown). For Alternatively fuelled cars, minus £10 from tax in Band A to E, and £5 from Band F. £1 is approximately equal to EUR 1.4.

Source: Department for Transport and UK Treasury Budget Statement 2006.

5.2 Regulatory and voluntary fuel efficiency standards

Increasing the abatement achieved by voluntary agreements with car makers and by regulatory limits for CO_2 emissions from new cars depends firstly on progressively tightening targets over time. Regulatory limits and voluntary targets are compared in Figure 5.4. The USA and Japan (and China) regulate passenger car fuel efficiency, and Japan also plans to regulate heavy duty vehicle fuel economy during 2006.

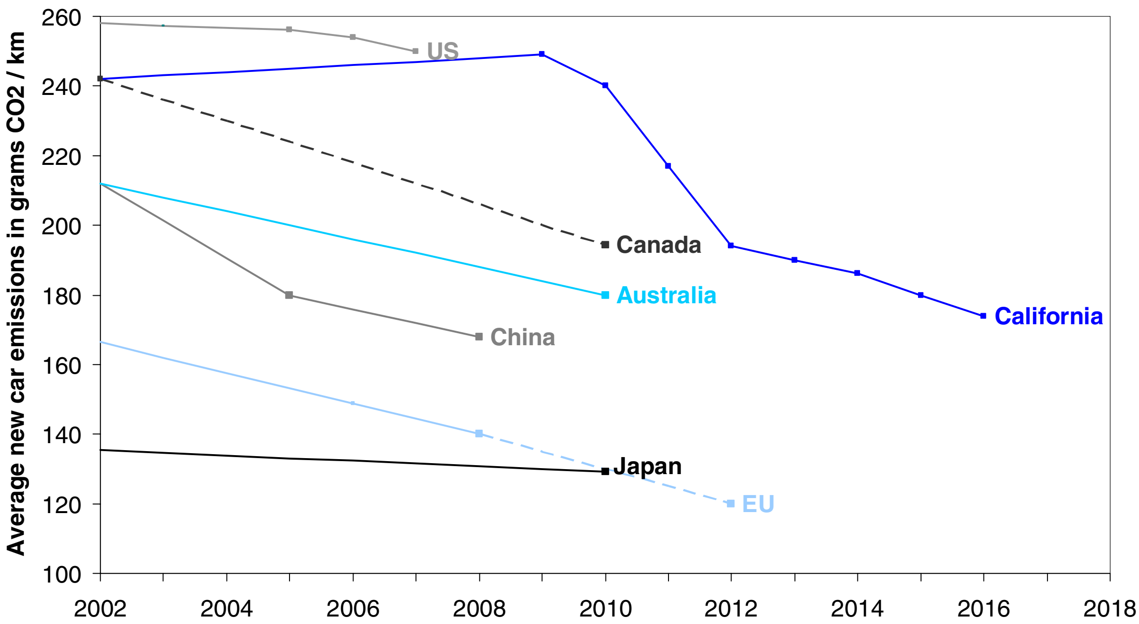
Table 5.2. **Japanese fuel economy standards for heavy duty vehicles**

	2002 average emissions	**2015 target**	**Change**
Trucks	415 g CO_2/km	370 g CO_2/km	12.2%
Buses	466 g CO_2/km	416 g CO_2/km	12.1%

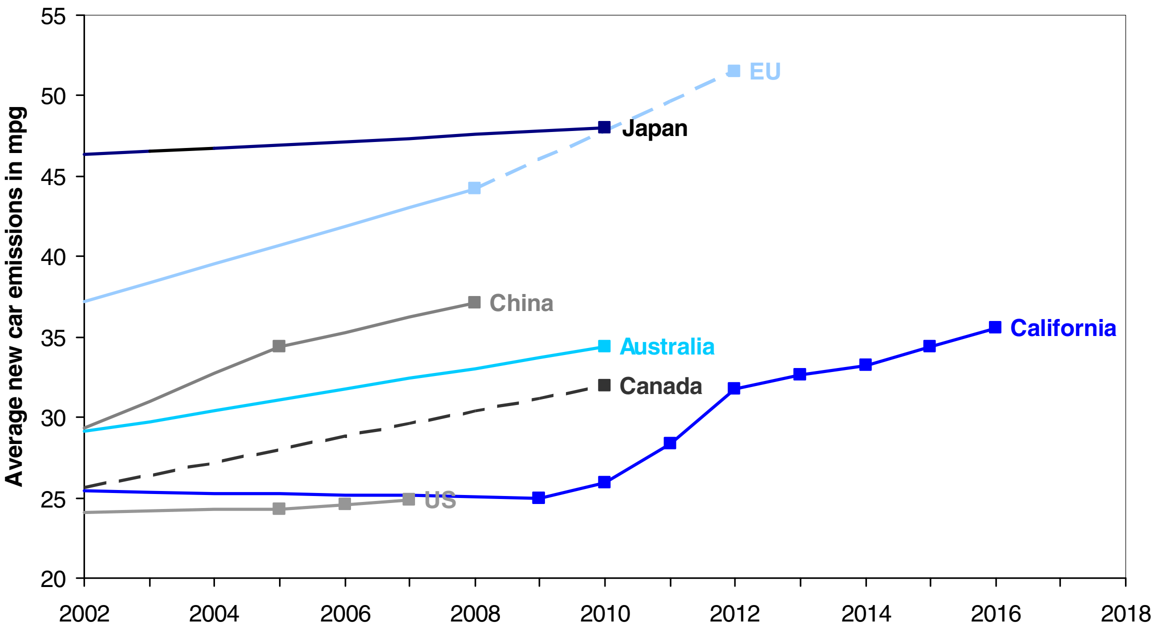
Source: ECMT.

Figure 5.4. **Worldwide passenger car fuel economy and CO_2 emissions standards and average new car emissions in 2002**

Grams CO_2/km, normalised on the basis of the New European Driving Cycle test



Miles per Gallon, normalised on the basis of US CAFE standards



Note: Dotted lines indicate proposed standards or targets.

Source: Comparison of passenger vehicle fuel economy and greenhouse gas emission standards around the world, Feng An and Amanda Sauer, PEW Center on Global Climate Change, 2004.

The EU and its Member States, Australia, Canada and Switzerland all employ voluntary targets for car manufacturers and importers. Japan has by far the most ambitious regulatory standards, but the EU voluntary targets are of a similar order. USA standards are far less ambitious and are subject to only modest revisions except in California. The State Government of California implemented a programme in January 2006 to progressively tighten standards to Australian/Chinese levels (see figure). A challenge to the legality of this legislation has been filed in the courts by vehicle manufacturers and will be heard in early 2007.

Few governments have targeted the fuel efficiency of light and heavy trucks with these policies though the USA set regulatory standards for light trucks in 2004 and Australia plans to extend its voluntary agreement to cover trucks up to 3.5 tonnes. The European Commissions first Climate Change Programme envisaged extending the voluntary agreements with car manufacturers to cover commercial vehicles up to 3.5 tonnes but negotiations have not so far begun. Natural incentives for fuel efficiency in the light commercial vehicle segment are less evident than for heavy duty vehicles, particularly for small businesses. A number of Governments have adopted standards for the fuel efficiency of government owned vehicles but there appears to be an opportunity in many countries to target a larger number of vehicles by extending voluntary targets or regulatory limits to all light commercial vehicle models.

For heavy trucks, fuel is a major item in operating costs and fuel efficiency is therefore an important factor in the choice of vehicles purchased by fleet operators. The market thus already drives improvements in engine and vehicle design, although smaller operators may not be in a position to respond effectively to fuel price signals. Japan regulates heavy duty vehicle CO_2 emissions, and expects to see a quantifiable benefit. All governments are encouraged to monitor the impact of the Japanese standards to determine if a similar approach would bring benefits elsewhere.

Regulatory and voluntary standards will need to be progressively tightened to maintain their value in driving technological innovation. Clearly the weaker targets (see Figure 5.4) can be brought closer to the tighter existing targets round the world, despite differences in the types of vehicles on sale in each market. There is scope for tighter standards in Europe and Japan too, the real issue is the appropriate time scale for achieving new targets. In Europe, however, before new targets are set vehicle taxes should be differentiated more widely to transform the market for new cars and encourage consumers to purchase the low emission vehicles already on offer – see previous section. Targets could also be improved if they were based on improved fuel consumption test cycles for vehicle certification that more closely reflect real world driving conditions.

5.3 Regulatory and voluntary fuel efficiency standards for vehicle components

Vehicle components that are not tested for efficiency in certification procedures, such as tyres, air conditioners, alternators, lubricants, lights and so on should be tested and labeled. It might also be possible to give credit in some cases under the existing regulations and voluntary agreements to the cars that perform best under typical conditions and driving styles with ancillary equipment in use.

Each OECD region has standard efficiency labeling systems for electrical equipment in the household and commercial sectors. The familiarity of these systems among consumers could be made use of by adopting similar labels to identify certain vehicle components and replacement parts. Michelin has proposed such a system for car tyres. It follows the approach to regulating vehicles in California as set out in Table 5.3 and Figure 5.3 and is designed to move the market towards more efficient tyres.

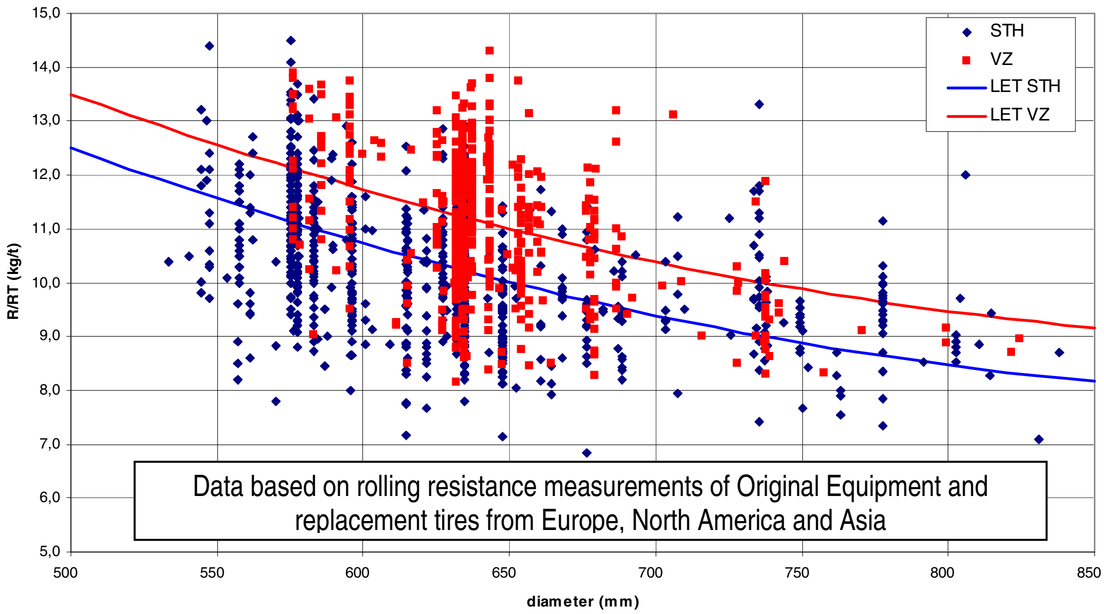
Table 5.3 **Possible classification for fuel-efficient tyres**

Vehicles		Tyres	
LEV	Low Emission Vehicle	LET-1	Low Energy Tyre level 1
LEV-2	Low Emission Vehicle level 2	LET-2	Low Energy Tyre level 2
ULEV	Ultra Low Emission Vehicle	ULET-1	Ultra Low Energy Tyre level 1
ULEV-2	Ultra Low Emission Vehicle level 2	ULET-2	Ultra Low Energy Tyre level 2
SULEV	Super Ultra Low Emission Vehicle	SULET	Super Ultra Low Energy Tyre
ZEV	Zero Emission Vehicle	NZET	Nearly Zero Energy Tyre

Source: Dominique Aimon, Michelin, IEA Energy Efficient Tyre Conference, 2005. http://www.iea.org/Textbase/work/2005/EnerEffTyre/aimon2.pdf

Three main characteristics determine the rolling resistance, and thus the fuel efficiency, of tyres: external tyre diameter; tread depth; and tyre speed index. This index categorises tyres according to their maximum design speed: S for 180 kph; T for 190; H for 210; with a second group for high performance cars: V 240; W 270 and Y 300 kph. Higher speed tyres require different designs for tyre structure. There are trade-offs between rolling resistance, rated speed and tread depth but better and worse performing tyres are on the market in each performance category. This is illustrated by the vertical spread of points in Figure 5.5 which plots rolling resistance for tyres on the European market against diameter (normal and high performance rated tyres are identified by the shape and colour of the points). The curves on the graph suggest a suitable boundary for classifying low energy tyres.

Figure 5.5. **Current better and worse performing tyres in all market segments: rolling resistance in relation to tyre diameter for normal (STH) and high performance (VZ) tyres**



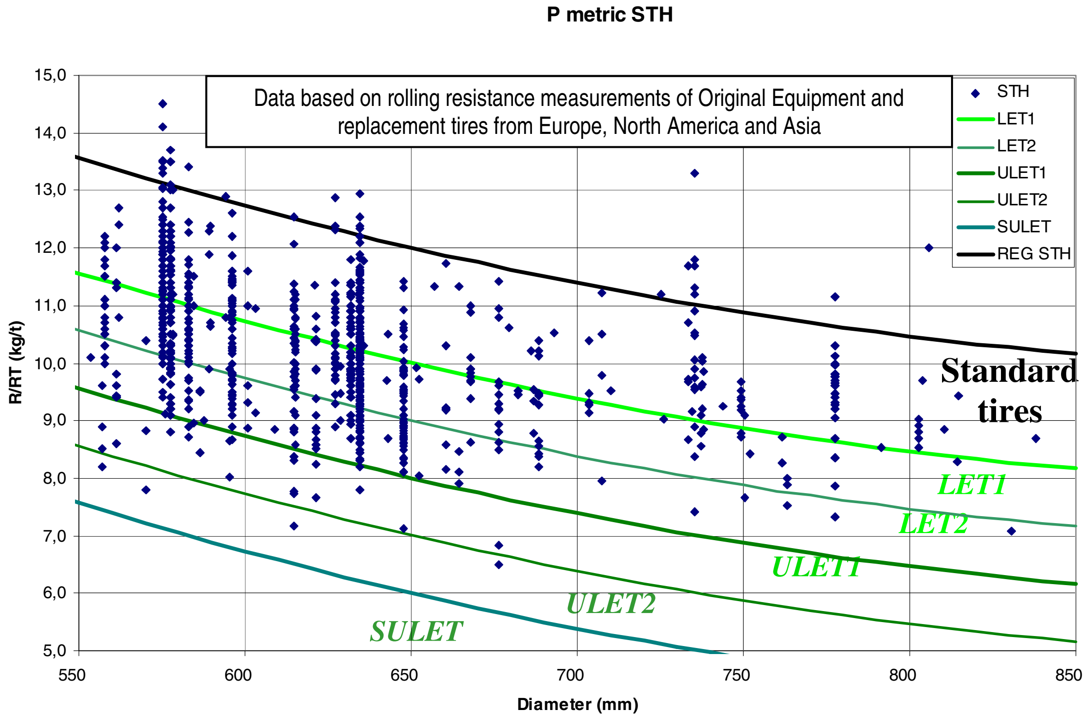
Source: Aimon, Michelin, IEA 2005.

It will be important to move all types of tyres in the direction of improved fuel economy and Michelin has proposed a regulatory minimum standard and categories (or "bins")[4] for low, ultra low and super-ultra low energy tyres, designed to provide more or less equal incentives for all segments of the market. The rolling resistance performance levels for the regulatory standard and the bins are illustrated for normal (S, T and H) tyres in Figure 5.6.

A similar approach would be worthwhile for commercial vehicles. Tyre rolling resistance for commercial vehicles is estimated to be responsible for up to one third of the fuel they use.

For car components that are not usually routinely replaced, such as lights, a minimum regulatory standard is also indicated, based as with tyres on factors that determine efficiency across market sectors, possibly with tighter future standards set in a parallel way to the performance bins suggested for tyres.

Figure 5.6. **Possible regulatory minimum standard and energy efficiency "bins" for standard tyres**

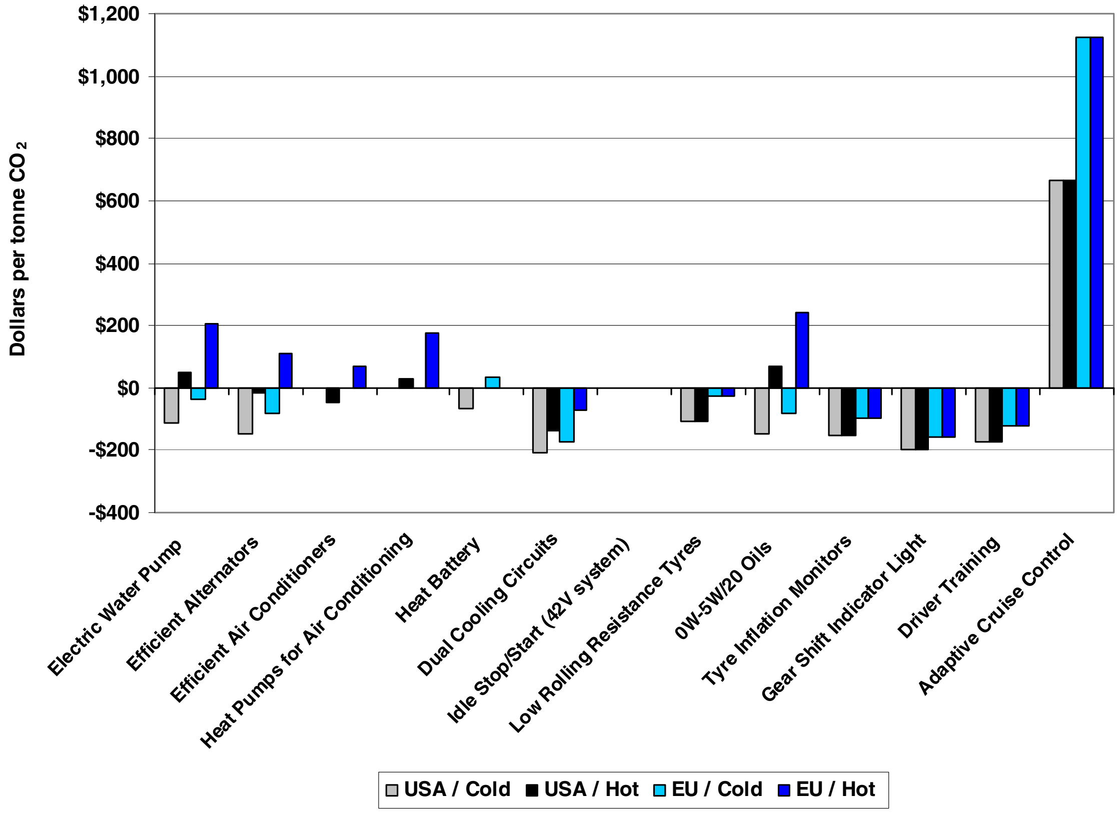


Source: Aimon, Michelin, IEA 2005.

The countries of the Nordic Council already include tyres in their Nordic Swan labelling system. This rates tyres on a composite index that includes noise and safety characteristics as well as rolling resistance. The State government of California has begun the process of developing regulations for tyres along the lines proposed by Michelin, starting with a consultation with industry launched in 2005. Standards are expected to be agreed some time in 2007.

Where such systems are introduced for labelling tyres and other vehicle components, they could be accompanied by tax incentives for maximum effect. The key car components that might benefit from these kinds of regulatory standards, labelling and fiscal incentives are examined in detail in the joint ECMT-IEA publication *Making cars more fuel efficient* (ECMT 2005). Figure 5.6 summarises the estimated net costs to the consumer[5] of CO_2 emissions abatement for vehicles incorporating of these technologies. It should be stressed that because these components are not tested in vehicle certification procedures manufacturers currently have incentive to introduce them, even where negative costs are shown.

Figure 5.7. **Net CO_2 abatement costs for gasoline cars**



Source: ECMT/IEA, Making cars more fuel efficient – technology for real improvements on the road, OECD 2005.

Note that some of the components covered in Figure 5.7 are currently optional extras rather than standard components: tyre pressure inflation monitors and gear shift indicator lights and adaptive cruise control. These are amenable to promotion through tax incentives in the same way as standard components. The government of the Netherlands cut taxes on in-car instrumentation that provides feedback for fuel efficient driving, such as shift indicator lights, econometers and cruise control, over a period of two years to great effect.

5.4 Reducing emissions from road freight

Governments already have a number of policies in place to attempt to reduce CO_2 emissions from road freight. Expected growth in freight movement in the coming years will mean this sector will become increasingly important. As stated above ECMT believes there is significant opportunity for governments to reduce CO_2 emissions in this sector with greater application of initiatives to improve logistics and fuel efficiency practices. In the first instance governments should focus on information-based campaigns, but once these are in place and running well they should be followed up with strong voluntary agreements that commit companies to improved performance. European Union countries would benefit from integrating these programmes with the requirements of Directive 2003/59/EC to make (initial and periodic) training for commercial drivers compulsory, and in particular the requirement of Article 7 of this Directive that periodic training should include a specific focus on rationalisation of fuel consumption (and road safety).

The potential CO_2 abatement from the application of these initiatives is very difficult to calculate and is bound to vary significantly from country to country. Analysis of fleets in the UK, a country with some of the highest fuel prices in the ECMT, gives perhaps the best indication (McKinnon, 1999) of the potential. This study found that, if fleets performing below the mean energy intensity were able to achieve this mean then fuel savings of around 10% would be achievable.

Examples of promising initiatives of this kind can be found in the Canada, Japan and the US.

In the **United States**, the Environmental Protection Agency (EPA) invites both fleet operators and companies with a high freight demand (shippers) to sign up to the "SmartWay Transport Partnership"[6]. In order to attract both parties to the partnership the EPA has developed a "SmartWay" endorsement logo that highlights the fleet operator or shipper as a "superior environmental achiever" – an adaptation of the EPA's very successful EnergyStar® programme developed for electrical appliances.

To become part of the Partnership, fleet operators have to commit to measuring their environmental performance (the EPA has developed a simple software tool to aid companies with this), set a goal for improved environmental performance, develop an action plan to achieve this goal and report progress annually to the EPA. Shippers must commit to similar actions for their freight facility operations as well as for increasing the percentage of their freight moved by SmartWay Partnership members to 50% or above. In return the EPA will provide technical guidance on reducing emissions, as well as with setting up these goals and action plans. The partnership will focus on technical measures, especially to reduce idling.

Around 150 fleet operators, 25 shippers and 7 operator/shippers have currently signed up to the partnership. Expectations are high for the CO_2 savings that will result from the programme, 33-66 Mt CO_2 in 2010 – this is the largest saving anticipated for an initiative listed in the CO_2 Abatement Policies Database from a single country.

The FleetSmart[7] initiative in **Canada** includes actions to reduce CO_2 emissions through both behavioural and technical improvements. Training in fuel efficient driving is provided to drivers through the "SmartDriver" initiative. Technology improvements are encouraged through a rebate programme. The rebate scheme is open to all fleet operators (not just FleetSmart members) and is currently available for technologies such as cab heaters and auxiliary power units. The rebates are set at 20% of the purchase price, with a cap and are only available for an approved range of products. In order to receive the rebates, operators must submit information about idling practices and a six month extended warranty is offered as an incentive to submit usage information after 12 months.

A Memorandum of Understanding was recently signed by the US SmartWay partnership and the Canadian FleetSmart initiative in order to promote fuel efficiency amongst cross-border operators.

Japan has taken a slightly more forceful approach in its attempts to improve the efficiency of logistics. Legislation was recently introduced that requires the 500 largest companies in Japan to annually report the environmental effects incurred by the transport that their business requires. There is an expectation that these effects, including CO_2 emissions, will be reduced. Companies who do not achieve reductions will be publicly named.

5.5 Urban policies – Integration of spatial planning and transport policies, modal shift, walking and cycling and land value taxation

The great majority of the population in OECD and ECMT countries already lives in cities and migration to cities continues. An increasing proportion of transport CO_2 emissions are therefore generated in and around cities and their volume determined by the way cities are organised. A structured settlement development policy is a pre-condition to managing traffic growth and CO_2 emissions without restricting the access to services that mobility provides (UBA 2005). Planning for mixed (workplace, residential and leisure) development patterns can limit the demand for long motorised journeys and planning for higher density land use patterns, limiting urban sprawl, can favour public transport. However, if land-use planning proceeds without consideration of prices and transport facilities, objectives are unlikely to be met (see 3.2.1). The availability of public transport, and the frequency and quality of services available is critical. And more than anything, the relative costs of transport between the modes determines the pattern of transport demand. Relative prices can change markedly over time as Figure 5.8 shows. Details on trends in fuel taxes are given in an Annex and reveal falling costs in real terms in most OECD and ECMT countries in line with the pattern for France shown here.

The generalised cost of end-to-end journeys by each mode, including cycling and walking, is important. Generalised costs include time spent travelling and looking for parking, the value attached to reliability of journey time, as well as the financial costs of bus or rail tickets, costs of car ownership and wear and tear, fuel, parking and possible congestion or city centre access charges.

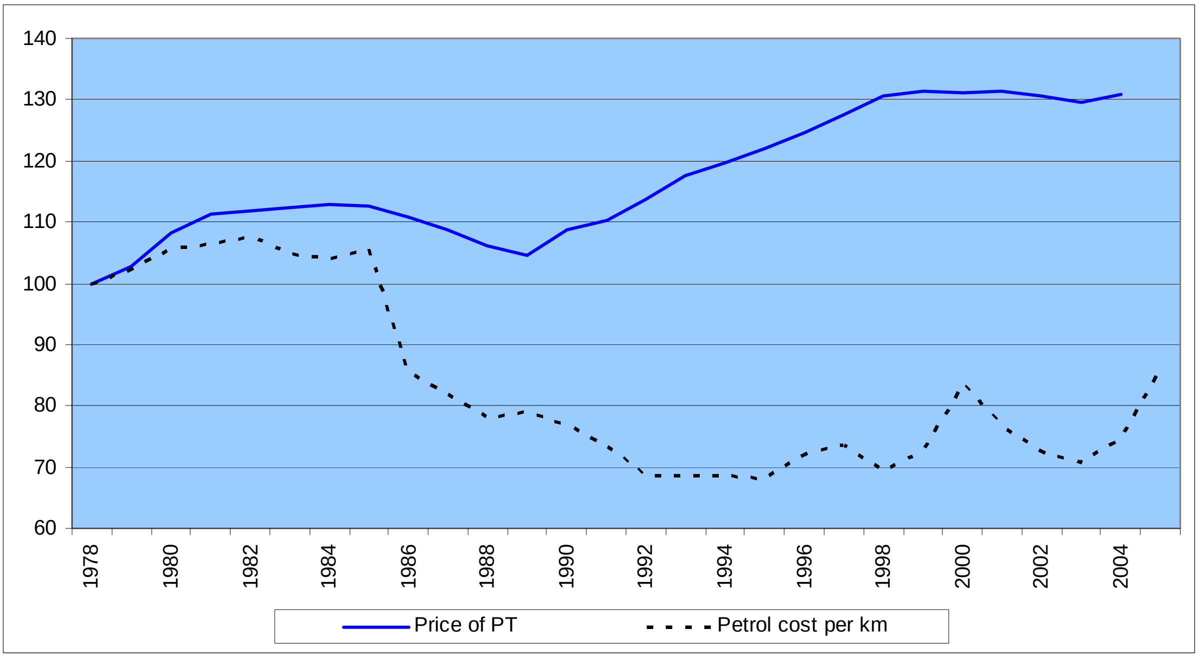
Large changes in travel behaviour generally only happen when policies change several of these cost elements at the same time in a co-ordinated fashion. A good example is provided by the London Congestion Charge that is estimated to have reduced CO_2 emissions by 20% in the charging area (and without a significant increase in traffic or emissions around or outside the charging boundary). Some important complementary policies were already in place and public transport systems in London are able to offer an alternative to car use. Notably, on-street parking is charged for and charging extremely strictly enforced. The Congestion Charge ended free use of valuable land (roads) for private car users and significantly increased the financial part of the generalised costs of using cars. Reduced congestion and greatly improved reliability for journey times cut costs for car users, but these changes also benefit bus users, indeed the impact on bus journeys is highly visible to users. Revenues from the charge have been spent mainly on increasing the frequency of bus services, further improving the quality of service on offer and successfully attracting a large increase in passengers. Unlike the case with most investments to improve bus services, new users are mainly former car drivers rather than predominantly pedestrians and cyclists. There has also been an increase in mobility for existing bus users as a result of the better service.

The reduction in congestion has also improved the environment for walking and cycling in London. These modes are generally neglected in transport policies, even at the local level, despite their overwhelming importance in the total volume of mobility and the significance of walking as the final leg in many motorised journeys. Additional elements in the generalised cost equation are important for these non-motorised modes, including:

- The availability of useable pavement space (not blocked by parked cars, delivery vehicles, road “furniture”, café seating, etc).

- Protection from motorised traffic – on pavements and in cycle ways.
- Priority at junctions and the time it takes to cross roads (rarely, if ever, factored into traffic management models or traffic light programming).
- The quality of the environment – noise, air pollution, dog waste, potholes etc.

Figure 5.8. **Trends in relative prices for public transport and car use in France**
(Index for ticket prices and for fuel costs per km for car use)



Notes: With limited increases in subsidies, PT prices increased 30% over the period whilst fuel costs for operating private cars fell around 30% as a result of the large fall in oil prices in the mid 1980s, substitution of diesel for petrol cars and average engine efficiency gains of 1% per year.

Source: INRETS, 2005. (Calculations by INSEE for public transport and INRETS for car use based on CPDP and SOFRES data).

Policies to encourage car users to substitute walking or cycling for some of their journeys offer significant potential to reduce CO_2 emissions but need to target improvements in all of these areas. Denmark provides some particularly good examples of promoting cycling. In Copenhagen, the capital city, one fifth of all trips are made by bicycle and as much as one third of all home to workplace journeys. The city continues to invest in improvements to the cycling environment in order to safeguard this performance, which contributes to maintaining both a good quality environment and free flowing traffic conditions. Finland achieves high shares of walking and cycling in its city traffic despite harsh winter conditions by investing in cycling infrastructure and promoting the benefits of physical activity. Unlike Denmark and most other countries, Finland reports these measures in it national communications on CO_2 abatement policies.

There are fiscal tools to support integrated spatial planning and transport policy at an even more fundamental level than congestion pricing. Land value taxation (known also as location benefit levy) can be used in place of conventional local property taxes (residential and business rates, and development taxes). This has been used very successfully in the redevelopment of Harrisburg, Pennsylvania in the US and Denmark uses land value taxation to fund local government expenditure. LVT uses an annual assessment of the value of land (not buildings) to determine the tax to be paid annually by urban land owners for infrastructure and other services such as sewers, refuse collection, public transport and so on. The value of urban land is to a large extent determined by access to these public services. For example the value of the land on which an office block is located can be multiplied several times over by the opening of a new underground railway station nearby. Under conventional models of taxation and finance for public transport, large windfall cash gains accrue to the owners of buildings on such land whilst finance for urban rail investments is always difficult to find. LVT can be used to enable the beneficiaries to pay for these kinds of investment. The result is an increased and more optimal supply of public transport and substitution of an efficient tax for conventional taxes that impede development of the local economy. Unlike taxes on property development, the system promotes rather than hinders redevelopment of inner city sites. It encourages development where public infrastructure is already in place, as opposed to encouraging sprawl into greenfield sites that government is then obliged to service, and it acts as a powerful incentive to bring derelict sites into productive use as the tax has to be paid what ever the land is used for. The potential contribution of LVT to reducing CO_2 emissions is large, although the benefits it offers for economic development are the primary argument for its more widespread introduction. The UK ministry of finance is currently reviewing the potential of this instrument.

The impact of some of these urban policy measures in reducing CO_2 emissions is not easy to estimate, and impossible on the basis of national reporting as they are very poorly covered in submissions to the UNFCC and the EC, but can be large as the London Congestion Charge illustrates. The measures are often primarily directed at achieving non-CO_2 welfare and economic benefits and following a co-benefits approach enhances their cost-effectiveness. They represent an essential part of the strategy to limit transport sector CO_2 emissions, even if, as argued elsewhere in this report, measures to promote technological and on-road fuel efficiency offer the largest emissions reductions in the short to medium term.

5.6 Biofuels

The potential

The theoretical potential for using biofuels in the transport sector is vast – every year plants capture roughly 36 times as much energy as ECMT member and associate member countries consume in their transport sectors (Smil, 2004). The bulk of this energy will never be available to the transport sector – about 40% is already used for activities including farming and forestry (although waste biomass from these sectors is a potential feedstock). A substantial proportion of the remaining 60% supports ecological processes essential to human existence as well as representing and sustaining the planet's biodiversity (Upton, 2004).

Establishing how much of this theoretical potential it might be technically feasible to convert into fuels suitable for the transport sector is a challenging exercise. An IEA (2004) "Biofuels in Transport" study summarises some of the recent attempts to calculate both the technical and the economic potential. The studies summarised in the IEA report place the technical potential in the region of 50 to 455 exajoules[8] in 2100, if all biomass was converted into liquid biofuels.[9] Studies of the economic potential are less common, but one (Johnson 2002, cited in IEA, 2004) suggests that, in 2050 it might be around 50% of the technical potential. In a more conceivable timescale Johnson estimates that sugar cane ethanol alone could contribute 6 exajoules (1 billion barrels of oil equivalent) at "low cost" by 2020.

Improvements in the technologies used to convert biomass into liquid fuels suitable for transport will be key to unlocking this potential. The conversion process is likely to be the largest component of the price of biofuels at the point of sale (CONCAWE, EUCAR and ECJRC, 2003). The other two major cost elements, feedstock and distribution, are likely to be fairly inflexible.

The IEA (2004) study provides and excellent summary of the current technological state-of-play for biofuels, the following section is a brief summary.

Commercial scale biofuel production currently relies on two technologies:

- The transesterification of oil or fat to produce biodiesel – from feedstocks such as vegetable oils (from oilseed crops) or animal fat. The technologies involved in this process are mature and unlikely to yield major cost reductions in the future.

- The fermentation of sugars into ethanol. Feedstocks include sugar beets or sugar cane and cereals such as corn and wheat. Enzymes are used to convert the starch in the kernels of cereals into sugars.

The more exciting prospect for reducing the costs (and improving the greenhouse gas performance) of biofuels lies in technologies that have the potential to extract much more energy from the biomass. The oil, sugar and starch extracted in the above processes make up a tiny percentage of the plant's mass. Advanced biofuels focus on extracting energy from the remainder of the plant, which is almost entirely composed of cellulose and hemicellulose (together 30 to 70%), and lignin (0 to 30%). In addition to greater extraction efficiencies, advanced biofuels would be able to utilise a wider range of feedstocks (including dedicated 'energy crops' and wastes) that reduces the conflict with food and animal feed production. Furthermore, all the energy required in the production processes comes from biomass itself, consequently improving the well to wheels greenhouse gas emissions.

The key to unlocking the potential of cellulose and hemicellulose biomass is a process known as "saccharification" that converts this material into sugars that can then be fermented into ethanol. Various processes, thermal, chemical and biological, are being considered, however, the most promising appears to be "consolidated bioprocessing." Essentially this combines the two processes of breaking down the cellulose or hemicellulose into sugar and of fermenting the sugar into ethanol into just one process.

A second advanced biofuel technology involves the gasification of biomass and its subsequent conversion into a fuel. Target fuels include: synthetic gasoline or diesel (via the Fischer-Tropsch process), methanol, dimethyl ether (DME) or gaseous fuels including methane and hydrogen. In all cases the conversion to the final fuel can be done with biomass derived energy, contributing to a high well to wheels greenhouse gas efficiency. The key part of the process is the gasification.

Gasification of biomass into methane, using anaerobic digestion is already relatively common throughout the world. New processes, which replace the biological process with a thermal or chemical process are being explored. The choice between thermal and chemical processes tends to be determined by the lignin content of the feedstock. If the lignin content is high a thermal process is required.

The IEA (2004) offers the following summary of current technological state-of-play.

It appears that all techniques for biomass gasification and conversion to liquid fuels are as or more expensive than [the conversion of cellulose to sugar], *followed by fermentation. With both types of approaches, costs will need to come down substantially – by at least half – in order for these fuels to compete with petroleum fuels at current world oil prices.*

"Well to wheels" analysis is a valuable tool for analysing the effects of changes to fuel type and vehicle technology, since one tends to affect the other. The overall effects on CO_2 emissions can only be understood if all the emissions incurred in the supply chain are reported against the kilometres achieved by the end user. The European Council for Automotive Research and Design (EUCAR), the association for the Conservation of Clean Air and Water in Europe (CONCAWE)[10], and the Joint Research Centre of the European Commission (JRC) recently completed a major well to wheels study (EUCAR, CONCAWE & ECJRC, 2003, 2003a, & 2004). This study analysed the well to wheels CO_2 efficiency of a range of transport fuels and powertrains relevant to Europe in 2010 and beyond.

Table 5.4 shows the well to wheels performance of a range of biofuels. With the exception of the first two fuels (the Fischer-Tropsch diesel and the Di-Methyl Ether) all are conventional biofuels. The third column in the table shows the specific CO_2 emissions these fuels would achieve using possible 2010 engine technologies. For the final two columns, the study envisaged a hypothetical scenario of 5% market penetration – that is, the fuels shown will be used in 5% of the kilometres travelled in the European Union in 2010 (approximately 250 billion kilometres). The table shows estimates of the resulting CO_2 savings and the cost of achieving these savings.

Although very costly based on the 2010 timeframe, the above results indicate that significant reductions in CO_2 emissions could be achieve through biofuels. The above table also highlights the significantly greater promise from advanced biofuels. The Fischer-Tropsch diesel and Di-Methyl Ether (DME), both produced from wood provide the largest CO_2 reductions of all the fuels shown, and the latter fuel is also the most cost-effective. As the gasification technologies mature these fuels hold promise for the future.

The IEA report on biofuels offers the following summary analysis.

[Figure 5.9] compares the cost of reducing greenhouse gas emissions from several types of ethanol. Taking into account well to wheels GHG reductions and incremental costs per litre, in a standard analysis, one can see that ethanol from grain in IEA countries currently costs US$ 250 or more per tonne of CO_2 – equivalent GHG emissions. In contrast, if large-scale plants using advanced conversion processes were constructed today, ethanol from cellulosic feedstocks would cost more per litre, but would provide GHG reductions at a lower cost per tonne (around $200). Over the next decade the costs of producing cellulosic ethanol may drop considerably, bringing cost per tonne down to $100 or even $50. Ethanol produced today in Brazil, with an incremental cost of $0.03 to $0.13 per gasoline-equivalent litre (i.e. adjusting for the lower energy content of ethanol) and very high well to wheels GHG reductions per litre, already provides reductions at a cost of $20 to $60 per tonne, by far the lowest-cost biofuels option.

(IEA, 2004)

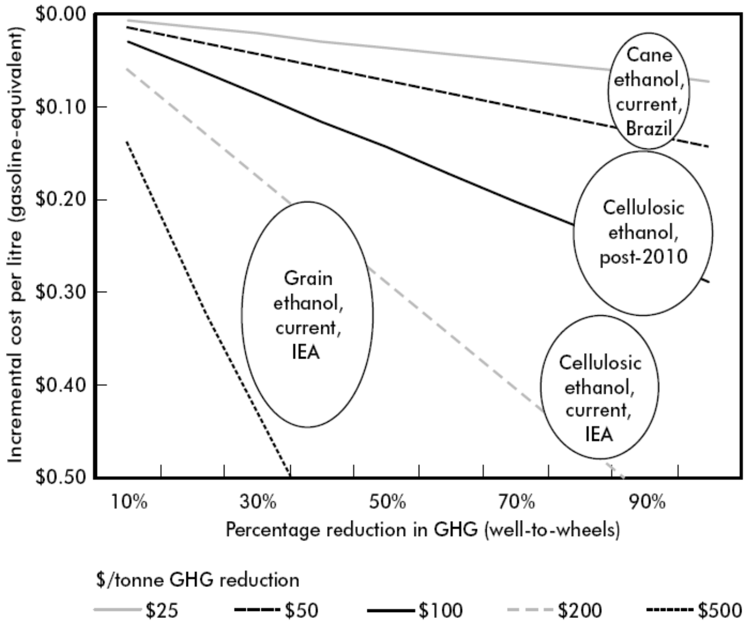
Table 5.4 **Well to wheels performance of biofuels (EUCAR, CONCAWE & ECJRC, 2003 & 2004)**

Fuel, feedstock and use of residues	Powertrain	Specific CO_2 emissions (grams per km)	CO_2 savings (million tonnes per year)	Cost CO_2 abatement (EUR per tonne of CO_2)
Synthetic diesel fuels				
Fischer-Tropsch diesel from wood	DICI + PDF	20	32	300
Di-Methyl Ether from wood	DICI	14	33	227
Ethanol				
Sugar beet				
Pulp to fodder	PISI	99	14	418
Pulp to Ethanol	PISI	111	12	563
Pulp to heat	PISI	55	24	254
Wheat	PISI	143	5	1 812
Wood	PISI	34	29	346
Biodiesel				
From rapeseed				
Glycerine as chemical	DICI + DPF	90	16	278
Glycerine as heat	DICI + DPF	99	14	345
From sunflower				
Glycerine as chemical	DICI + DPF	65	22	217
Glycerine as heat	DICI + DPF	74	20	260

DICI Direct Injection Compression Ignition (diesel engine)
DPF Diesel Particle Filter
PISI Port Injection Spark Ignition (petrol engine)

Source: EUCAR, CONCAWE & ECJRC, 2004.

Figure 5.9 **Biofuels cost per tonne of greenhouse gas reduction**



Source: Biofuels in Transport, IEA, 2004.

Policies to promote biofuels

The IEA (2004) study points out that adjustments to taxation policies (i.e. reduction of excise taxes on biofuels) are sufficient to create demand for biofuels. Alternatively subsidies for biofuel processing plants can enable biofuels to compete with petroleum fuels, at least in countries where fuel excise duties are low. Such subsidies have the advantage in domestic policy terms of promoting local agriculture, but the disadvantage of preventing international markets from sourcing biofuel from the most cost effective producers with the lowest life-cycle CO_2 emissions.

One example is the tax subsidy in the United States that has encouraged substantial production of corn-derived ethanol. Federal fuel tax is reduced for gasoline blends with up to 10% ethanol. The tax is reduced by the equivalent to 52 cents per gallon of ethanol or roughly 14 cents per litre. The measure is designed to promote attainment of local air quality under 1990 Clean Air Act Amendments by increasing the oxygenation of gasoline. Some CO_2 abatement co-benefit is to be expected. An import duty on ethanol of 54 cents per gallon ensures US farmers benefit from the tax incentive, keeping Brazilian sugar cane ethanol out of the market although it would achieve higher rates of CO_2 abatement.

Most EU countries have introduced some level of relief from fuel excise taxation for biofuels, partly in response to Directive 2003/30/EC that sets targets for the proportion of transport fuels derived from biofuels. Tax subsidies for biofuels in Europe are summarised in the accompanying table and a number of countries, including France and the UK, provide grants that partially or totally cover the cost of building biofuel processing plants.

The IEA's key recommendation on biofuels is that subsidies and tax incentives are derived on the basis of well to wheels CO_2 emissions, and therefore differentiated to promote the best performing biofuels most. This argues for tax incentives to be designed to be flexible enough to target better performing biofuels as they become available, and partly explains why tax incentives in some countries are for temporary, renewable periods. It also suggests caution in using grants to subsidise processing plants devoted to specific crops, so as to avoid lock-in to conventional sources of biofuel when advanced processes hold the potential for much more cost effective abatement.

Tax incentives to purchase biofuels, as opposed to producer subsidies, could result in a major expansion of biofuel imports from tropical countries as palm oil is currently the most competitive crop for producing diesel substitutes and sugar cane the lowest cost source of ethanol. This could increase pressure to fell tropical rain forests. There are also ecological risks associated with local production of biofuels in OECD/ECMT countries. Increased production of biodiesel will require increased production of sunflower seeds and especially rape seed (canola). This is likely to take fallow land set aside for wildlife back into production and displace cereals and grass in crop rotation. Oil-seed rape is particularly vulnerable to pests that also attack cereals. More intensive farming of rape will require a significant increase in pesticide applications. Rape also has high irrigation requirements and consumes as much water as sweet corn.

Is transport the best use for biomass?

Biofuel is not the most effective use of biomass for CO_2 abatement. Several studies (EU well to wheels study, EUCAR, CONCAWE & ECJRC, 2004 and CE Delft 2003 and 2005) show that, on a per hectare basis, woody biomass achieves the greatest CO_2 abatement when it is used in an IGCC[11] power plant to offset coal-fired generation. Estimates for the cost effectiveness of using biomass for power production and for producing conventional biofuels are compared in Figure 5.10. These estimates were produced by CE in its 2005 report from a survey of a large number of primary studies.

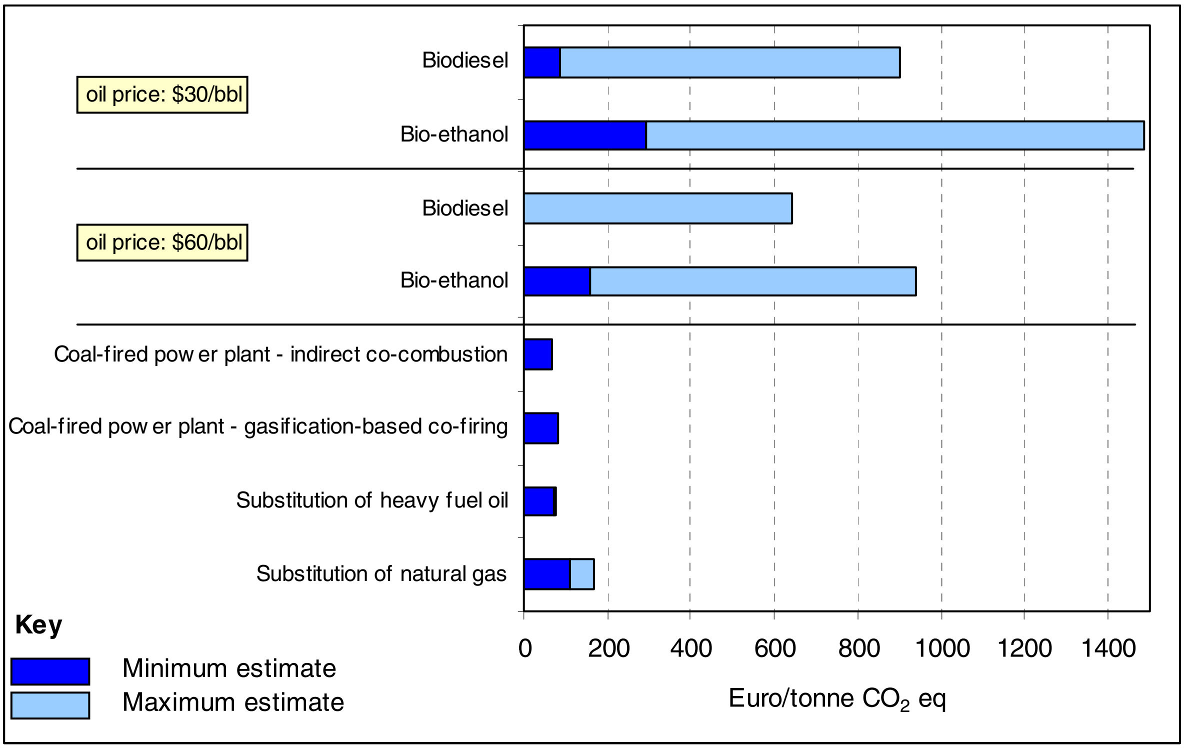
Net biofuel costs are estimated on the basis of two oil prices \$30 and \$60 a barrel. The range of estimates reported is particularly large for biofuels, reflecting uncertainties both in the well-to-wheels CO_2 emissions reductions expected and the cost of collecting and processing biomass. In the best cases biofuel cost effectiveness figures are comparable to those for using biomass to produce electricity. The average cost effectiveness of biofuels is, however, much less favourable than that for using biomass in electricity generation. Higher oil prices offset part of the costs for biofuels but even at \$60 a barrel biomass can be used more cost effectively in electricity production.

Table 5.5 **Tax incentives for biofuel blends and grants for biofuel processing plants**

Country	Ethanol (/1000 l of ethanol)	Biodiesel (/1000 l of pure biodiesel)	Grants
Australia			10.3 million
Austria	Yes	Yes	
Canada	72	29	85 million
Canada, Ontario, planned		105	
Czech Republic		107	
Denmark	40	40	
Estonia	Yes	Yes	
Finland	300		
France	370	Yes	Yes
Germany	630 (total exemption from excise tax)	470 (total exemption from excise tax)	
Hungary	Yes	Yes	
Ireland, planned	375 approx	375 approx	
Italy	230	Planned	
Latvia		Yes	
Lithuania	Yes	Yes	
Netherlands	Planned	Planned	
Portugal	Planned	Planned	
Slovenia	25% tax rebate available on application	25% tax rebate available on application	
Spain	420		
Sweden	520 (total exemption from excise tax)	360 (total exemption from excise tax)	
UK	290	290	Yes
USA	122	17 planned	

Sources: ECMT database and IEA 2004.

Figure 5.10 **Estimates for cost effectiveness of greenhouse gas abatement with biomass – comparison of conventional biofuels with the use of biomass in the power sector (timeframe 2005-2010)**

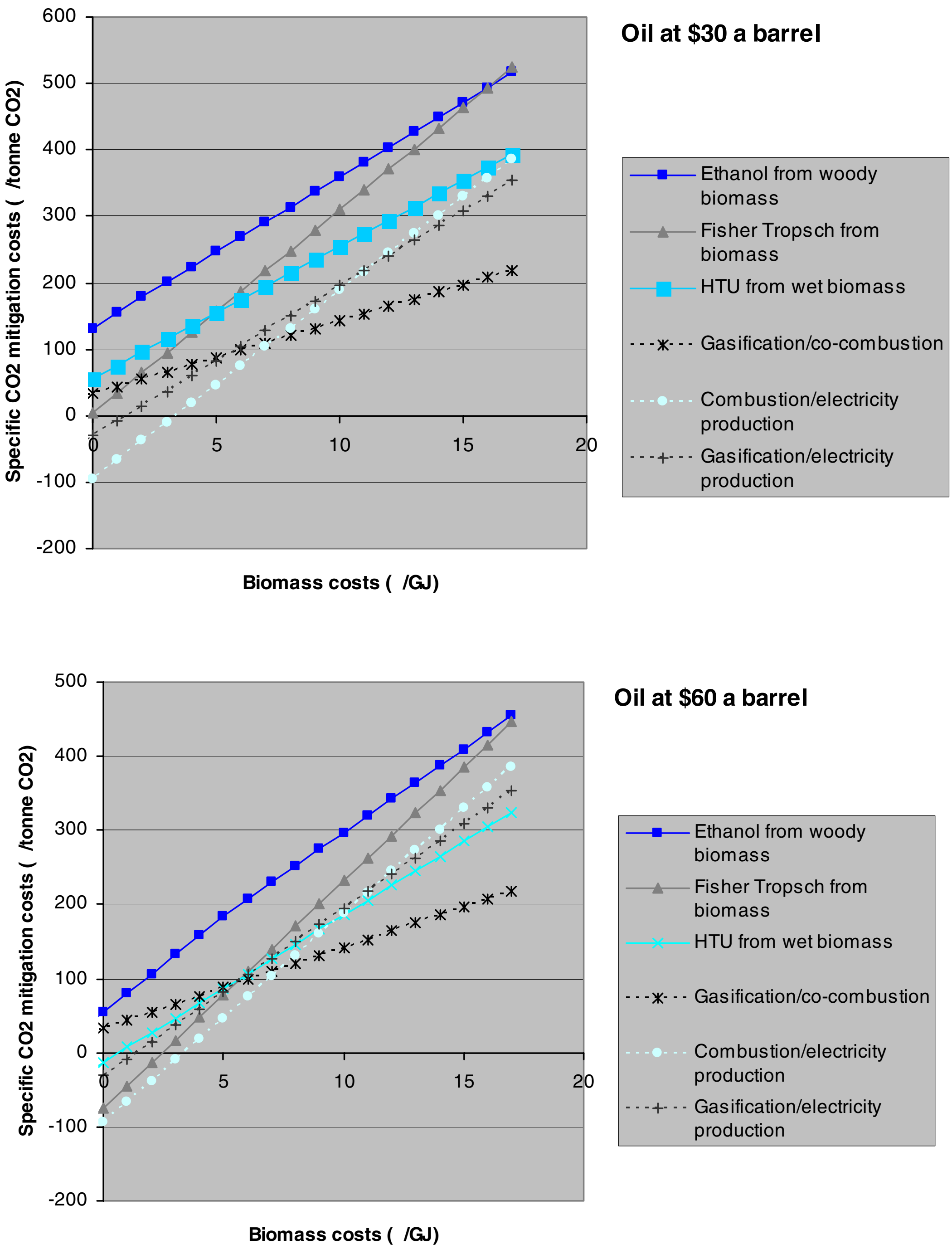


Source: Kampman *et al*, Biofuels under Development: An analysis of currently available and future biofuels and a comparison with biomass application in other sectors, CE 2005.

Figure 5.11 compares the cost effectiveness of advanced biofuels compared to biomass used in electricity generation. Results are presented for two oil prices, $30 and $60 a barrel, As future biomass costs are also uncertain, the graphs show results for a range of costs. Future biomas costs are anticipated to be around EUR 6 a tonne in 2010. Uncertainty ranges are significant but not shown. The graphs show that electricity production is likely to remain a more cost effective application of biomass in the future, despite the expected improvement in the performance of second generation biofuels. Higher oil prices improve the figures for biofuels, but at all combinations of oil and biomass price there is always an electricity generating technology that outperforms biofuel production.

In the short term the main reason for the less favourable cost effectiveness of biofuels is the additional cost and processing energy required to convert biomass to high quality transport fuel as compared to the use of raw biomass in electricity generation. The fact that electricity attracts higher prices per unit of energy than transport fuels is likely to preserve the advantage of using biomass for electricity even if second generation biofuels perform as well as expected in the long term.

Figure 5.11 **Estimates for the cost effectiveness of greenhouse gas abatement with biomass – comparison of 2nd generation biofuels with biomass use in power generation (timeframe 2010-2020)**



HTU stands for hydro-thermal upgrading processes, which can be used to convert dry or wet biomass to diesel.

Source: Kampman, De Bruin and Den Boer, *Cost effectiveness of CO_2 mitigation in transport*, CE 2006, report for ECMT.

5.7 Carbon taxes and emissions trading systems

Fuel taxes are in theory the ideal instrument for addressing the climate change costs of transport. CO_2 emissions are directly correlated to fuel consumption and a tax on fuel (differentiated according to the average CO_2 emissions emitted by combustion of each type of fuel) is the most direct way to influence emissions. A complementary differentiated vehicle tax can be employed to compensate for the way consumers heavily discount future fuel savings when they make decisions on the purchase of a new car. Fuel taxes are moreover cheap to administer and already exist in all OECD and ECMT countries. They should be the ideal tool for CO_2 abatement policies. However, fuel taxes are already utilised for a range of other purposes, from financing road construction to simply increasing general tax revenues, this robs them of transparency as an instrument for climate policy. As a result they can be highly politically unpopular.

In international aviation, fuel taxation is discouraged not least by the 1944 Chicago Convention, which provides for international aviation to be exempt from taxation. The objective of the treaty was to ensure countries do not compete to extract revenues from international transport to mutual disadvantage. Governments also seek international agreement on tax policy towards international air traffic because if some levied fuel taxes others would compete to attract the establishment of airline hubs through lower tax rates. International shipping presents similar problems. Indeed the ability to store fuel oil off-shore in floating reservoirs in international waters rules out fuel taxation for maritime shipping.

Trading permits for CO_2 emissions offers a proxy for fuel taxation, albeit at much higher administrative cost. The more users are licensed to hold permits the higher the cost of administration, which generally rules out emissions trading for markets as dispersed as private car drivers. Nevertheless, trading systems for road transport fuels have been envisaged at the theoretical level, involving trade between authorised fuel dealers. And again in theory it is possible to imagine trading of emissions permits used to share costs efficiently between car manufacturers obliged to meet a common fleet average efficiency standard. Closer to implementation in practice is incorporation of civil aviation in the European Emissions Trading System (ETS), which is envisaged by a 2005 Communication from the European Commission (see following section for details).

The system chosen for the distribution of permits is critical to the effectiveness of emissions trading for reducing CO_2 emissions. In theory an auction is required to establish the value of permits. In practice permits have been allocated (at least in the ETS) free to existing emitters. This not only complicates the establishment of a price for permits but discriminates against potential new entrants to the market and works to preserve the market shares of operators, for example airlines or power companies, already in the market. The number of permits issued, and the nominal volume of CO_2 emissions they represent, is also critical in determining the price for permits and the cost thereby assigned to CO_2 emissions. A generous allowance of free permits, as in the first phase of the ETS, will prevent trading from having much impact on total emissions levels. Future decisions on the total volume of CO_2 emissions permitted in the system will be crucial to its effectiveness.

In theory emissions trading facilitates action to reduce emissions in the most cost-effective ways right across the economy. In practice lobbying and political acceptability determine the number and allocation of permits and exclude some of the largest emitters form the system entirely. As experience is gained in the costs of running the ETS and its effectiveness or otherwise for reducing CO_2 emissions, attention might switch back to fuel taxes as a simpler, cheaper, perhaps no more controversial and ultimately superior tool.

5.8 Aviation

There is increasing concern about the proportion of total transport sector emissions accounted for by the aviation and maritime shipping sectors. Though their share in total transport sector emissions is currently small, rates of growth are higher than in other transport modes. Attention to these sectors from national governments has not been focused by UN agreements to the same extent as inland transport because international aviation and maritime shipping emissions are not counted in national inventories under the Kyoto Protocol.

Greenhouse gas emissions from aviation

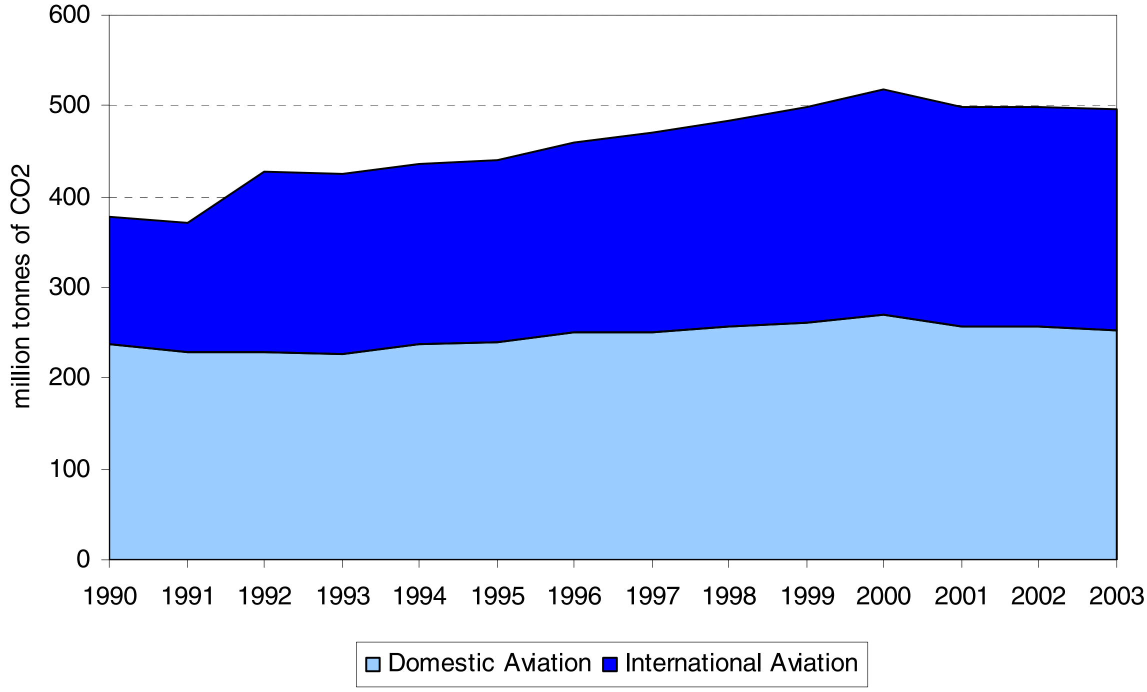
It is difficult to make a comparison between greenhouse gas emissions from aviation and the rest of the transport sector. Emissions from aviation are unique because the majority occur far above the Earth's surface (in the altitude range of 9 to 13 kilometres). As a result they have a markedly different effect on climate mechanisms (RCEP, 2002). Scientific understanding enabling the quantification of these effects is still improving. The first major study was released by the IPCC (see IPCC, 1999) and more recent evidence is summarised in a report by Dutch consultants CE (see CE, 2004). Radiative forcing from aviation's emissions of NOx, water vapour and aerosols that result in the formation of contrails and cirrus clouds is currently generally believed to more or less equal the impact of aviation's CO_2 emissions. This adds extra dimensions to the approach to reducing the climate impact of aviation. Improving the efficiency of aero engines is constrained by the need also to limit NOx emissions. On the other hand strategies to reduce the formation of contrails and cirrus cloud appear to be available at almost no cost through minor changes to flight paths when atmospheric conditions favour formation of high level clouds (Mannstein *et al.,* 2005).

The effect of CO_2 emissions from planes are of course indistinguishable from those emitted by any other source. The rest of this section address CO_2 emissions from aviation alone but it should be borne in mind that the potential climate impact of aviation is as much as twice that due to CO_2 alone.

Domestic air transport CO_2 emissions in ECMT countries were around 256 million tonnes in 2002, while emissions from fuel sold in ECMT countries for international air transport were around 240 million tonnes. Domestic air transport emissions represent 7% of ECMT "national" transport sector emissions[12] and, combined, the domestic and international aviation emissions represent 13% of ECMT national and international emissions[13]. The share of aviation emissions differs significantly between countries and is highest in countries with major international airports.

Figure 5.12 shows the trend in international and domestic air transport CO_2 emissions from all ECMT member and associate member countries. Up until 2001, the trend was largely one of steady growth. In the period between 1996 and 2000 annual growth averaged 3.2%. Across the whole period growth average 1.2% and there was no second-order trend up or down in the growth rates. In 2001 and 2002 emissions fell markedly as a result of a decline in both international and domestic tourism in the wake of the terrorist attacks in the US. This fall in emissions is unlikely to be sustained[14].

Figure 5.12. **CO_2 emissions from domestic and international aviation, OECD/ECMT region**[15]



Source: IEA (2005) CO_2 Emissions from Fuel Combustion.

Greenhouse gas abatement policies in the aviation sector

The only known policy already put in place by a **national government** attempting to directly affect domestic CO_2 emissions from aviation is the Norwegian CO_2 tax that applies to domestic flights only. The tax is currently set at 0.28 NOK (3.6 euro cents) per litre. An OECD report on the tax provides the following summary:

> *In 1999 a CO_2 aviation fuel tax was introduced in Norway. The increased expenses for the airlines were compensated through reductions in the then existing seat tax. Thus, the immediate cost effect of the tax was rather limited, which explains the limited political opposition to it. The fuel tax is believed to have led to very little fuelling abroad, and its effects on air ticket prices and the environment have been negligible due to fierce competition and cost reduction programmes in the aviation industry.*
> (p.4, OECD, 2005)

New Zealand planned to introduce a similar tax that would also have only applied to domestic aviation, from April 2007, but has cancelled the policy.

ICAO, the International Civil Aviation Organisation (part of the United Nations), was delegated specific responsibility for developing policies and measures to reduce greenhouse gas emissions from international aviation under Article 2.2 of the Kyoto Protocol (UNFCCC, 1997). International aviation emissions are reported but not counted as part of national governments' greenhouse gas inventories. This situation has arisen as a result of the difficulty involved in attributing emissions from international aviation to a specific country. So far, member countries have not been able to agree on any concrete greenhouse gas abatement policies. They have, however, endorsed the concept of an international emissions trading scheme implemented through a voluntary scheme, or the incorporation of international aviation into the existing trading systems (CE, 2005c).

Aviation in the EU emissions trading scheme?

In September 2005 the European Commission adopted a Communication that recommended that CO_2 emissions from all flights departing from within the EU should be incorporated into the existing EU Emissions Trading Scheme (ETS) from 2008 (EUROPA, 2005). The scheme would involve placing a cap on the CO_2 emissions allowed from any company (including foreign companies) operating flights departing from within the EU. Companies who exceed their emission allowance would be required to purchase the difference from other companies participating in the ETS or face a fine. The fine in the current trading session that runs from 2005 to 2007 is EUR 40 per tonne. For the second trading period starting in January 2008 the fine has still to be determined.

The projected "business as usual" growth in CO_2 emissions is 25.9 Mt between 2008 and 2012. The cap on emissions is still to be determined, however, the results of setting the cap at the 2008 level have been modelled (CE, 2005c). In this scenario only 1.1 – 3.2 Mt[16] of this is expected to be avoided by abatement activity in the aviation sector – the bulk of which will be a demand response to the slight increase in the price of air travel (air ticket prices are expected to increase by up to an average of 9 euros).

Under the current ETS, national governments set a cap on emissions of individual companies via National Allocation Plans. Who will be responsible for setting a cap on foreign carriers has not yet been determined. The Commission is hoping that a report by an industry expert group in mid 2006 will help answer this question[17].

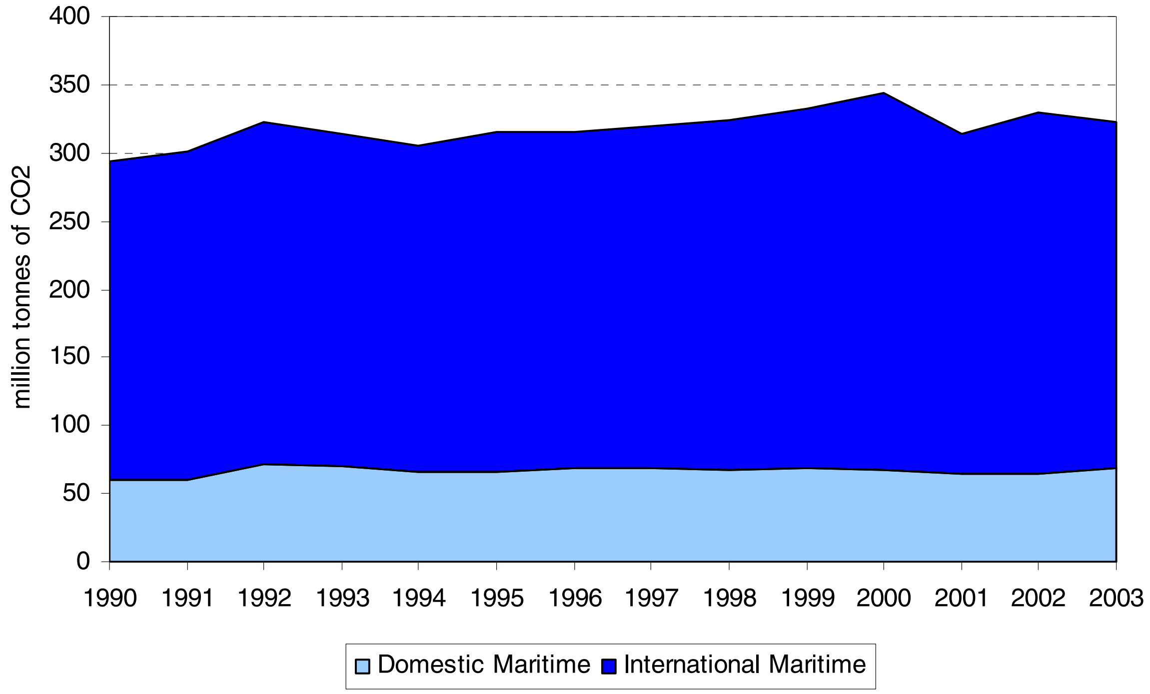
5.9 Maritime shipping

Greenhouse gas emissions from maritime transport

CO_2 emissions from the maritime sector are overall somewhat smaller and slower growing than those from aviation. In 2002 domestic CO_2 emissions in ECMT member and associate member countries were 64 Mt, while CO_2 emissions from fuel sold in ECMT countries for international shipping were 273 Mt. Note this figure is higher than for the international part of aviation emissions. Domestic shipping emissions represent 2% of ECMT transport sector emissions and, combined, the domestic and international emissions represent 8% of transport sector emissions.

Figure 5.13 shows the trend in both domestic and international maritime CO_2 emissions between 1990 and 2003. The growth during this period averaged 0.7%, and exhibited no second order trend up or down.

Figure 5.13. **CO_2 emissions from domestic and international navigation, OECD/ECMT region**[18]



Source: IEA (2005) CO_2 Emissions from Fuel Combustion.

Greenhouse gas abatement policies in the maritime sector

Countries reporting significant CO_2 abatement policies for domestic maritime transport include Norway (CO_2 tax) and New Zealand (planned by now cancelled CO_2 tax).

As with international aviation, international maritime CO_2 emissions are reported, but not counted, as part of national greenhouse gas inventories.

The International Maritime Organisation (IMO) was delegated responsibility for developing proposals to reduce greenhouse gas emissions from international shipping – little progress has been made. A report by the IMO (2000) recommended the following strategy for the development of CO_2 abatement policy:

- *Explore the interests for entering into voluntary agreements on GHG emission limitations between the IMO and the ship owners, or to use environmental indexing*[19]*.*
- *Start working on how to design emission standards for new and possibly also for existing vessels.*
- *Pursue the possibilities of credit trading from additional abatement measures implemented on new and possibly also on existing vessels.*

(p.9, IMO, 2000)

In 2002, the IMO's Marine Environmental Protection Committee (MEPC) published a report describing the outcome of the work performed to date. The main results were the following[20].

- Progress is hampered by disagreement over whether or not the definition of reduction targets is an appropriate role for the IMO.
- The most appropriate mechanism for reducing international maritime emissions is a voluntary environmental indexing scheme.
- The MEPC should continue work on the development of emissions standards, on linking maritime emissions with trading schemes and on methodological aspects related to the reporting of GHG emissions from ships.

In 2003, the IMO assembly adopted a resolution (A.963(23)) urging the MEPC to establish a GHG emission baseline, to develop a methodology to determine the GHG emission index for ships, to develop guidelines for practical implementation of the GHG emission indexing scheme, and to evaluate technical, operational and market-based solutions (CE, 2005b).

Progress since 2003 has been hampered by political disagreements. At the meeting of the MEPC in July 2005 a set of interim guidelines on CO_2 emission indexing were approved for use in trials (IMO, 2005).

The obvious tools for applying the IMO guidelines are fairway and harbour fees differentiated on the basis of the agreed indexing. Fairway fees could be applied to ships in territorial waters. A simple system would apply a standard fairway or harbour CO_2 charge to all maritime shipping, and ships equipped with efficient engines or hull designs that qualify for a reduced charge under the IMO index would be able to notify the charging authority and pay a reduced rate. The Longbeach harbour authority in Los Angeles operates a system of environmental harbour fees that could serve as a model – ships that reduce speed below a certain threshold on their approach to the port pay a reduced NOx charge.

5.10 Hydrogen

The ultimate possibilities of a hydrogen fuelled transport system sometimes lead to the conclusion that "promoting hydrogen" is an effective CO_2 abatement policy. However, increased use of hydrogen at this present time would probably result in an increase in CO_2 emissions. Hydrogen is likely to have a role to play in the very long term, but the current state of the technologies involved means that it should only be considered as a research and development policy, and not as a CO_2 abatement policy.

Fuel cells will be the key to effective use of hydrogen (see well to wheels discussion below) but have some way to go before they can compete with the internal combustion engine on the basis of cost, size or durability. Table 5.6 outlines current performance in four key areas that the US Department of Energy believe are fundamental to achieving competitiveness – the 2010 targets set by the DoE are included.

Even if these goals are achieved in 2010, when this might actually translate into hydrogen fuel cell vehicles being widely available is another matter. There appears to be a consensus among car and fuel cell industry experts that it will be 20 years before fuel cell vehicles are commercial. See for example the 2005 edition of *USA Fuel Cell Today's* annual industry survey and the poll in *Electric and Hybrid Vehicle Technology International Annual Review 2005.*

Table 5.6 **Key performance indicators for hydrogen fuel cells**

Performance Characteristic	2004	US DoE Target for 2010
Cost per kilowatt	103	45
Power density (Watts $_{net}$ per litre)	1 205	2 000
Durability (lifetime in hours)	2 200	5 000
Freeze start capability	100 seconds to reach 50% power at -20°C	30 seconds to reach 90% power at -20°C

Source: 2004 figures (Ballard, 2005).

Well to wheels CO_2 efficiency

The well to wheels CO_2 efficiency of hydrogen depends on how the hydrogen is produced (the hydrogen "source") and on the powertrain employed. There are two options for the source of hydrogen:

- "Reformation" of a carbon based energy source (e.g. natural gas).
- "Electrolysis" of water, using electricity. In this situation the well to wheels efficiency depends on how the electricity was originally generated (e.g. from natural gas, coal, renewables, nuclear power etc).
- There are also two powertrain options for the use of hydrogen:
- In an internal combustion engine, (e.g. replace petrol as the fuel in a spark-ignition engine),
- In a fuel cell.

Both of these technologies could be used in 'hybridised' vehicles. Hybridised fuel cell vehicles remove the need for an electric generator, but would still make use of the regenerative braking and battery.

Table 5.7 presents the results from the detailed European well to wheels study, discussed in the section on biofuels above. A useful reference is the projected performance of convention technologies. Conventional petrol and diesel engines are expected to achieve well to wheels efficiencies of around 164 and 162 grams of CO_2 equivalent per kilometre by 2010; hybridised versions of the same vehicles are expected to achieve 140 and 141 grams of CO_2 equivalent per kilometre by 2010.

The most significant reductions in CO_2 emissions per kilometre occur when the original source of hydrogen is not a fossil fuel (i.e. nuclear or wind). Useful reductions do also occur when hydrogen reformed from natural gas is used in fuel cells.

The study also estimated the cost per tonne of CO_2 avoided, if these technologies achieved a 5% penetration by 2010 – that is, if they were contributing 5% of all kilometres being travelled by new cars in that year. The results are given in Table 5.8.

Table 5.7 **Well to wheels CO_2 efficiency of various hydrogen pathways**

Hydrogen 'source'	Powertrain	Grams of CO_2 equivalent per km
Electrolysis of water, using the CO_2 emission characteristics of the existing European Union electricity supply mix	Fuel cell	196
	Hybridised fuel cell	174
	Hypothetical 2010 spark ignition ICE[21]	349
	Hybridised 2010 ICE	310
Electrolysis of water, using new nuclear-powered electricity generation	Fuel cell	7
	Hybridised fuel cell	6
	Hypothetical 2010 spark ignition ICE	12
	Hybridised 2010 ICE	11
Electrolysis of water, using new wind-powered electricity generation	Fuel cell	9
	Hybridised fuel cell	8
	Hypothetical 2010 spark ignition ICE	16
	Hybridised 2010 ICE	14
Reformation of natural gas (using natural gas from within the EU and where reformation takes place at the site of extraction)	Fuel cell	98
	Hybridised fuel cell	88
	Hypothetical 2010 spark ignition ICE	176
	Hybridised 2010 ICE	156

Source: EUCAR, CONCAWE & ECJRC, 2003 & 2004.

Table 5.8 **Costs of CO_2 abatement from various hydrogen pathways**

Hydrogen 'source'	Powertrain	Cost per Tonne of CO_2 Avoided
Electrolysis of water, using new nuclear-powered electricity generation	Fuel cell	808
	Hybridised fuel cell	822
	Hypothetical 2010 spark ignition ICE	857
	Hybridised 2010 ICE	825
Electrolysis of water, using new wind-powered electricity generation	Fuel cell	714
	Hybridised fuel cell	730
	Hypothetical 2010 spark ignition ICE	746
	Hybridised 2010 ICE	718
Reformation of natural gas (using natural gas from within the EU and where reformation takes place at the site of extraction)	Fuel cell	1 539
	Hybridised fuel cell	1 351

Source: EUCAR, CONCAWE & ECJRC, 2003 & 2004.

Governments should consider whether transport applications are the most effective use of hydrogen – particularly in terms of its potential impact on CO_2 emissions. The European well to wheels study (EUCAR, CONCAWE & ECJRC, 2004) compares the CO_2 avoidance potential of future transport applications of hydrogen with potential applications to offset fossil fuel-fired electricity generation. This comparison highlights that substituting coal-fired electricity generation with any of the three hydrogen sources discussed above (renewably generated electricity, natural gas or nuclear-powered electricity) offers greater potential for greenhouse gas abatement than using them to generate hydrogen for the transport sector.

Conclusion on hydrogen

While hydrogen powered fuel cells are a likely transport future, this future is a long way off. Promotion of hydrogen as a transport fuel is unlikely to achieve any CO_2 abatement in the near to medium term. At this stage ECMT recommends governments consider hydrogen as a research and development initiative only.

The IEA comes to similar conclusions in its 2005 report *Prospects for Hydrogen and Fuel Cells*. It notes that development of hydrogen infrastructure at this point would be premature as some of the key technical issues – such as fuel cell operating conditions and hydrogen on-board storage – may have a considerable impact on the choice of technologies for hydrogen production, distribution and refuelling. Continued international co-operation on R&D is however vital. It suggests governments concentrate on niche opportunities to deploy fuel cell vehicles for instance in public service fleets (buses and delivery vans) to start the process of cost reduction through larger scale manufacture and to broaden operating experience.

NOTES

1. COM(2005)261 final.

2. Cars purchased by companies account for 25 to 50% of all new car sales in the countries studied (with the exception of Italy where the proportion is lower at 10%).

3. The study used a price elasticity of the car fleet of -0.6 – i.e. an increase in prices of cars of 10% would lead to a 6% decline in the size of the car fleet.

4. Bins is the regulatory term used in the US to indicate categories of vehicle according to emissions performance standards.

5. Fuel costs discounted over the first 10 years of the vehicles life.

6. Information for this summary was drawn from the SmartWay website, which the reader is referred to for further information: www.epa.gov/smartway/.

7. See http://oee.nrcan.gc.ca/transportation/fleetsmart.cfm for further information.

8. Around 55 exajoules of energy is currently consumed by the transport sectors of ECMT member and associate member countries.

9. The reality is that the transport sector will compete with a lot of other sectors for the use of biomass.

10. The oil companies' European association for environment, health and safety in refining and distribution.

11. IGCC (Integrated Gasification Combined Cycle) plants burn coal, biomass etc., gassifying the fuel to drive a gas turbine as well as raising steam to drive a steam turbine.

12. i.e. excluding emissions from international shipping and aviation.

13. i.e. including emissions from international shipping and aviation.

14. Some research suggests aviation might eventually become the largest source of CO2 emissions from transport, based on the logic that using low carbon intensity fuels (like natural gas or hydrogen) is more difficult in aviation because of the weight of fuel storage systems. See for example *Decarbonising the UK,* Tyndall Centre for Climate Research.

15. Data for 1990 and 1991 is estimated to take account of no reporting of figures for CIS states.

16. Based on a cost per tonne of CO2 of 10 Euro/tonne and 30 euro/tonne respectively.

17. Further details of the scheme and its impacts can be found at: http://europa.eu.int/comm/environment/climat/aviationen.htm

18. Data for 1990 and 1991 is estimated to take account of no reporting of figures for CIS states.

19. Environmental indexing of ships, simply put involves calculating the energy intensity of that ship over a representative time window and typical operational pattern (CE, 2005b).

20. IMO, 2002; cited in CE 2005b.

21. Internal Combustion Engine.

6. SUMMARY OF COUNTRY POLICIES AND MEASURES

6.1 The transport sector CO_2 abatement policies and measures database

ECMT used national communications to the UNFCCC, more recent policy documentation where available and national Government input through ECMT and OECD committees to assemble a database of over 350 CO_2 abatement policies introduced or under development for the transport sector. The following table gives an explanation of the information collected for each of these policies.

Table 6.1 **Outline of information collected on CO_2 abatement policies**

Field Name	Description
Country	The country the measure is being applied in.
Policy Approach	Each measure is characterised according to the nature of the government intervention, using one of the following categories: **Fiscal** – includes tax policies, fees, charges, rebates and differential tax rates. **Investment** – public sector investment and grants. **Regulation** – mandatory standards (and regulatory reform). **Voluntary Agreements** – essentially a regulatory approach. **Information and Education** – includes demonstration and information dissemination as well as marketing and behaviour change measures. **Research and Development** – policies that encourage and finance research and development. **Policy Process** – e.g. strategy development/
Name	Name of measure
Status	Under Investigation (measures being considered but with no decision yet made); Active (measures currently in place); Planned (measures which have a timetable for introduction); No Longer Active (measures which have been discontinued, but the effects of which are still felt).
Description	A brief description of the measure. In some cases the information presented here is very limited. This is due to the lack of information available in the original source.
Impact Type	There are four key factors that can be influenced to reduce overall CO_2 emissions. This field shows which of the these factor is influenced (NOTE: only the **primary** impact type is shown): **Fuel Efficiency** – more correctly “energy intensity” a measure falls into this category when it affects the energy use per tonne-kilometre or per passenger-kilometre of a particular mode. It is important to note that this includes improvements in “test-cycle fuel efficiency”, “on-road fuel efficiency” (i.e. the effects of driver behaviour) and load factors (e.g. carrying more people or more goods with the same vehicle). **Carbon intensity** – the carbon content of a fuel (grams of carbon per unit of energy).

	Modal Shift – transferring travel from one mode to a more fuel efficient one. **Demand** – reduction in activity, either passenger-kilometre or tonne-kilometre.
Mode	The transport mode where the reduction of CO_2 emissions occurs (e.g. a policy that encourages freight modal shift from road to rail would show “Road Freight”): **Cars** (includes motorbikes, vans and SUVs), **Road Freight** (loosely, anything over 3.5 GMV, excluding buses), **Buses**, **Rail**, **Coastal and Inland Shipping** (including ferries and hovercraft) and **Air**.
Reference	Original source(s) of information
Technical Reference	For measures that include abatement estimates this reference is to further technical information on how these estimates were calculated.
Cost	Published estimates of the cost of the measure.
Impact	Impact of measure, unless otherwise stated this is the expected reduction in 2010 – measured in **million tonnes of CO_2 equivalent**. Where two numbers are given they represent the lower and upper range estimated.

Table 6.2 **Distribution of OECD/ECMT transport sector CO_2 abatement policies by type (see table 4.4 for details on top 7 measures)**

Impact Type	Measure Type	Average "Percentage Impact"	Range of "Percentage Impact"	Number of Countries with Active Policies	Targeted CO_2 Emissions	CO_2 Savings from Active Policies in 2010 (Million tonnes)
Carbon Intensity	Fiscal *e.g. biofuel subsidies*	1.9%	0.1% - 7.3%	19	73%	66
	Information and Education *e.g. US federal information programmes for state and local government*			1	48%	28
	Investment *e.g. grants for biofuel production facilities*	1.3%	0.1% - 0.4%	7	11%	3.7
	Regulatory *e.g. biofuel obligation*	2.6%	2.5% - 2.8%	3	4%	4.2
	Voluntary Agreement *e.g. voluntary biofuel obligation*	1.3%		1	0%	0.2
Demand	Fiscal *e.g. truck-km charge*	2.1%	0.2% - 3.5%	4	6%	12
	Information and education *e.g. information on how to reduce a company's freight needs.*			1	1%	6
Fuel Efficiency – On-road	Fiscal *e.g. fiscal incentives for devices such as econometers.*	1.1%	0.4% - 1.8%	1	4%	2
	Information and Education *e.g. driver training*	2.8%	0.5% - 4.0%	12	22%	22
	Investment *e.g. logistics management systems*			1	0%	0.2
	Regulatory *e.g. speed limiters*	1.8%	0.3% - 4.6%	10*	36%	24
	Voluntary Agreement – Freight *e.g. the US SmartWay programme*	1.8%	0.5% - 3.8%	3	49%	66

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Impact Type	Measure Type	Average "Percentage Impact"	Range of "Percentage Impact"	Number of Countries with Active Policies	Targeted CO_2 Emissions	CO_2 Savings from Active Policies in 2010 (Million tonnes)
Fuel Efficiency – Technical	Fiscal - Fuels *e.g. carbon tax*	7.1%	3.7% - 15.4%	6*	23%	62
	Fiscal - Vehicles *e.g road tax differentiation*	4.3%	4.2% - 4.5%	14*	69%	60
	Information and Education *e.g. product labelling*	2.2%	0.5% - 3.4%	14*	30%	16
	Investment e.g. government procurement of more efficient vehicles			8	61%	73
	Regulatory *e.g. US CAFÉ regs*	1.9%	1.1% - 2.8%	3	55%	27
	Voluntary Agreement *e.g. EU-ACEA agreement*	4.6%	0.7% - 9.6%	5*	32%	86
Modal Shift	Fiscal *e.g. fares support*	1.3%	0.01% - 3.5%	7	60%	15
	Information and Education *e.g. promoting travel planning*	0.9%	0.3% - 1.6%	6	59%	17
	Investment *e.g. bus purchase*	1.3%	0.1% - 3.5%	21	70%	34
	Regulatory *e.g. restricting vehicle-kilometres from new developments*			3	1%	0.6

* The EU is included as if it were a single country where the policy was introduced across Member States through an EU Directive.

The policies are distributed according to impact type and type of measure as shown in Table 6.2. The middle columns give an indication of the effectiveness of each measure. This is expressed as an expected "percentage impact", calculated where countries have reported an expected abatement potential for 2010 (e.g. 5 Mt CO_2 from a fuel efficiency policy). As the abatement potential of a policy is directly linked to the size of the transport sector is applied to – a policy promoting efficient freight logistics in the UK might save 5 Mt CO_2in 2010 but in Belgium it might only save 2 Mt CO_2 – the impacts are presented as percentages of the 2002 transport sector CO_2 emissions from the country concerned.[1] Column five shows the number of countries employing each type of measure. Column 6 shows the CO_2 emissions from transport in the countries using that particular policy (all the countries concerned not just those reporting estimates for the expected tonnes of CO_2 abated). The final column gives an estimate of the abatement expected to be achieved from the policies implemented, including in countries that did not quantify abatement expected but for which the ECMT was able to estimate abatement.

6.2 National transport sector CO_2 abatement policies and measures database

The full policy database is summarised in the tables that follow.

NOTE

1. It would be preferable to use the forecast 2010 emissions for the transport sector, however, this information can not be obtained for all countries.

Table 6.3 **Primary sources for policies reported**

	UNFCC 1NC / 2NC	UNFCC 3NC	UNFCC 4th National Communication	EC Biofuels Communication	EC Latest MS submissions	EC Earlier MS submission	Other
Albania	✓						
Armenia	✓						
Australia			✓				Australian Greenhouse Office website: http://www.greenhouse.gov.au/ggap/successfulprojects/ntbc.html (19/11/04); Transport Sector GHG Emissions Projections 2004
Austria		✓			✓		Federal Environment Agency (2004). Biofuels in the Transport Sector in Austria in 2004.; European Commission, COM (2005) 626, Biomass Action Plan (see p. 30)
Azerbaijan	✓						
Belarus	✓						
Belgium			✓		✓		OECD 2004, Can cars come clean?
Bosnia Herzegovina							
Bulgaria		✓					
Canada		✓					Climate Change Plan for Canada
Croatia	✓	✓					
Czech Republic			✓		✓		European Commission, COM (2005) 626, Biomass Action Plan (see p. 30); European Commission, State Aid Case No. N223/05 –Amendment excise reduction and operating subsidies for biodiesel. (July 2005); European Commission COM (2005) 459 - Reducing the Climate Change Impact of Aviation
Denmark			✓	✓	✓		
Estonia			✓	✓			
European Union			✓				IEA database http://www.iea.org/dbtw-wpd/textbase/envissu/pamsdb/index.html
Finland			✓	✓		✓	
France		✓		✓	✓		Climate Plan 2004; European Commission, COM (2005) 626, Biomass Action Plan (see p. 30)
FYR Macedonia	✓						
Georgia							

Germany		✓		✓	✓		European Commission, COM (2005) 626, Biomass Action Plan (see p. 30); Federal Ministry of Transport, Building and Housing, National Cycling Plan 2002 to 2012, http://www.bmvbw.de/Anlage/original_11696/Ride-your-bike-Information-in-englischer-Sprache.pdf . Federal Environmental Agency, Reducing CO_2 emissions in the transport sector. http://www.umweltbundesamt.de/uba-info-medien/mysql_medien.php?anfrage=Kennummer&Suchwort=2607
Greece		✓			✓		OECD 2004, Can cars come clean?
Hungary			✓				
Iceland		✓					
Ireland		✓		✓	✓		
Italy		✓			✓		OJ C 146, 19.6.2002, p. 6; OJ C 16, 22.1.2004, p. 22; OECD (2004), Can cars come clean?
Japan		✓					
Korea	✓						
Latvia		✓					UNFCCC/WEB/2003/1 (p. 70)
Liechtenstein		✓					
Lithuania			✓	✓			
Luxembourg					✓		OECD (2004), Can cars come clean?
Malta	✓						
Mexico							
Netherlands			✓		✓		Traffic Emissions Policy Document; European Commission, COM (2005) 626, Biomass Action Plan (see p. 30)
New Zealand		✓					www.eeca.govt.nz
Norway			✓				
Poland		✓				✓	
Portugal		✓		✓	✓		
Republic of Moldova	✓						
Romania			✓				
Russian Federation		✓					
Serbia & Montenegro							
Slovakia			✓	✓			
Slovenia		✓					
Spain		✓			✓		OECD (2004), Can cars come clean?
Sweden			✓	✓	✓		
Switzerland			✓				OECD/EEA database on instruments used for environmental policy and natural resources management.

Turkey						
Ukraine	✓					
United Kingdom		✓		✓	✓	www.dft.gov.uk; www.est.org.uk; www.freightbestpractice.org.uk /www.hm-treasury.gov.uk/budget/budget_06/budget_report/ bud_bud06_repindex.cfm
United States of America		✓				IEA, Biofuels for Transport, 2004; US Energy Policy Act
- Alaska						http://www.taxadmin.org/fta/rate/motor_fl.html
- California						IEA database http://www.iea.org/dbtw-wpd/textbase/envissu/pamsdb/index.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16); http://www.iea.org/Textbase/work/2005/EnerEffTyre/boyd.pdf; http://www.hydrogenhighway.ca.gov/sb76/sb76.htm
- Hawaii						http://www.ethanol.org/ethanolinstatelegislation.html
- Idaho						http://www.taxadmin.org/fta/rate/motor_fl.html
- Iowa						http://www.taxadmin.org/fta/rate/motor_fl.html
- Maryland						www.commuterchoicemaryland.com/; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16); www.energy.state.md.us/cleanincentives.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16); www.op.state.md.us/smartgrowth/; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16)
- Minnesota						www.commerce.state.mn.us/pages/Energy/MainModTech.htm; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16)
- Montana						http://www.ethanol.org/ethanolinstatelegislation.html
- New Jersey						www.state.nj.us/cgi-bin/governor/njnewsline/view_article.pl?id=624; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16)
- New York						2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16); www.nyserda.org/afvprogram.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16); Car Lines; Proposal by Governor Pataki on 18 May 2005; www.nyserda.org/sep.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16)
- Oregon						www.energy.state.or.us/trans/hybridcr.htm; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16)
- South Dakota						http://www.taxadmin.org/fta/rate/motor_fl.html
- Utah						www.envisionutah.org; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16)
- Washington						www.metrokc.gov/earthlegacy/smartgrowth.htm; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16)

Table 6.4. **National transport sector CO_2 abatement policies and measures database**
(Available as an Excel table on the web: www.cemt.org/topics/env/envdocs1.htm)

Policy Approach	Name	Status	Description	Impact Type	Mode	Cost	Impact in 2010 (Mt CO_2 equivalent pa)
Albania							
Fiscal	Carbon tax	Under Investigation	Introduction of a carbon tax. ***Reference***: Third National Communication to the UNFCCC (p. 82).	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	-
Fiscal	Taxes on second hand cars	Under Investigation	Increasing taxes for second hand cars. ***Reference***: Third National Communication to the UNFCCC (p. 82).	Fuel Efficiency - Technical	Cars	-	-
Investment	Roading infrastructure development	Under Investigation	Investment in roading infrastructure. ***Reference***: Third National Communication to the UNFCCC (p. 82).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	-
Unknown	Non-motorised modes	Under Investigation	[No information provided] ***Reference***: Third National Communication to the UNFCCC (p. 82).	Modal Shift	Cars, Road Freight	-	-
Unknown	Reducing road-based transport	Under Investigation	Increasing the modal share of less carbon intensive modes for both passengers and goods ***Reference***: Third National Communication to the UNFCCC (p. 82).	Modal Shift	Cars	-	-
Australia							
Fiscal	Alternative Fuels Conversion Programme	Active	This programme commenced in January 2000, intending to provide subsidies for the conversion of heavy commercial vehicles and buses (greater than 3.5 tonnes gross vehicle mass) to compressed natural gas (CNG) or LPG, or the purchase new vehicles running on these fuels. Uptake of CNG buses has been significant - 718 buses (by Feb 2005) and more than $200 million invested by transport authorities. Uptake of trucks has been much slower (362 by Feb 2005). This element of the programme has been reviewed and now focuses on large truck fleet operators - agreements are in place with five major truck fleet operators to evaluate the business case for alternative fuels. The programme has now been expanded to include a scoping study into the feasibility of a wide-scale rollout of hydrogen buses in Australia. Note that the primary objective of the programme is to test commercial viability of new technologies, rather than achieve significant greenhouse gas abatement. **Note:** quantitative estimate includes CNG Infrastructure programme below. **Reference**: Australia's Fourth National Communication to the UNFCCC. ***Technical Reference***: Transport Sector GHG Emissions Projections 2004.	Carbon Intensity	Road Freight, Buses	AUS$37.5 million (2000-08)	0.04

Fiscal	Fiscal incentives for ethanol and biodiesel	Active	The production of biofuels is encouraged through the payment of production grants of 38 cents per litre for fuel ethanol and biodiesel. Production grants for fuel ethanol commenced in September 2002 and were extended in 2004 for a further eight years to June 2011. In the 2003-04 Federal Budget, the Government announced broadly similar treatment for biodiesel commencing from September 2003. These arrangements ensure that the effective rate of excise tax for biofuels is zero until 1 July 2011. **Note:** quantitative estimate is in fact for the "350ML Biofuels Target" but it quoted here because it is the principle mechanism by which the CO_2 savings will be achieved and also includes the effects of the "Biofuels Capital Grants" programme ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses			0.3
Voluntary Agreement	Extended National Average CO_2 Emissions target	Planned	Negotiations are underway with the motor vehicle industry to develop the NACE target to cover cars, vans, four wheel drives and light commercial vehicles up to 3.5 tonnes and will include diesel and LPG vehicles. Only petrol pasenger cars are included in the current NACE targets (see below). It had been expected that this process would be completed by the end of 2004, but it appears no progress has been made. ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars		-	
Voluntary Agreement	National Average CO_2 Emissions (NACE) target.	Active	A voluntary agreement between Government and industry to improve the fuel efficiency of petrol passenger cars by 18% between 2002 and 2010 (to 6.8 litre per 100 km). **Note:** the abatement potential indicated for this measure includes the effects of the "Fuel consumption labelling scheme" (and the associated "Green Vehicle Guide") and the "Australian Government Fleet Target" as well as the NACE target. ***Reference***: Australia's Fourth National Communication to the UNFCCC. ***Technical Reference***: Transport Sector GHG Emissions Projections 2004.	Fuel Efficiency - Technical	Cars	-		0.5
Investment	Australian Government Fleet Target	Active	A target has been set to increase the proportion of those vehicles in Federal government agencies' fleets which score in the top half of the Green Vehicle Guide (mentioned under the "Fuel consumption labelling scheme") from 18% to 28% by December 2005. **Note:** no information on whether this target was actually achieved is available. ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars		-	

Investment	Biofuels Capital Grants Program	Active	This programme, announced in 2003, is providing one-off capital grants for projects that provide new or expanded biofuels production capacity. Grants are being provided at a rate of 16 cents per litre of production capacity for new or expanded projects which produce a minimum of 5 million litres of biofuel per annum (/limited to $10 million per project). ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	AUS$37.6 million	-	
Investment	CNG Infrastructure Programme	No Longer Active	This programme provided financial assistance for three additional publicly accessible CNG refuelling sites, as well as assisting with other technical developments. The objectives are now covered under the Alternative Fuels Conversion Programme (mentioned above). ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Carbon Intensity	Road Freight, Buses	AUS$1.5 million	-	
Investment	Douglas Shire ethanol plant - Greenhouse Gas Abatement Programme	Planned	Support from the Greenhouse Gas Abatement Programme (up to AUS$7.35 million) for this project includes the development of an ethanol production plant which will use as feedstock the by-products of a sugar mill. ***Reference***: Australian Greenhouse Office : http://www.greenhouse.gov .au/ggap/successfulprojects/ntbc.html (19/11/04). ***Technical Reference***: Transport Sector GHG Emissions Projections 2004.	Carbon Intensity	Cars, Road Freight, Buses	AUS$34 million		0.06
Investment	East Coast Renewables Project - Greenhouse Gas Abatement Programme	Planned	Support from the Greenhouse Gas Abatement Programme: up to AUS$8.8 million for the BP Bulwer Island Refinery in Brisbane will supply a 10% ethanol/petrol blend for the Queensland market. The refinery will enter into long-term contracts for the supply of fuel grade ethanol, and install appropriate infrastructure for the storage, blending and delivery of ethanol based fuels within the supply region of the refinery. ***Reference***: Australian Greenhouse Office : http://www.greenhouse.gov .au/ggap/successfulprojects/ntbc.html (19/11/04). ***Technical Reference***: Transport Sector GHG Emissions Projections 2004.	Carbon Intensity	Cars, Road Freight, Buses	AUS$14 million		0.28
Investment	Promoting Rail - Greenhouse Gas Abatement Programme	Planned	Support from the Greenhouse Gas Abatement Programme for the CargoSprinter project which is expected to import three prototypes of a new, lightweight, fuel-efficient cargo train. These trains will be used to target higher value road freight markets, including express parcel and inter-modal freight, as an alternative to heavy rail and trucking. ***Reference***: Transport Sector GHG Emissions Projections 2004. ***Technical Reference***: Transport Sector GHG Emissions Projections 2004.	Modal Shift	Road Freight	-		0.2

Investment	State and Territory actions	Active	A range of state level actions to encourage modal shift of both freight and passengers, includes infrastructure investment and travel behaviour change initiatives to support and encourage mode switching. ***Reference***: Australia's Fourth National Communication to the UNFCCC. ***Technical Reference***: Transport Sector GHG Emissions Projections 2004.	Modal Shift	Cars, Road Freight	-	0.8
Investment	State and Territory actions on alternative fuels	Active	Several states and territories are also encouraging the conversion of buses from diesel to less carbon intensive fuels. The Western Australian Government is currently undertaking a $15 million hydrogen fuel cell bus trial in Perth, while 214 (or 26.5%) of buses in the South Australian Government's bus fleet are fuelled by CNG. ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Carbon Intensity	Buses	-	-
Information and Education	Fuel consumption labelling scheme	Active	A fuel consumption labelling scheme for new vehicles commenced in January 2001. Vehicles up to 2.7 tonnes gross vehicle mass (except for diesel and other non-gasoline vehicles in the light commercial and 4WD classes) are required to display a label at the point of sale. From January 2004 the mandatory coverage was extended to cover **all** vehicles up to 3.5 tonnes. The labelling scheme is linked to the web-based Green Vehicle Guide which allows easy comparison between vehicles on the basis of fuel efficiency. ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars		-
Information and Education	National Travel Behaviour Change Programme - Greenhouse Gas Abatement Programme	Planned	This project aims to reduce car reliance by encouraging and supporting alternative transport modes such as walking, cycling public transport and ride sharing. Over 5 years (2008-12), more than 186 000 households will participate in voluntary programs which will analyse their travel behaviour and their effect on the environment. It is anticipated that the programme will result in a reduction of more than 3 billion car kilometres travelled. Support from the Greenhouse Gas Abatement Programme: up to AUS$6.487 million. ***Reference***: Australian Greenhouse Office : http://www.greenhouse.gov .au/ggap/successfulprojects/ntbc.html (19/11/04). ***Technical Reference***: TravelSmart, December 2004 - Brief on NTBCP for Philip Watson OECD.	Modal Shift	Cars	AUS$18 million	0.25

Policy Process	350 ML Biofuels Target	Active	In 2001, the Government set an objective that biofuels would contribute at least 350 million litres to the total fuel supply by 2010. The Government restated its commitment to this target in 2005 and is working with stakeholders to establish how it will be reached. ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses		-	
Policy Process	Local Greenhouse Action	Active	Encourage and facilitate GHG abatement by local government and the community through: maintaining and increasing abatement from the operations of local government through *Cities for Climate Protection™ Australia*; using local government as the key conduit to the community by providing incentives for local government to take action with households, transport systems and businesses; leveraging the complementary role of local government in planning and infrastructure provision; increasing the information and resources available to encourage community greenhouse gas abatement. ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Modal Shift	Cars			0.02
Policy Process	Strategic transport planning	Active	In 2003 Federal, state and territory governments endorsed the National Charter of Integrated Land Use and Transport Planning, a high-level agreement between transport and planning ministers providing a national commitment to a framework for responsive planning, consistent decision-making and good design and management. The objective of the national charter is to achieve greater integration of land use and transport planning across agencies, jurisdictions and levels of government to facilitate effective and sustainable urban and regional development across Australia. ***Reference***: Australia's Fourth National Communication to the UNFCCC.	Demand	Cars		-	
Austria								
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Active	Austria has granted pure biofuels and blends (up to 2% with diesel and up to 5% with petrol) an exemption from the Mineral Oil excise tax to help achieve the reference targets outline in Directive 2003/30/EC. ***Reference***: Federal Environment Agency (2004). Biofuels in the Transport Sector in Austria in 2004.	Carbon Intensity	Cars, Road Freight, Buses	-		1
Fiscal	Fuel Consumption Levy	Active	Registration tax on passenger cars is based on fuel consumption. The highest tax rate is 16% for cars exceeding 11 l/100 km for petrol or 10 l/100 km for diesel. Cars less than 3 l/100 km petrol or 2 l/100 km diesel are exempt from registration tax. ***Reference***: Third National Communication to the UNFCCC (p. 85).	Fuel Efficiency - Technical	Cars	-	-	

Fiscal	Further internalisation of costs	Under Investigation	Possible further internalisation of environmental costs into the charges paid by users transport. ***Reference***: Third National Communication to the UNFCCC (p. 85).	-		-	-
Fiscal	Mileage based toll for lorries	Active	A distance based road user charging scheme was introduced in 2004 and applies to all heavy good vehicles travelling on motorways. ***Reference***: Third National Communication to the UNFCCC (p. 85, 73).	Demand	Road Freight	-	0.3
Fiscal	Road user charging	Planned	Since 1996 private car users have had to pay an annual fee of EUR 40 for highway driving. Raised to EUR 73 in 2001 this tax was originally planned as a 'vignette' to a mileage based fee, however, no timetable is in place for the introduction of the distance based fee. ***Reference***: Third National Communication to the UNFCCC (p. 85); In-depth review of Third National Communication to the UNFCCC (p. 14).	Demand	Cars	-	-
Fiscal	Vehicle tax adaptation 2000	Active	Amendments to taxation laws in 2000 led to an average increase of 50% on circulation taxes on passenger cars and motor bikes. These taxes are based on engine power. ***Reference***: Third National Communication to the UNFCCC (p. 85, 70).	Fuel Efficiency - Technical	Cars	-	-
Regulatory	Biofuels Obligation (in relation to Directive 2003/30/EC)	Active	An obligation requiring fuel companies to incorporate a certain percentage of biofuels in the fuel they place on the national market or face a penalty. ***Reference***: European Commission, COM (2005) 626, *Biomass Action Plan* (see p. 30).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Regulatory	Improvement of fuel quality	Active	Implementation of EU directive 98/70/EC on fuel quality into federal law - the required reduction in sulphur content allowed certain more fuel efficient vehicles to enter the fleet. ***Reference***: Third National Communication to the UNFCCC (p. 85, 70); estimated savings from Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars, Road Freight	-	0.1
Regulatory	Improvement of spatial planning	Planned	Improvement of spatial planning to avoid traffic-inducing settlement structures. ***Reference***: Third National Communication to the UNFCCC (p. 85).	Demand	Cars	-	0.3
Investment	Rail infrastructure and public transport investments	Active	Ongoing investment in rail and public transport infrastructure - to increase capacity, speed and service quality. ***Reference***: Third National Communication to the UNFCCC (p. 85, 70-1).	Modal Shift	Cars	-	0.3
Information and Education	Fuel Efficiency Labelling	Active	Labelling of new cars on sale with comparative fuel efficiency information. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	0.5

Information and Education	Improvement of transport logistics	Active	Pilot projects demonstrating opportunities for reduction of emissions from trucks by means of improved logistic management and infrastructure measures. ***Reference***: Third National Communication to the UNFCCC (p. 85).	Fuel Efficiency - Onroad	Road Freight	-	0.7
Information and Education	Public awareness raising measures	Active	Federal, regional and city level projects such as regional centres for mobility management, education and training schemes, information on economic driving (‘ecodriving’), labels on food products indicating transport intensity are at a planning stage. ***Reference***: Third National Communication to the UNFCCC (p. 85).	Fuel Efficiency - Onroad	Cars, Road Freight	-	0.3
Information and Education	Traffic management and speed limitation	Planned	Improvement of traffic management to reduce congestion. ***Reference***: Third National Communication to the UNFCCC (p. 85).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	0.3
Research and Development	Model projects for environmentally sound mobility	Active	Model projects that aim to raise public awareness and demonstrate new technologies. ***Reference***: Report to EU under 93/389/EEC.	-	Cars, Buses, Rail	-	-
Research and Development	Promotion of energy efficient and alternative motor concepts	Active	New and alternative motor concepts, like electric vehicles, fuel cells, biodiesel, hydrogen and hybrid vehicles will be promoted by means of pilot programmes (e.g. in tourist areas and ecologically sensitive regions, towns and public service), research and technological development programmes. ***Reference***: Third National Communication to the UNFCCC (p. 85).	Carbon Intensity	Cars	-	0.1
-	Promotion of walking and cycling	Active	[No information provided] ***Reference***: Third National Communication to the UNFCCC (p. 85).	Modal Shift	Cars	-	0.3
Belarus							
Unknown	Emissions controls	Active	Equipping motor vehicles with neutralisers of exhaust gas. ***Reference***: First National Communication to the UNFCCC (p. 136-138).	-		-	-
Unknown	Fuel efficiency improvements	Active	Reduction in the use of fuel by improving fuel efficiency. ***Reference***: First National Communication to the UNFCCC (p. 136-138).	Fuel Efficiency - Technical	Cars	-	-
Unknown	Increased freight efficiency	Active	Increased freight efficiency through improved logistics. ***Reference***: First National Communication to the UNFCCC (p. 136-138).	Fuel Efficiency - Onroad	Rail	-	-
Unknown	In-service emissions controls	Active	Setting up posts for controlling the level of exhaust emissions; equipping enterprises with diagnostic and gas analysing equipment. ***Reference***: First National Communication to the UNFCCC (p. 136-138).	Fuel Efficiency - Onroad	Cars, Road Freight	-	-

Unknown	Retrofitting LPG and CNG into vehicles	Active	Retrofitting motor vehicles of some enterprises using gas cylinders with CNG and LPG. ***Reference***: First National Communication to the UNFCCC (p. 136-138).	Carbon Intensity	Cars	-	-
Belgium							
Fiscal	Promotion of Modal Shift	Active	Free train service funded by the Federal Government for civil service commuters. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Cars	-	-
Fiscal	Subsidies for freight transport by rail	Active	A subsidy is available from the Federal Government for movement of freight by rail for trips longer than 50 km (22 EUR per unit + 0.40 EUR per km). ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Road Freight	-	-
Fiscal	Tax advantage for highly efficient vehicles	Active	The Federal Government provides an incentive for the purchase of highly efficient vehicles through a fiscal rebate: up to 15% of the vehicle price (max. 4 000 EUR) for cars with CO_2 emissions lower than 105 g/km, and up to 3% of the vehicle price (max. 750 EUR) for cars with CO_2 emissions between 105 and 115 g/km. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Tax deductions on travel to and from home	Active	The Federal Government has extended the existing deduction for professional expenses relating to journeys between home and work to cover all modes of transport, including walking, cycling and public transport. It had previously only applied to cars, hybrid vehicles and minibuses. The deduction is EUR 0.15 / km, capped at 50 km round trip. ***Reference***: Third National Communication to the UNFCCC (p. 66-75); 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Cars	-	-
Fiscal	Vehicle taxation	Active	Both circulation and registration taxes are differentiated according to engine size, with a small supplementary tax for diesel fuelled cars. ***Reference***: OECD 2004, Can cars come clean?	Fuel Efficiency - Technical	Cars	-	-
Regulatory	Mobility Plans	Active	The Brussels regional government requires all enterprises with more than 200 employees to have a mobility plan. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Cars	-	-

Investment	Improvements in public transport systems	Active	Investments in public transport in the Wallonia Region to increase the available supply of public transport (through new routes/lines and increasing services on existing routes) and to increase its attractiveness and usability - through improving interconnectedness of different services; enhanced user safety; shorter journey times and newer vehicles. ***Reference***: Third National Communication to the UNFCCC (p. 66-75); 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Cars	-	-
Investment	Investment for the freight sector	Active	Investment in infrastructure and systems by the Wallonia Regional Government to aid the transfer of freight between different modes, and investment in infrastructure for shipping (including inland) and rail. ***Reference***: Third National Communication to the UNFCCC (p. 66-75); 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Road Freight	-	-
Investment	Promotion of clean vehicles	Active	The Brussels regional government is increasing the share of clean vehicles in the fleets of regional administration and public transport operators. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Fuel Efficiency - Technical	Cars	-	-
Investment	Public procurement rules for car fleet of Federal administrations and Public services	Planned	The Federal Government is planning a progressive shift of its fleet towards cleaner vehicles. This is planned through: • Renewal of the car fleet of the federal administration. • Voluntary agreements between federal state and public sector organisations. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Fuel Efficiency - Technical	Cars	-	-
Information and Education	Eco-driving	Active	The Brussels regional government promotes "soft" driving behaviour (ecodriving). ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Fuel Efficiency - Onroad	Cars	-	-
Information and Education	Information about alternative transport modes	Active	The Brussels regional government promotes alternatives means of transport: public transport, cycling and walking. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Cars	-	-
Information and Education	Information campaign on sustainable driving	Active	The Flemish Regional Government is running a public campaign promoting fuel efficiency with radio spots, stickers and brochures, and an action programme with energy saving driving tips available on the web. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Fuel Efficiency - Onroad	Cars	-	-

Information and Education	Promotion of low emission cars ("CO_2 guide")	Active	The Federal Government publishes an annual guide of CO_2 emissions for all cars put on the market in Belgium, which is distributed in all show-rooms. A database of car emissions is also available on a web site. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Fuel Efficiency - Technical	Cars	-	-
Research and Development	Mobility observatories	Active	Mobility "observatories" were set up in the Wallonia Region to improve understanding of passenger and freight mobility patterns and how they evolve. ***Reference***: Third National Communication to the UNFCCC (p. 66-75); 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Cars, Road Freight	-	-
Unknown	Car parking management	Active	The Brussels regional government's effort to control, tax and plan car parking facilities, which include installation of dissuasion measures and transit parking outside and inside the region. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	Modal Shift	Cars	-	-
Unknown	Flemish Mobility Plan	Active	The Flemish Regional Government adopted the Mobility Plan on 17 October 2003. This plan describes five policy packages to achieve sustainable road transport: more alternatives for cars and trucks, better infrastructure, promotion of modal shift, efficient use of means of transport, more efficient and safe car parking. ***Reference***: 2005 Report to Commission by Belgium under 28/2004/EC.	-	Cars, Road Freight, Buses	-	-
Bulgaria							
Investment	Improving rail services	Active	Investment in rail infrastructure and services, including electrification of the lines which form part of the Pan-European transport corridors. ***Reference***: Third National Communication to the UNFCCC (p. 72-75).	Modal Shift	Cars, Road Freight	-	-
Investment	Improving the bus fleet	Active	Renewal of the urban bus fleet with more environmentally friendly buses. ***Reference***: Third National Communication to the UNFCCC (p. 72-75).	Fuel Efficiency - Technical	Buses	-	-
Investment	Promoting combined transport	Active	Construction of new and redevelopment of existing combined transport terminals. ***Reference***: Third National Communication to the UNFCCC (p. 72-75).	Modal Shift	Road Freight	-	-
Information and Education	Limiting the increase of urban car travel	Planned	Limiting the increase of urban car travel by promoting public transport and the efficient use of infrastructure. ***Reference***: Third National Communication to the UNFCCC (p. 72-75).	Modal Shift	Cars	-	-

Canada							
Fiscal	Commercial Transportation Energy Efficiency Rebate	Active	Certain types of energy efficient equipment which can be retrofitted into trucks are eligible for a rebate. Equipment includes cab heaters and associated auxiliary power units. ***Reference***: http://oee.nrcan.gc.ca/transportation/business/fleetsmart/rebate-application-form.cfm?attr=16.	Fuel Efficiency - Onroad	Road Freight		-
Fiscal	Fiscal incentives for biofuels	Active	Both ethanol and biodiesel are subject to lower rate of fuel excise duty than fossil based fuels. A CAN$0.10 / litre (EUR 0.07/litre) incentive is in place for ethanol and a CAN$0.04 / litre (EUR 0.029/lite) incentive for biodiesel. **Note:** In addition, Ontario intends to exempt biodiesel from the CAN$0.14 / litre (EUR 0.10/litre) provincial tax. ***Reference***: Communication to ECMT.	Carbon Intensity	Cars, Road Freight, Buses	-	1.1
Fiscal	Future Fuel Initiative	Active	The Future Fuel Initiative will increase ethanol fuel use from the current level of 240 million litres per year to 1 billion litres in 2010. This builds on current federal and provincial excise tax exemptions (for the ethanol portion of the fuel) as well as federal funding for research and development and the use of ethanol in the federal fleet. ***Reference***: Climate Change Plan for Canada (p. 21). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Carbon Intensity	Cars	-	0.8
Fiscal	Inter-modal freight movement	Planned	Promotion of inter-modal freight opportunities and increasing the use of low-emission vehicles and modes. Possibly through support for infrastructure improvements, greater use of intelligent transportation, identification and removal of barriers to inter-modal freight, harmonization of national and international standards, and showcasing of best practices and new technologies. ***Reference***: Climate Change Plan for Canada (p. 21). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Modal Shift	Road Freight	-	1
Regulatory	Increased speed limit enforcement	Planned	***Reference***: Climate Change Plan for Canada (p. 21). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Fuel Efficiency - On road	Cars	-	1.5
Voluntary Agreement	Motor Vehicle Fuel Efficiency Initiative	Active	Voluntary agreement with manufacturers to reduce the emissions of greenhouse gases produced by light duty motor vehicles. ***Reference***: Climate Change Plan for Canada (p. 21). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Fuel Efficiency - Technical	Cars	-	5.3

Voluntary Agreement - Freight	Freight Efficiency and Technology Initiative - Voluntary Performance Agreements	Planned	Voluntary performance agreements are being established between the federal government and industry associations within each freight mode - rail, marine, aviation and trucking - to outline concrete initiatives for reducing GHG emissions. Agreements will include an emission reduction target, an action plan to achieve that target, and requirements to report on progress. The first agreement has been made, with the Air Transport Association of Canada who will assist its members to improve the energy efficiency of their operations (both domestic and international) by an average of 1.1% a year). ***Reference***: http://www.tc.gc.ca/programs/environment/Freight/voluntary_performance.htm.	Fuel Efficiency - Technical	Road Freight, Shipping, Air		-
Investment	Ethanol Expansion Programme	Active	The Ethanol Expansion Programme offers grants for the construction of new ethanol production facilities - a total of CAN$118 million (EUR 85 million) has been allocated. Along with the CAN$1 billion (EUR 721 million) invested by industry, this is expected to deliver around 1.2 billion tonnes of ethanol production capacity by the end of 2007. ***Reference***: Communication to ECMT; www.nrcan-rncan.gc.ca/media/newsreleases/2005/200550_e.htm	Carbon Intensity	Cars, Road Freight, Buses	-	-
Investment	Greening Government - the vehicle fleet	Active	The Government will take a series of measures to ensure that its fleet of vehicles is among the greenest in the country, including: replacing its vehicles more quickly and choosing more efficient models; significantly increasing its purchase of hybrid vehicles and vehicles that operate on E85 and other alternative fuels; and adopting more stringent user practices such as anti-idling and vehicle sharing. ***Reference***: Moving forward on climate change (p. 27).	Fuel Efficiency - Technical	Cars	-	-
Investment	Sustainable Travel and Planning	Active	Increased investment through various programs in sustainable transport infrastructure in order to reduce single occupant car trips. For some programs, this includes supporting policies. With strong supportive measures, investments in public transport infrastructure and services could reduce emissions by up to 3 million tonne of CO_2. ***Reference***: Climate Change Plan for Canada (p. 23). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Modal Shift	Cars	-	3
Investment	Sustainable Travel and Planning - Local and State Level Actions	Planned	As part of federal transfers to local and provincial levels, there is a requirement that they develop integrated community sustainability plans which would provide, among other things, for actions which are complementary to planned investment in public transport. ***Reference***: Climate Change Plan for Canada (p. 23). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Modal Shift	Cars	-	2.5

Information and Education	EnerGuide	Active	A vehicle ranking system, EnerGuide label appears on all new cars on sale. Light-duty vans, pickup trucks and special purpose vehicles not exceeding a gross vehicle weight of 3 855 kg (8 500 lb) are included in the scheme. The information displayed can be used to compare between different vehicles. A fuel consumption guide, which covers all vehicles on sale in Canada, is produced annually. ***Reference***: Climate Change Plan for Canada (p. 22). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Fuel Efficiency - Technical	Cars	-	0.8
Information and Education	FleetSmart	Active	The FleetSmart initiative offers free practical advice to fleet operators on how energy-efficient vehicles and business practices can reduce operating costs and improve productivity. Advice includes, among other things training materials for fuel efficient driving and outlines how to establish a fuel management plan. ***Reference***: Climate Change Plan for Canada (p. 23). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Fuel Efficiency - Onroad	Road Freight, Rail	-	2
Information and Education	Freight Efficiency and Technology Initiative - Freight Sustainability Demonstration Programme	Active	This programme provides funding, through a competitive process, for companies and not-for-profit organisations to undertake a freight-related demonstration project of an existing or new technology or best practice in the aviation, marine, rail, truck or intermodal sectors. Projects funded include demonstration of hybrid (diesel-electric) trucks, fuel efficient tyres for trucks and the use of 20% biodiesel blends in trucks and in ships. ***Reference***: http://www.tc.gc.ca/programs/environment/freight/FETI/FSDP/menu.htm.	Fuel Efficiency - Technical	Road Freight, Rail, Shipping, Air	-	-
Information and Education	Freight Efficiency and Technology Initiative - Training and Awareness	Active	Transport Canada is organising a series of events to increase awareness of strategies to improve energy efficiency and reduce greenhouse gas emissions in Canada's freight sector. The conferences are of interest to the freight carrier, shipping and freight forwarding communities; manufacturers & suppliers; regulators; and environmental NGOs. The first conference, in 2002 was on fuel efficiency measures in the aviation sector. The second, in 2005 addressed fuel efficiency in the maritime sector. ***Reference***: http://www.tc.gc.ca/programs/environment/Freight/Training/menu.htm	Fuel Efficiency - Technical	Road Freight, Rail, Shipping, Air		-
Information and Education	Information campaigns	Active	The "One Tonne Challenge" is an initiative, cutting across all types of energy use, encouraging Canadians to reduce their greenhouse gas emissions (by one tonne). Participants can use an emissions calculator to estimate the amount of greenhouse gas they are responsible for and receive free tips on how to reduce their impact on the climate.	Fuel Efficiency - Onroad	Cars	-	-

			The "Personal Vehicle Initiative" provides motorists with helpful tips on buying, driving and maintaining their vehicles to reduce fuel consumption and greenhouse gas emissions that contribute to climate change. It is linked to the EnerGuide label. ***Reference***: http://oee.nrcan.gc.ca/transportation/personal-vehicles-initiative.cfm; http://www.climatechange.gc.ca/onetonne/english/index.asp?pid=171.				
Information and Education	MOST - Moving On Sustainable Transport	Active	This programme was established to support education and awareness programs and the development of analytical tools needed to make sustainable transportation a reality. The MOST Programme provides funding to help support projects that provide Canadians with practical information and tools to better understand sustainable transportation issues, promote sustainable transportation and achieve quantifiable environmental/sustainable-development benefits. ***Reference***: www.tc.gc.ca/programs/environment/most/aboutmost.htm.	Modal Shift	Cars	-	-
Policy Process	Biodiesel Support	Planned	Federal, provincial and territorial governments intend to collaborate on how to reach a target of 500 million litres of biodiesel production by 2010, using a variety of tools including incentives, standards and research and development. ***Reference***: Climate Change Plan for Canada (p. 23). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Policy Process	Ethanol (E-10)	Planned	Investigate the possibility of increasing the target for ethanol blended fuel (E10 - a blend of petrol which contains 10% ethanol from renewable sources) to 35% of petrol supply by 2010 or introducing a standard for a certain percentage of fuel to be GHG free - to encourage the development of cellulosic ethanol. ***Reference***: Climate Change Plan for Canada (p. 22). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Carbon Intensity	Cars	-	0.9
Research and Development	Fuel cell vehicles	Active	Development and demonstration of refuelling technologies and infrastructure for commercialisation of fuel cell vehicles. ***Reference***: Climate Change Plan for Canada (p. 22). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Carbon Intensity	Cars	-	0.1

Research and Development	Urban Transportation Showcase Program	Active	Demonstration of integrated strategies, technologies and planning to reduce urban transportation emissions. This initiative was established to enable all levels of government to demonstrate the potential of innovative, integrated and sustainable urban transportation practices. ***Reference***: Climate Change Plan for Canada (p. 23). ***Technical Reference***: http://www.tc.gc.ca/programs/environment/climatechange/subgroups1/english/.	Modal Shift	Cars	-	0.8
Croatia							
Research and Development	Biodiesel and Hydrogen	Planned	The BIOEN programme is focused on energy generation from biomass and waste and it indicates that such production could cover a minimum of 15 percent of total primary energy demand by the year 2020 (the proportion in the transport sector is unclear). The objective is to be realized by: initiation of demonstration projects, creation of a market for increased use of biomass energy, attracting industry and businesses, education and stimulation of research and international collaboration. ***Reference***: First National Communication of the Republic of Croatia to the UNFCCC (p. 104, 128-9).	Carbon Intensity	Cars, Road Freight, Buses	-	0.33 (in 2020)
Czech Republic							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Active	Excise duty on diesel containing at least 31% (by volume) biodiesel from rapeseed methyl ester is granted a rebate of CZK 3.08 per litre of blended fuel. ***Reference***: European Commission, State Aid Case No. N223/05 – *Amendment excise reduction and operating subsidies for biodiesel*. (July 2005).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Regulatory	Biofuels Obligation (in relation to Directive 2003/30/EC)	Planned	An obligation requiring fuel companies to incorporate a certain percentage of biofuels in the fuel they place on the national market or face a penalty. ***Reference***: European Commission, COM (2005) 626, *Biomass Action Plan* (see p. 30).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Investment	Organisation of transport	Active	Subsidies are available for initiatives which help encourage a modal shift towards the more fuel efficient modes of transport. ***Reference***: Fourth National Communication to the UNFCCC.	Modal Shift	Cars	-	-
Investment	Support for public transport	Active	Investment in public transport is focused on renewing vehicle stocks. In 2004, funding included CZK 760 million from the public budget and at least CZK 144 million from private sources. ***Reference***: In-depth review of Third National Communication - see table 7.	Modal Shift	Cars	-	0.065

Information and Education	Promotion of the sound use of energy	Active	This measure is concerned with public awareness, education, consulting and promotion of the sound use of energy and renewable energy sources in the transport sector. Support is provided for exhibitions, professional courses, workshops and non-profit conferences, preparation of studies, handbooks and information materials, video presentations, television and radio programs, creation and development of information databases and computer systems. The projects are concerned with informing the public on the potential for rational energy use in the transport sector and persuading people of its importance. ***Reference***: Fourth National Communication to the UNFCCC	Fuel Efficiency - Onroad	Cars	-	-
Denmark							
Fiscal	CO_2 tax and biofuels support (in relation to Directive 2003/30/EC)	Active	A CO2 tax on petrol and diesel of 0.22 DKK/litre (around 3 Euro-cents per litre) was introduced at the beginning of 2005. The tax does not represent an increase in the tax burden for petrol, but rather a re-organisation in order to make room for a tax exemption for biofuels. ***Reference***: Report to the EU concerning directive 2003-30-EC – Denmark.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Green owner tax on motor vehicles	Active	This purchase tax for cars was introduced in 1997, the tax rate is differentiated according to fuel consumption and fuel type (petrol and diesel). There are 24 different graduations for petrol ranging, from 580 DKK/year (for less than 5 litres/100 km) to 18 460 DKK/year (for greater than 22 litres/100 km). For diesel there are 27 graduations – the lowest rate is 80 DKK/year (for less than 3.1 litres/100 km) to 25 060 DKK (for greater than 19.6 litres/100 km). ***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Increases in fuel excise tax	No Longer Active	Increases in the rate of excise duty on transport fuels between 1990 and 2001. Note that a tax freeze has been in place since 2002. ***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	1.2
Regulatory	Initiative on enforcing speed limits	Active	[No information provided] ***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars, Road Freight	-	-
Regulatory	Spatial planning	Active	Being implemented by counties and municipalities. ***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Demand	Cars, Road Freight	-	-
Investment	Establishment of intermodal installations	Active	***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Modal Shift		-	-

Investment	Reduced travel times for public transport	Active	***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Modal Shift	Cars	-	-
Information and Education	Energy-correct driving technique	Active	Eco-driving principles have been incorporated into driving courses. ***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars	-	-
Information and Education	Information campaign on fuel consumption of new cars	No Longer Active	***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars	-	-
Information and Education	Promotion of environmentally friendly goods transport	Active	***Reference***: Denmark's Fourth National Communication to the UNFCCC.	Modal Shift	Road Freight	-	-
Information and Education	Swan Label for tyres	Active	The Nordic Swan Label for energy efficient products introduced by the Nordic Council of Ministers recognises tyres that meet certain standards for rolling resistance and noise. ***Reference***: ECMT.	Fuel Efficiency - Technical	Cars, Road Freight	-	-
Total	Total effect of "energy intensity - technical / onroad" policies	Active	The total effect of the following policies have been quantified: the effect of the European level voluntary agreements with vehicle manufacturers, the green owner tax on motor vehicles, energy-correct driving technique and information campaign on fuel consumption of new cars. ***Reference***: Denmark's Fourth National Communication to the UNFCCC (p. 271).	Total	Total	-	0.6
Estonia							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Active	An excise tax exemption exists for biofuels including bioethanol, biodiesel and vegetable oils. ***Reference***: Report to the EU concerning directive 2003-30-EC - Estonia.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Subsidies for public transport	Planned	***Reference***: Estonia's Fourth National Communication to the UNFCCC.	Modal Shift	Cars		0.032
Regulatory	Technical inspection of vehicles	Planned	***Reference***: Estonia's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses		0.01
Investment	Improvement of road quality	Planned	***Reference***: Estonia's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses		0.021

Unknown	Increasing the proportion of new vehicles	Planned	***Reference***: Estonia's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars, Road Freight, Buses		0.023
Unknown	Promotion of railway transport	Planned	***Reference***: Estonia's Fourth National Communication to the UNFCCC.	Modal Shift	Cars, Road Freight		0.034
European Union							
Fiscal	Charging of heavy-duty vehicles for the use of road infrastructure	Planned	The Commission has proposed to extend the 1999 Directive on the charging of heavy-duty vehicles for the use of road infrastructure to include vehicles greater than 3.5 tonnes. The current Directive harmonises the levies (vehicle taxes, tolls and charges) that Member States can impose on vehicles with a laden weight over 12 tonnes. ***Reference***: The European Union's Fourth National Communication to the UNFCCC - Progress Report.	Demand	Road Freight	-	-
Fiscal	Inclusion of Aviation in the EU Emissions Trading Scheme	Under Investigation	The European Commission is currently investigating the feasibility of including the aviation sector in Phase II of the EU Emissions Trading Scheme. ***Reference***: European Commission COM (2005) 459 - Reducing the Climate Change Impact of Aviation. ***Technical Reference***: CE (2005), *Giving Aviation Wings.* CE, Delft (see Section 5.4).	Demand	Air		0.3 - 2 (in 2012)
Fiscal	Minimum excise tax rates (Directive 2003/96/EC)	Active	The EU operates a system of minimum excise taxation on transport fuels - this encourages more efficient use of energy. Member States can be authorised to grant tax advantages to fuels with lower carbon intensity. ***Reference***: The European Union's Fourth National Communication to the UNFCCC - Progress Report.	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	-
Fiscal	Vehicle taxation reform	Planned	Proposed reform of member countries vehicle taxation such that taxation rates are based on CO_2. **Note:** abatement estimate includes the effects of the Energy Labelling of New Cars Directive ***Reference***: The European Union's Fourth National Communication to the UNFCCC - Progress Report.	Fuel Efficiency - Technical	Cars	-	32 - 35

Regulatory	Phase out of HFC-134a	Planned	The fluorinated greenhouse gas HFC-134a has a global warming effect that is 1 300 times greater than that of CO_2. It is used in car air conditioning systems. This proposal aims to impose maximum allowed leakage rates and phase out the use of HFC-134a in new vehicles between 2011 and 2017. ***Reference***: The European Union's Fourth National Communication to the UNFCCC - Progress Report.	Other	Cars	-	-
Regulatory	Speed limiters	Active	In 1992 the European Commission made compulsory the fitting of speed limiters on all trucks over 12 tonnes and buses over 10 tonnes which have been registered since 1988. Trucks are limited to a maximum speed of 90 km/h and buses to 100 km/h. From 2005 this has been extended to all new passenger and freight vehicles over 3.5 tonnes. Progressively, from 2006, all such vehicles which have entered service since 2001 will be required to retrofit speed limiters. ***Reference***: IEA database http://www.iea.org/dbtw-wpd/textbase/envissu/pamsdb/index.html.	Fuel Efficiency - Onroad	Road Freight, Buses		-
Voluntary Agreement	EU agreement with European, Japanese and Korean car manufacturers	Active	The European Commission has voluntary agreements with European, Japanese and Korean car manufacturers which set the target of reducing the sales weighted average CO_2 emissions of newly sold cars to 140 g/km by 2008/09. ***Reference***: Third National Communication	Fuel Efficiency - Technical	Cars	-	75 - 80
Investment	Macro Polo Programme	Active	The Marco Polo Programme addresses the modal split of freight transport. It has a budget of EUR 100 million for 2003-2006 which is used to co-finance: • The start-up of non-road freight transport services. • Innovative measures to overcome structural barriers in the market that act as obstacles to non-road freight transport. • Cooperation and exchange of know-how among operators in the freight logistics market in order to improve the sector's environmental performance. ***Reference***: IEA database http://www.iea.org/dbtw-wpd/textbase/envissu/pamsdb/index.html.	Modal Shift	Road Freight	EUR 100 million	-
Investment	STEER	Active	STEER focuses on investigating alternative fuels and vehicles, developing policy measures for efficient use of energy in transport, and strengthening the knowledge of local energy agencies in the transport field ***Reference***: IEA database http://www.iea.org/dbtw-wpd/textbase/envissu/pamsdb/index.html.	Carbon Intensity	Cars	-	-

Information and Education	Requirement to label vehicles with fuel efficiency information	Active	Directive requiring Member Countries to introduce regulations which makes it compulsory to label new cars on sale with information on their fuel efficiency. ***Reference***: The European Union's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars	-	-
Policy Process	Biofuels Support (Directive 2003/30/EC)	Active	Directive 2003/30/EC requires national governments to set targets for the introduction of biofuels - for 2010 the indicative target is 5.75% (on the basis of energy content) of total transport fuels. ***Reference***: Third National Communication.	Carbon Intensity	Cars, Road Freight, Buses	-	35 - 40
Finland							
Fiscal	Differentiation of vehicle taxation on energy efficiency basis	Planned	Fiscal measures with the aim to reform vehicle taxation to encourage purchase of fuel efficient cars. Differentiation of annual vehicle tax on the basis of fuel efficiency or carbon dioxide is proposed for introduction in 2006-07. ***Reference***: Third National Communication to the UNFCCC (p. 87-92). Proposal to differentiate vehicle taxes made in 2005 Sustainable Production and Consumption White Paper, for inclusion in Climate Change Strategy to be finalised in September 2005.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Tax deduction for company/employer paid public transport tickets	Active	Increasing market share of public transport in working trips through tax deduction of company paid public transport tickets. ***Reference***: Communication from Finland to ECMT.	Modal Shift	Cars	-	-
Regulatory	Biofuels Fuel Obligation	Planned	A biofuels obligation was introduced in February 2006. ***Reference***: Communication from Finland to ECMT.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Regulatory	Spatial and urban planning: zoning and land-use planning	Active	Building in so-called "low and dense" style with good public transport connections and cycling routes. ***Reference***: Communication from Finland to ECMT. Guidelines for spatial planning.	Modal Shift	Cars	-	-
Regulatory	Traffic speed limits	Active	Decreasing speed limits especially in winter time. Enforcing traffic surveillance. ***Reference***: Communication from Finland to ECMT. Traffic Safety Plan.	Fuel Efficiency - Onroad	Cars, Road Freight	-	-
Voluntary Agreement - Freight	Agreements with transport operators	Active	Voluntary energy saving agreements with transport carriers. ***Reference***: Third National Communication to the UNFCCC (p. 87-92).	Fuel Efficiency - Onroad	Road Freight	-	-

Investment	Improvement of transport logistics	Active	New action programme on transport logistics: investments in telematic and management systems. ***Reference***: Communication from Finland to ECMT. Strengthening Finland's logistics – an action programme (2005).	Fuel Efficiency - Onroad	Road Freight	-	-
Investment	Maritime highways and short-sea-shipping	Active	Investments in harbours, logistics and management systems. ***Reference***: Communication from Finland to ECMT. Transport Plan.	Modal Shift	Road Freight	-	-
Investment	Promotion of cycling and walking	Active	Investments in infrastructure for walking and cycling. ***Reference***: Communication from Finland to ECMT. Action programmes on cycling and walking (2001).	Modal Shift	Cars	-	-
Investment	Rail infrastructure and rail services	Active	A new high speed railway line Helsinki-Lahti will be opened in 2006. ***Reference***: Communication from Finland to ECMT. Transport investment plan.	Modal Shift	Road Freight	-	-
Information and Education	Additional promotion of public transport and non-motorised modes	Planned	[No information provided] ***Reference***: Third National Communication to the UNFCCC (p. 93).	Modal Shift	Cars	-	0.1 - 0.2
Information and Education	Eco-driving	Active	Information, education and motivation campaigns aimed at awareness raising and changing transport behaviour to encourage more efficient driver behaviour. ***Reference***: Third National Communication to the UNFCCC (p. 87-92); ECMT Env Group 19 May 2005.	Fuel Efficiency - Onroad	Cars, Road Freight	-	0.5
Information and Education	Mobility management	Active	Providing information on Mobility Management through regional Energy Centres and assisting in preparing Mobility Management Plans. ***Reference***: Communication from Finland to ECMT.	Modal Shift	Cars	-	-
Information and Education	Promotion of cycling and walking	Active	Promotion campaigns and information. ***Reference***: Communication from Finland to ECMT. Action programmes on cycling and walking (2001).	Modal Shift	Cars	-	-
Information and Education	Promotion of public transport	Active	Investments in travel centres, public transport information and public transport. Publicity campaigns encouraging modal shift. ***Reference***: Communication from Finland to ECMT. Public Transport Strategy – Public Transport an Attractive Alternative (2001).	Modal Shift	Cars	-	-
Information and Education	Swan Label for tyres	Active	The Nordic Swan Label for energy efficient products introduced by the Nordic Council of Ministers recognises tyres that meet certain standards for rolling resistance and noise. ***Reference***: ECMT	Fuel Efficiency - Technical	Cars, Road Freight	-	-

Research and Development	Biofuels Support (in relation to Directive 2003/30/EC)	Active	Finland has granted partial relief from excise duty for biofuels intended for research and testing. Two projects are currently under way where the duty on bioethanol in a fuel blend of petrol and bioethanol has been reduced by 0.30 per litre. These projects are due to finish 31 December 2004 and have not applied for an extension. So far no tax reductions have been granted pursuant to the Energy Tax Directive (2003/96/EC), which came into force on 1 January 2004. ***Reference***: Report to the EU concerning directive 2003-30-EC – Finland.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Research and development	Increasing fuel efficiency of heavy duty road transport	Active	Research efficiency measures for heavy duty vehicles (e.g. tyres, tyre pressures, loading, driving style, lubricants, lights (day-time lights based on LEDs)). ***Reference***: Communication from Finland to ECMT. Research programme “HDEnergy” 2002-2008.	Fuel Efficiency - Onroad	Road Freight	-	-
France							
Fiscal	Air transport	Under Investigation	During 2004, the French Ministry of Transport is studied the introduction of an EC air tax based on CO_2 emissions. France was also to request a study in favour of the taxation of kerosene at European level. ***Reference***: Climate Plan 2004 (p. 26-31).	Fuel Efficiency - Technical	Air	-	0.5
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Active	Reductions in fuel excise duty for biofuels and biofuel blends, relative to petrol and diesel. ***Reference***: Climate Plan 2004 (p. 26-31); Rapport de la France concernant la directive 2003/30/CE visant à promouvoir l’utilisation des biocarburants.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Bonus/surcharge	Under Investigation	Concerted action will be undertaken at the French and European levels to study the introduction of a bonus/surcharge system based on the fuel efficiency label which is required for new vehicles on sale. This carefully balanced fiscal tool is intended as an incentive to purchase low-emission vehicles and as a disincentive to the purchase of inefficient vehicles. ***Reference***: Climate Plan 2004 (p. 26-31).	Fuel Efficiency - Technical	Cars	-	1
Fiscal	Corporate travel plans	Active	Incentives will be introduced to encourage companies to set up 'travel plans' for their employees, the aim is to increase the number of organisations involved from 50 to 500 by 2005-2006. ***Reference***: Climate Plan 2004 (p. 26-31).	Modal Shift	Cars	EUR 2 million	0.02
Fiscal	Fuel tax adjustments	Active	Progressive increase of diesel tax to petrol tax level. ***Reference***: 2004 Report to EU under 93/389/EEC.	-	Cars, Road Freight, Buses	-	2.7

Fiscal	Improved corporate logistics	Planned	To increase awareness among economic players of all the emissions attributable to their activities, incentives will be provided to encourage large companies to report their CO_2 emissions and attempt to reduce those emissions through improved logistical organisation. Major sea and air ports will also be required to report emissions. ***Reference***: Climate Plan 2004 (p. 26-31).	Fuel Efficiency - Onroad	Road Freight	-	0.5
Fiscal	Internalise the cost of carbon	Active	Internalisation of carbon cost in fuel taxation. ***Reference***: 2004 Report to EU under 93/389/EEC	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	3.7
Regulatory	Biofuels Obligation (in relation to Directive 2003/30/EC)	Active	An obligation requiring fuel companies to incorporate a certain percentage of biofuels in the fuel they place on the national market or face a penalty. ***Reference***: European Commission, COM (2005) 626, *Biomass Action Plan* (see p. 30).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Regulatory	Land use planning	Active	Spatial planning of communities. ***Reference***: 2004 Report to EU under 93/389/EEC.	Demand	Cars	-	3.65
Regulatory	Land use planning	Active	Control the evolution of urban space. ***Reference***: 2004 Report to EU under 93/389/EEC.	Demand	Cars	-	1.5
Regulatory	Speed limits enforcement	Active	Continued enforcement of current speed limits is expected to bring down average speeds (in addition to the 5-10 km/h reduction in the last year). The potential impact of full compliance: 2.1 Mt CO_2 for cars, 0.4 Mt CO_2 for heavy goods vehicles; 0.5 Mt CO_2 for light utility vehicles. ***Reference***: Climate Plan 2004 (p. 26-31).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	3
Regulatory	Speed optimisation	Active	Speed optimisation on fast lanes of highways. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars	-	0.2
Regulatory	Work regulations	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC	-	Cars, Road Freight, Buses	-	0.5
Voluntary Agreement	Improving fuel efficiency	Planned	The French government is seeking a voluntary commitment from manufacturers to develop speed limiting devices. Also, the use of low viscosity oils, enabling a reduction in fuel consumption and CO_2 emissions will be actively encouraged. ***Reference***: Climate Plan 2004 (p. 26-31).	Fuel Efficiency - Onroad	Cars	-	-

Investment	Biofuels Support (in relation to Directive 2003/30/EC)	Active	Public investment in biofuel processing plants. Tenders for 800 000 t pa biodiesel plants were launched in September 2004, with a tender for further 1.8 Mt pa of plants launched in 2005, which will produce enough biofuels to meet the 7% target for 2010. ***Reference***: Climate Plan 2004 (p. 26-31); Rapport de la France concernant la directive 2003/30/CE visant à promouvoir l'utilisation des biocarburants.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Investment	Development of Collective Urban Transport Systems	Planned	Assist municipalities with the development and implementation of strategies to manage urban growth, in particular by: implementing local solutions for more effective funding; instigating standardised relevant tools for assessing urban travel arrangements; identifying which municipalities have particular problems with urban sprawl. ***Reference***: Climate Plan 2004 (p. 26-31).	Demand	Cars	-	0.2
Investment	High speed train networks	Planned	Ring-fencing of motorway toll revenue for infrastructure spending will double the rate of development of the high speed train network. ***Reference***: Climate Plan 2004 (p. 26-31).	Modal Shift	Cars	-	0.6 (in post-2010)
Investment	Increasing attractiveness of public transport	Planned	Encourage the appeal of public transport by decreasing journey times. ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	0.07
Investment	Infrastructure Development	Active	Improvement of interurban infrastructure. ***Reference***: 2004 Report to EU under 93/389/EEC.	-	Cars, Road Freight	-	3.7
Investment	Maritime highways	Planned	The development of coastal shipping and access to ports via river and rail. The routes between Spain, France and Italy will be given first priority. ***Reference***: Climate Plan 2004 (p. 26-31).	Modal Shift	Road Freight	-	0.2
Information and Education	Air conditioners	Planned	Steps to reduce the emission of HFCs from air-conditioners in vehicles will be introduced in 2005 in liaison with garage owners to enhance operator skills and perform regular checks of air-conditioning circuit containment. ***Reference***: Climate Plan 2004 (p. 58).	Other	Cars, Road Freight, Buses	-	3.5
Information and Education	Awareness of eco-friendly driving style	Active	Starting in 2005, driving schools will emphasise fuel-conscious driving skills in their teaching and the driving test will include the topic of "driving and the greenhouse effect." Measures will be taken to raise public awareness of the links between fuel economy and climate change. ***Reference***: Climate Plan 2004 (p. 26-31).	Fuel Efficiency - Onroad	Cars, Road Freight	-	0.7
Information and Education	Information on fuel consumption	Planned	A proposal will be made to label new cars on sale with clear, reliable and comparative information on fuel consumption and CO_2 emissions. The label will be similar to the current label for household electric appliances. ***Reference***: Climate Plan 2004 (p. 26-31).	Fuel Efficiency - Technical	Cars	-	-

Policy Process	Biofuels Support (in relation to Directive 2003/30/EC)	Active	National implementation of the European directive dated 8 May 2003 (2003/30/EC) which sets an indicative target of 5.75% of liquid fuels from the biomass on the market by 2010. The date was advanced to 2008 by the government in September 2005, and a higher target of 7% set for 2010 and 10% for 2015. ***Reference***: Climate Plan 2004 (p. 26-31); Rapport de la France concernant la directive 2003/30/CE visant à promouvoir l'utilisation des biocarburants.	Carbon Intensity	Cars, Road Freight, Buses	-	7
Research and Development	Alternative fuelled vehicles	Active	Development of vehicles using alternative fuels. ***Reference***: 2004 Report to EU under 93/389/EEC.	Carbon Intensity	Cars, Road Freight, Buses	-	1.1
Unknown	-	Active	MOT of light duty vehicles. ***Reference***: 2004 Report to EU under 93/389/EEC.	-	Cars	-	3.1
Unknown	-	Active	Preparation of decisions of public authorities for the development of clean cars. ***Reference***: 2004 Report to EU under 93/389/EEC.	Carbon Intensity	Cars	-	0.4
Unknown	Combined transport	Planned	Organisation of combined transport. ***Reference***: 2004 Report to EU under 93/389/EEC.	Demand		-	0.7
Unknown	Common and alternatve transport	Planned	Common transport and alternative urban transport. ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	0.55
Unknown	HGV efficiency	Active	Technical measures on vehicle efficiency of lorries. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Road Freight	-	1.5
Unknown	Infrastructure Management	Planned	Management of the interurban main roads. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars, Road Freight	-	0.04
Unknown	Intermodal freight	Active	Development of intermodal freight transport. ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Road Freight	-	3.3
Unknown	Rail freight	Planned	Improve the quality of rail freight service, by firstly optimising the freight activity of the state owned rail operator SNCF and secondly allowing other operators to utilise the national rail network. ***Reference***: Climate Plan 2004 (p. 26-31).	-	Rail	-	0.7 (post-2010)
Unknown	Traffic Signals	Planned	Regulation of traffic lights and moderating progressive signal systems. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars	-	0.3

FYR Macedonia							
Fiscal	Incentives for more fuel efficient vehicles	Under Investigation	Fiscal incentives which encourage the purchase of more fuel efficient vehicles are being investigated e.g. tax and custom discounts for new vehicles, tax and custom incentives for commercial vehicles and buses etc. ***Reference***: First National Communication to the UNFCCC (p. 68).	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	See "Total" entry
Regulatory	Fuel quality	Planned	The European standards on the quality of fuels will be applied. ***Reference***: First National Communication to the UNFCCC (p. 69).	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	See "Total" entry
Investment	Development of a sustainable freight transport system	Planned	Planning and development of integrated multi-modal transport system. Investing in transport terminal centres with transfers between air, railway and road. ***Reference***: First National Communication to the UNFCCC (p. 69).	Modal Shift	Road Freight	-	See "Total" entry
Investment	Development of a sustainable urban transport system	Planned	Support the development of urban public transport infrastructure that would attract more car users through planning and investing combined with support measures such as priority treatment for buses and parking policy. ***Reference***: First National Communication to the UNFCCC (p. 69).	Modal Shift	Cars	-	See "Total" entry
Investment	Increased use of electricity in transport sector	Planned	Support for electric modes of transport. Electrification of the railway, and greater use of railway. Introduction of a tramway in Skopje. [**Note:** Macedonia's electricity production seems to be dominated by coal, and therefore it is unlikely that a fuel switch to electricity would reduce CO_2 emissions the opposite is more likely to occur]. ***Reference***: First National Communication to the UNFCCC (p. 69).	Modal Shift	Cars, Road Freight	-	See "Total" entry
Investment	Intelligent Traffic Systems	Planned	Improvement of traffic management and control system. Improvement of traffic flows (urban and interurban). Development of city logistic systems that have potential to reduce the movement of supply commercial vehicles in cities. ***Reference***: First National Communication to the UNFCCC (p. 69).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	See "Total" entry
Total	Total effect of all policies	Planned	Total effect of all policies. ***Reference***: First National Communication to the UNFCCC (p. 70).	Total	Total	-	0.2 - 0.4
Germany							
Fiscal	Circulation tax	Active	Tax base is engine volume, differentiated for petrol and diesel. ***Reference***: Third National Communication to the UNFCCC (p. 76-87). ***Technical Reference***: IFEU (2002) TREMOD: Transport Emission Estimation Model.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Ecological tax reform	No Longer Active	This initiative was originally intended to provide for regular, stepwise increases in tax on transport fuels in order to encourage greater fuel efficiency. While the regular increases have been discontinued, there remains a EUR 0.153 / litre eco tax on transport fuels.	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	5

			Reference: Third National Communication to the UNFCCC (p. 76-87). Report to EU under 93/389/EEC. ***Technical Reference***: RWI (1999) [in German] cited in ECOFYS (2000) Evaluation of National Climate Change Policies in 6 EU member states - country report on Germany.				
Fiscal	Emissions-based landing fees	Under Investigation	Introduction of emissions based take-off and landing fees at German airports. ***Reference***: Third National Communication to the UNFCCC (p. 76-87). ***Technical Reference***: IFEU (2002) TREMOD: Transport Emission Estimation Model.	Fuel Efficiency - Technical	Air	-	1 (in 2005)
Fiscal	Fuel efficient vehicles	Active	Fiscal incentives for fuel efficient vehicles. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	1 (in 2005)
Fiscal	LKW Maut Electronic road use charge for trucks using motorways	Active	Distance-based charge for trucks, with emissions-based structure. Implementation was originally planned for 2003, but delayed until 2005, (**Note:** that this may affect the projected CO_2 emissions, as they are for a 2003 start date). ***Reference***: Third National Communication to the UNFCCC (p. 76-87). ***Technical Reference***: IFEU (2002) TREMOD: Transport Emission Estimation Model.	Demand	Road Freight	-	5 (in 2005)
Fiscal	Promotion of natural gas powered cars	Active	Tax reduction, up to 2020, on cars powered by natural gas. ***Reference***: First national report on the implementation of Directive 2003-30-EC on the promotion of the use of biofuels or other renewable fuels for transport – Germany.	Carbon Intensity	Cars	-	-
Fiscal	Promotion of use of sulphur-free fuel	No Longer Active	Increasing mineral oil tax on fuels that do not meet the sulphur standards of 50 ppm, between Nov 2001 and Jan 2003, and of 10 ppm subsequently. [Allowed the early entry into the fleet of the more fuel efficient vehicles which require these fuels]. ***Reference***: Third National Communication to the UNFCCC (p. 76-87). ***Technical Reference***: IFEU (2002) TREMOD: Transport Emission Estimation Model.	Other	Cars	-	2 - 5 (in 2005)
Fiscal	Reduction of housing subsidies	Active	Subsidies for newly built houses have been eliminated from the beginning of 2006. ***Reference***: Communication to ECMT June 2005.	Demand	Cars	-	-
Fiscal	Reduction of travelling subsidies	Active	Subsidies for home to work trips have been cut. Further cuts are being considered. ***Reference***: Communication to ECMT June 2005.	Demand	Cars	-	-
Fiscal	Reform of Funding Public Transport	Active	In several states funding for public transport is no longer solely linked to vehicle kilometres but is also being linked to passenger volumes. ***Reference***: Communication to ECMT June 2005.	Modal Shift	Cars	-	-

Fiscal	Tax exemption for biofuels (in relation to Directive 2003/30/EC)	Active	The Mineral Oil Duty Act was amended on 1 January 2004 to grant full exemption from duty for biofuels until 2009. Both pure and the biofuel component of blended fuels are exempt from excise duty. Draft legislation being considered (03/02/06) would end the complete exemption and introduce a 10 euro cents per litre tax for all biofuels from August 2006. ***Reference***: Report to EU under 93/389/EEC.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	VAT on aviation	Under Investigation	Introduction of VAT for domestic share of international flights. ***Reference***: 2004 Report to EU under 93/389/EEC.	Demand	Air	-	2 (in 2005)
Regulatory	Ban on SF6	Active	Regulation preventing the use of SF6 to fill tyres (in place of normal compressed air). ***Reference***: 2004 Report to EU under 93/389/EEC.	Other	Cars, Road Freight, Buses	-	0.7
Regulatory	Biofuels Obligation (in relation to Directive 2003/30/EC)	Under Investigation	An obligation requiring fuel companies to incorporate a certain percentage of biofuels in the fuel they place on the national market or face a penalty. ***Reference***: European Commission, COM (2005) 626, *Biomass Action Plan* (see p. 30).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Voluntary Agreement	Alternative fuels and engines	Active	Agreement on alternative fuels and engine technologies. ***Reference***: 2004 Report to EU under 93/389/EEC.	Carbon Intensity	Cars, Road Freight, Buses	-	0.15
Investment	Anti-traffic jam programme	Active	***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	0.5 (in 2005)
Investment	National Cycling Plan	Active	Support for states and local governments to improve cycling infrastructure and awareness raising measures. ***Reference***: Federal Ministry of Transport, Building and Housing, National Cycling Plan 2002 to 2012, http://www.bmvbw.de/Anlage/original_11 696/Ride-your-bike-Information-in- englischer-Sprache.pdf . Federal Environmental Agency, Reducing CO2 emissions in the transport sector. http://www.umweltbundesamt.de/uba-info-medien/mysql_medien.php?anfrage=Kennummer&Suchwort=2607. ***Technical Reference***: IFEU (2002) TREMOD: Transport Emission Estimation Model.	Modal Shift	Cars	-	1 - 10 (in 2005)
Investment	Railway-structure reform	Planned	Reform of the rail sector. Expansion of the railway network and expansion of combined road-rail transport facilities. ***Reference***: Third National Communication to the UNFCCC (p. 76-87).	Modal Shift	Road Freight	-	-

Information and Education	Fuel efficiency improvements	Active	Use of low friction oil and tyres in new cars. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	11
Information and Education	Public awareness raising measures	Active	Campaign for climate protection in the transport sector, with the following emphasis: fuel-saving driving habits, vehicle maintenance, low-viscosity oils and low-roll-resistance tyres and highly fuel efficient vehicles (3 litre/100km). ***Reference***: Third National Communication to the UNFCCC (p. 76-87). ***Technical Reference***: IFEU (2002) TREMOD: Transport Emission Estimation Model.	Fuel Efficiency - Onroad	Cars	-	5 (in 2005)
Greece							
Fiscal	Fuel excise tax exemption for biofuels	Active	Biodiesel and ethanol are exempt from fuel excise duty until 2007. ***Reference***: Greece's 4th National Communicaon to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Vehicle taxation	Active	Tax base for circulation tax is fiscal horsepower. Registration, while based on purchase price includes an element differentiated according to engine volume. ***Reference***: OECD 2004, Can cars come clean?	Fuel Efficiency - Technical	Cars	-	-
Regulatory	Exhaust control cards	Active	Improved enforcement of existing regulation of in-service vehicle emissions standards. If, as a result, vehicles are better maintained (on average) there is likely to be a slight improvement in fuel efficiency. ***Reference***: Greece's 4th National Communicaon to the UNFCCC.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	-
Investment	Bus efficiency	Active	Improving the fuel efficiency of the bus fleet through the gradual purchase of new buses. ***Reference***: Greece's 4th National Communicaon to the UNFCCC.	Fuel Efficiency - Technical	Buses	-	-
Investment	Investment in biofuel production plant	Active	Two biodiesel production plants were financed by the governmetn (one in Kilkis and one in Volos). They have a combined production capacity of 80,000 tonnes. ***Reference***: Greece's 4th National Communicaon to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Investment	Investment in public transport	Active	Two new metro lines are in operation, and the extension of these lines is already in progress. Establishment of priority measures for pubic transportation including dedicated lanes for buses and trams in Athens. ***Reference***: Greece's 4th National Communicaon to the UNFCCC.	Modal Shift	Cars	-	-
Investment	Traffic management and further investment in public transport	Under Investigation	Investment in public transport infrastructure that increases the efficiency of the existing system. Investment will include both technical (e.g. priority for buses at traffic lights) and non-technical measures (e.g. bus lanes). ***Reference***: Greece's 4th National Communicaon to the UNFCCC.	Modal Shift	Cars	-	-

Hungary							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Active	The development of biofuels will be supported through rebates on excise tax on bioethanol blended into petrol as ETBE as well as standard quality biodiesel blended in mineral diesel from 1st January 2005 to 31st December 2010. ***Reference***: Fourth National Communication to the UNFCCC - Progress Report.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Unknown	Modal Shift	Active	Incentives are provided for measures that would moderate the increase of road transportation and shift it to railways or waterways, as well as to moderate the use of passenger cars and encourage people to use public transport. ***Reference***: Fourth National Communication to the UNFCCC - Progress Report.	Modal Shift	Cars, Road Freight	-	-
Iceland							
Fiscal	Reform of tax on diesel vehicles	Planned	Proposed changes to the taxation for diesel cars will remove the existing annual fixed or mileage tax in favour of a fuel excise tax. This change is expected to transfer around 10% of current gasoline use to diesel. ***Reference***: Third National Communication to the UNFCCC (p. 15).	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Review of vehicle excise taxes	Under Investigation	Review of import fees for vehicles to determine if changes in fees are a feasible option to increase the share of energy-efficient vehicles. ***Reference***: Third National Communication to the UNFCCC (p. 15).	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	-
Regulatory	Better urban form	Under Investigation	Increased emphasis on short travel distances in physical planning of urban areas. ***Reference***: Third National Communication to the UNFCCC (p. 15).	Demand	Cars	-	-
Investment	Traffic management	Planned	Increased coordination of traffic lights. ***Reference***: Third National Communication to the UNFCCC (p. 15).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	-
Information and Education	Swan Label for tyres	Active	The Nordic Swan Label for energy efficient products introduced by the Nordic Council of Ministers recognises tyres that meet certain standards for rolling resistance and noise. ***Reference***: ECMT.	Fuel Efficiency - Technical	Cars, Road Freight	-	-
Unknown	Better public transport	Planned	Improvement of public transportation systems. ***Reference***: Third National Communication to the UNFCCC (p. 15).	Modal Shift	Cars	-	-

Ireland							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Active	Excise relief for biofuels (including pure plant oil, biodiesel blends, and bioethanol blends up to a max of 5%). ***Reference***: Report to the EU concerning directive 2003-30-EC - Ireland; OJ C 98, 22.4.2005, p. 10.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Encouraging a shift to less CO_2 intensive fuels in the public transport sector	Active	Fuel switching towards the most CO_2 efficient alternatives to diesel will be encouraged in the public transport system. Adjustment of fuel taxation rebate rates will be used to promote the necessary shift. ***Reference***: Third National Communication to the UNFCCC (p. 23-32, 78).	Carbon Intensity	Buses	-	-
Fiscal	Fuel Taxes to displace bunkering	Active	Gradual increases in excise tax in order to slow the increase in overall fuel consumption, encourage fuel switching and to stop the current practice of heavy goods vehicles engaged in international transport to bunker fuel in Ireland prior to travelling to elsewhere in the EU. ***Reference***: Third National Communication to the UNFCCC (p. 23-32, 78).	Fuel Efficiency - Technical	Cars, Road Freight	-	0.9
Fiscal	Road tax	Active	Road tax rebalancing. ***Reference***: 2004 Report to EU under 93/389/EEC.	Demand	Cars, Road Freight	-	0.1
Fiscal	Vehicle Registration Taxes and other, Taxes	Active	Vehicle Registration Tax (VRT) and annual motor tax are differentiated on the basis of engine size (although the base for the former is purchase price). As new, more efficient technologies emerge VRT and annual motor tax will be further rebalanced to favour the purchase of more fuel-efficient vehicles. ***Reference***: Third National Communication to the UNFCCC (p. 23-32, 78).	Fuel Efficiency - Technical	Cars	-	0.5
Voluntary Agreement - Freight	Freight	Active	A negotiated agreement between Government and the road haulage industry which will ensure that, as the industry evolves, the most GHG efficient practices will be adopted. ***Reference***: Third National Communication to the UNFCCC (p. 23-32, 78).	Fuel Efficiency - Onroad	Road Freight	-	0.05
Investment	Freight modal shift	Active	Investment in railways and shipping for freight transport. ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Road Freight	-	0.05
Investment	Fuel switching for buses	Active	Converting of buses to LPG and biofuels. ***Reference***: 2004 Report to EU under 93/389/EEC.	Carbon Intensity	Buses	-	0.3
Investment	Infrastructure investment	Active	Improved road infrastructure. ***Reference***: 2004 Report to EU under 93/389/EEC.	-	Cars, Road Freight, Buses	-	0.027

Investment	Investment in rail	Active	Increased investment in mainline rail. ***Reference***: Third National Communication to the UNFCCC (p. 23-32, 78).	Modal Shift	Road Freight	-	-
Investment	Public Transport Measures	Active	A large investment programme in public transport will concentrate on the bus network, light rail, suburban rail, transport integration (park and ride, integrated ticketing, interchange facilities) and cycle infrastructure. ***Reference***: Third National Communication to the UNFCCC (p. 23-32, 78).	Modal Shift	Cars	-	0.15
Investment	Renewable Energy Research Development and Demonstration	Planned	Under the Renewable Energy Research, Development and Demonstration programme capital grant aid is offered for biofuels projects as follows. Pure plant oil applications - up to 25% support for oil presses and up to 45% support for the vehicle engine modifications for up to 100 vehicles per project; two projects are anticipated under this category, one of which is already being supported; Biodiesel plant - 10% of the capital cost for a plant with a capacity of 15-25 million litres per year. 25% support will be considered for a plant which is smaller scale (less than 10 million litres per year); Bioethanol plant - 10% of the capital costs for a plant with a capacity of 15-25 million litres per year. ***Reference***: Report to the EU concerning directive 2003-30-EC - Ireland.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Investment	Traffic Management	Active	To complement the measures supporting public transport, integrated traffic management and restraint schemes will be supported with an investment programme, including additional Quality Bus Corridors, further park and ride facilities, improved pedestrian facilities, development of the cycle network and improved traffic signalling and signposting. ***Reference***: Third National Communication to the UNFCCC (p. 23-32, 78).	Modal Shift	Cars	-	0.2
Information and Education	Fuel efficiency labelling	Active	Labelling of new cars on sale with comparative fuel efficiency information. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	0.38
Italy							
Fiscal	Fiscal incentives for biofuels (in relation to Directive 2003/30/EC)	Active	Biodiesel, ethanol and ETBE are exempt from excise tax. ***Reference***: OJ C 146, 19.6.2002, p. 6; OJ C 16, 22.1.2004, p. 22.	Carbon Intensity	Cars, Road Freight, Buses	-	-

Fiscal	Incentives for motorcycles and cars	Active	Regulations on re-financing and extension of incentives for the acquisition of motorcycles and motor vehicles. ***Reference***: Third National Communication to the UNFCCC (p. 98-104).	-		-	-
Fiscal	Low-carbon fuels	Active	Financial incentives are available to local authorities and private businesses for the acquisition of vehicles with zero or low emissions (hybrids, electric, methane, LPG cars) in urban areas with more than 150 000 inhabitants; incentives for the conversion to CNG or LPG of non-catalysed vehicles; promotion of biodiesel. ***Reference***: Third National Communication to the UNFCCC (p. 88, 98-106).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Reducing car use	Planned	Local "mobility managers" to co-ordinate carpooling - possibly supported by voluntary agreements with businesses; provision of car-sharing services, with low environmental impact vehicles, by local public transport businesses; on-demand public transport services through public companies or incentives for private firms; an agreement between government and industry on the establishment of freight trading centre(s). ***Reference***: Third National Communication to the UNFCCC (p. 88, 98-106).	Fuel Efficiency - Onroad	Cars, Road Freight	-	2.1
Fiscal	Vehicle taxation	Active	Circulation tax is based on engine power. ***Reference***: OECD (2004), Can cars come clean?	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Vehicle taxation	Active	Modification of vehicle tax. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	1.3
Voluntary Agreement	LPG and natural gas vehicles	Planned	Promotion of natural gas use, with the goal of increasing the number of natural gas powered vehicles from 1 to 1.5 million by 2010, up from around 0.4 million in 2000; promotion of natural gas powered buses through local regulations and Programme Agreements to replace buses more than 10 years old with natural gas powered or dual-fuelled ones; promotion of LPG powered vehicles, through a voluntary agreement with industry and financial incentives for new LPG vehicles or conversion of new vehicles - goal of increasing the number of LPG powered vehicles from 1.4 million in 2000 to 3.5 to 4 million by 2010. ***Reference***: Third National Communication to the UNFCCC (p. 88, 98-106).	Carbon Intensity	Cars, Buses	EUR 880 million	1.5
Investment	Ecological Sundays	Active	Financing plan called "Ecological Sundays" for low or zero emission public transport. ***Reference***: Third National Communication to the UNFCCC (p. 98-104).	Modal Shift	Cars	-	-

Investment	Enhancing freight efficiency	Active	[No information provided] ***Reference***: Third National Communication to the UNFCCC (p. 88, 98-106). ***Technical Reference***: Ecofys, 2001, Evaluation of National Climate Change Policies in EU Member States - Country Report on Italy.	Fuel Efficiency - Onroad	Road Freight	-	2.6 - 3.2
Investment	Infrastructure investment	Active	Investment in road infrastructure. ***Reference***: 2004 Report to EU under 93/389/EEC.	-	Cars, Road Freight, Buses	-	2.7
Investment	Investment in infrastructure	Planned	Investment in restructuring and modernisation of ports; re-opening and development of inland waterways; extension of the rail network with particular attention to high speed trains, inter-modal connections and commuter rail; dedicated bus lanes; development of regional hubs for both freight and passenger transport. ***Reference***: Third National Communication to the UNFCCC (p. 88, 98-106).	Modal Shift	Cars, Road Freight	-	3.6
Investment	Investment in public transport	Active	Financing to the Regions for the replacement of buses for public transport which are more than 15 years old. ***Reference***: Third National Communication to the UNFCCC (p. 98-104).	Fuel Efficiency - Technical	Buses	-	-
Investment	Park and ride	Active	Improvements in infrastructure such as better links between railway stations and parking areas. ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	0.6
Investment	Promotion of bicycling	Active	Establishment of a specific fund for promoting the use of bicycles. ***Reference***: Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-
Research and Development	Hydrogen vehicles	Active	Pilot projects for hydrogen and fuel cells. ***Reference***: 2004 Report to EU under 93/389/EEC.	Carbon Intensity	Cars, Road Freight, Buses	-	0.2
Research and Development	Research	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	-		-	1.45
Unknown	LPG technologies	Active	Improved technologies for LPG use. ***Reference***: 2004 Report to EU under 93/389/EEC.	Carbon Intensity	Cars	-	0.85
Unknown	Modal Shift to shipping	Active	Programme of measures in the freight sector to transfer road traffic to rail and sea (related to the Convention for the Protection of the Alps 1991). ***Reference***: Third National Communication to the UNFCCC (p. 88, 98-106). ***Technical Reference***: Ecofys, 2001, Evaluation of National Climate Change Policies in EU Member States - Country Report on Italy.	Modal Shift	Road Freight	-	1

Unknown	Reducing vehicle weight	Active	New materials to reduce vehicle weight. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	0.4
Unknown	Telematics for freight	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Road Freight	-	0.5
Unknown	Urban mobility plans	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	2.25
Japan							
Fiscal	Fiscal incentives for top performing vehicles	Active	Vehicles which exceed the "Top Runner" defined vehicles by 5% or more (in terms of fuel efficiency) receive incentives on both purchase and circulation taxes. (High performing vehicles receive further support through government procurement effort). Circulation tax is reduced 25%, or 50% for vehicles that also qualify as low emissions vehicles in respect of local air pollutants; Car acquisition tax is reduced by EUR 70, or EUR 110 for low emission vehicles. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Fuel Efficiency - Technical	Cars	-	2.6
Fiscal	Promoting dissemination of clean energy vehicles	Planned	Promoting the smooth introduction and use of hybrid vehicles and natural gas trucks and buses through subsidies and tax concessions. ***Reference***: Third National Communication to the UNFCCC (p. 86-91); FCCC/WEB/2003/1 (p. 65).	Carbon Intensity	Cars, Road Freight, Buses	-	2.2
Fiscal	Promoting telecommunication	Planned	Fiscal incentives and financial support for companies to encourage teleworking. ***Reference***: Third National Communication to the UNFCCC (p. 86-91); FCCC/WEB/2003/1 (p. 65).	Demand	Cars	-	3.4
Regulatory	Improving fuel efficiency Toprunner programme	Active	Fuel efficiency standards for passenger and freight vehicles. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Fuel Efficiency - Technical	Cars, Road Freight	-	3.5 - 6.95
Regulatory	Speed limiting	Active	Installation of speed liming devices on large trucks. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Fuel Efficiency - Onroad	Road Freight	-	0.8
Investment	Increased rail convenience	Active	Increased rail convenience by increasing transport capacity. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Modal Shift	Rail	-	0.3
Research and Development	Promotion of rail freight	Active	Investigation of regulatory reform - studying institutional arrangements including legislation to support improved efficiency of trunk line distribution. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Modal Shift	Road Freight	-	1.5

Unknown	Anti-idling technologies	Active	Distribution of vehicles featuring idling prevention systems. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Fuel Efficiency - Onroad	Cars	-	1.1
Unknown	Car traffic demand management	Active	[No information provided] ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	-	Cars	-	0.7
Unknown	Modal Shift to shipping	Active	Promotion of modal shift to shipping by reviewing regulations, strengthening competitiveness through introduction of new technologies, and improving efficiency. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Modal Shift	Shipping	-	2.6
Unknown	Promotion of Intelligent Transport Systems	Planned	[No information provided] ***Reference***: Third National Communication to the UNFCCC (p. 86-91). FCCC/WEB/2003/1 (p. 65)	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	3.7
Unknown	Reduction in engineering works on roads	Active	[No information provided] ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	-	Cars, Road Freight, Buses	-	0.4
Unknown	Traffic safety facilities	Active	Improve efficiency of traffic control systems. ***Reference***: Third National Communication to the UNFCCC (p. 86-91).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	0.7
Korea							
Fiscal	Traffic Demand Management	Active	A range of measures were put in place by the Traffic Demand Management Policy, released in Jan 2001, including: variation in commuting hours, incentives for companies to run in-house demand management initiatives and increased investment in Intelligent Traffic Systems. ***Reference***: Second National Communication to the UNFCCC (p. 61).	Modal Shift	Cars	-	-
Regulatory	Regulations banning idling of vehicles	Active	Legislation introduced in 2003 gives local authorities the power to ban idling for an extended period in areas such as terminals, garages and parking lots. The ban is supplemented by a promotional campaign. ***Reference***: Second National Communication to the UNFCCC (p. 61).	Fuel Efficiency - Onroad	Cars, Road Freight	-	-
Investment	Congestion reduction	Active	Investment in new roading infrastructure is expected to help alleviate congested urban traffic. ***Reference***: Second National Communication to the UNFCCC (p. 60).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	-

Investment	Investment in public transport infrastructure	Active	Ongoing expansion of urban, light and intercity rail infrastructure and in dedicated lanes for public buses. Investment will include adoption of Bus Rapid Transit systems and expansion and improvement of passenger transit transfer facilities. ***Reference***: Second National Communication to the UNFCCC (p. 60-1).	Modal Shift	Buses, Rail	-	-
Unknown	Establishment of a 'Comprehensive Logistics Information Network'	Active	Through computerisation of logistics bases such as airports and inland container depots. ***Reference***: Second National Communication to the UNFCCC (p. 61).	Modal Shift	Road Freight	-	-
Unknown	Promotion of logistics standardisation	Active	[No information provided] ***Reference***: Second National Communication to the UNFCCC (p. 61-2).	Modal Shift	Road Freight	-	-
Latvia							
Fiscal	Incentives for biodiesel	Planned	Tax incentives for biodiesel introduced on 13.3.2005. ***Reference***: ECMT Env Group 19 May 2005.	Carbon Intensity	Cars, Road Freight	-	-
Regulatory	Vehicle Inspection and Maintenance	Active	Construction of technical check-up stations, for vehicle safety and exhaust emissions inspection. If an improvement in vehicle maintenance results then a small improvement in fuel efficiency can be expected. ***Reference***: FCCC/WEB/2003/1 (p. 70).	Fuel Efficiency - Onroad	Cars	-	-
Investment	Development of cycling	Active	Investment in cycling infrastructure in urban areas. ***Reference***: Third National Communication to the UNFCCC (p. 78).	Modal Shift	Cars	-	-
Investment	Development of the public transport system	Active	Ongoing investment in the public transport system, with an emphasis on interconnectedness and with supporting measures such as policies restricting parking in downtown areas. ***Reference***: Third National Communication to the UNFCCC (p. 77).	Modal Shift	Cars	-	-
Liechtenstein							
Fiscal	Distance and gross vehicle mass based charging for heavy vehicles	Under Investigation	A system of charges on heavy goods vehicles is being investigated. ***Reference***: Third National Communication to the UNFCCC (p. 24).	Demand	Road Freight	-	-
Fiscal	Tax exem. tions for low carbon fuelled vehicles	Active	Tax exemptions for solar, hybrid, electric or CNG vehicles. ***Reference***: Third National Communication to the UNFCCC (p. 24).	Carbon Intensity	Cars	-	-
Investment	Support for public transport	Active	Support for public transport including development of the Liechtenstein Bus Authority and the 'Liechtenstein-Takt' train service, priority for buses at traffic signals. ***Reference***: Third National Communication to the UNFCCC (p. 24).	Modal Shift	Cars	-	-

Lithuania							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Active	Fiscal incentives (a reduction in excise tax) for biodiesel, vegetable oils, bioethanol and ETBE. ***Reference***: Report to the EU concerning directive 2003-30-EC - Lithuania; Lithuania's 3rd and 4th National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	0.255
Luxembourg							
Fiscal	Vehicle taxation	Active	Circulation tax is based on engine volume. ***Reference***: OECD (2004), Can cars come clean?	Fuel Efficiency - Technical	Cars	-	-
Malta							
Fiscal	Motor vehicle access restriction in Valletta	Planned	Plans are underway to reduce cars going into the capital city Valletta. This will be achieved by reforming the current Valletta licence charge and introducing parking charges. A Park-and-Ride project is also being implemented. ***Reference***: Personal Communication, Maria Attard, Malta Transport Authority.	Modal Shift	Cars	-	-
Fiscal	Restrictions on vehicle use	Under Investigation	A range of policy options designed to reduced car use is currently under investigation, including an increase in fuel prices, a tax on vehicle emissions, changing the time and cost parameters of parking charges and increasing the appeal of public transport. ***Reference***: First National Communication to the UNFCCC (p. 37).	Modal Shift	Cars	-	0.02
Regulatory	On-street vehicle testing	Active	On-site vehicle roadworthiness testing was introduced early in 2005, it includes exhaust emissions testing. If improved maintenance results a slight improvement in fuel efficiency can be expected. ***Reference***: Personal Communication, Maria Attard, Malta Transport Authority.	Fuel Efficiency - Onroad	Cars	-	-
Mexico							
Fiscal	Freight vehicle renewal programme	Planned	Payments to replace old, inefficient freight vehicles available to 2007. ***Reference***: ECMT Env Group 19 May 2005.	Fuel Efficiency - Technical	Road Freight	-	-
Netherlands							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Planned	The government intends to introduce a system of fiscal incentives for biofuels in 2006. ***Reference***: Netherlands's Fourth National Communication to the UNFCCC - Report on Progress.	Carbon Intensity	Cars, Road Freight, Buses	-	-

Fiscal	CO_2 differentiation in tax	Planned	The differentiation of vehicle purchase tax on the basis of CO_2 has been approved by the Dutch parliament, it applies from July 2006. In addition, there is a tax cut for emerging technologies (e.g. petrol-electric hybrid vehicles and hydrogen fuel cell powered vehicles). This gives the best performing vehicles (with "A" labels) a tax reduction of up to EUR 1000 and imposes an extra tax of EUR 540 on the worst performing cars (with "D" to "G" labels). ***Reference***: Traffic Emissions Policy Document (p. 39).	Fuel Efficiency - Technical	Cars	-	-
Fiscal	In-vehicle fuel saving devices	No Longer Active	A fiscal incentive scheme was introduced in May 2001 to enable the installation (as standard) in new cars of on-board devices such as econometers, on-board computers and cruise control at a reduced price. The European mandatory requirement for speed limiters in heavy goods vehicles was extended to cover 2.5 - 10 tonne vehicles. The scheme was cancelled due to the cost to the Government. ***Reference***: Traffic Emissions Policy Document (p. 40).	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	-
Fiscal	Road user charging	Under Investigation	A kilometre based charging system for road usage is under investigation. ***Reference***: Netherlands's Fourth National Communication to the UNFCCC.	Demand	Cars, Road Freight	-	-
Fiscal	Variable fuel duty according to sulphur content	Active	From 2005 the fuel duty on diesel containing more than 10 mg/kg of sulphur will increase by 0.01 euro, while the duty on fuel with less than 10 mg/kg will remain unchanged. ***Reference***: Traffic Emissions Policy Document (p. 40).	Other	Cars, Road Freight, Buses	-	-
Regulatory	Biofuels Obligation (in relation to Directive 2003/30/EC)	Planned	An obligation requiring fuel companies to incorporate a certain percentage of biofuels in the fuel they place on the national market or face a penalty. This obligation will come into force from January 2007, and will be set at 2 percent of total transport fuel consumption ***Reference***: European Commission, COM (2005) 626, *Biomass Action Plan* (see p. 30).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Regulatory	Speed limit enforcement	Active	Enforcement of speed limits has been stepped up. ***Reference***: Netherlands's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars, Road Freight	-	-

Investment	CO_2 Reduction Programme - Freight Transport	Active	Grants are available for regional and local government enterprises to investment in CO_2 reduction measures in the freight sector - costs incurred in connection with investment in technology, utilisation of technology and outreach activities are eligible. Funding is EUR 3.5 million per year. Examples of projects include: technical adjustments required to adapt vehicles to new fuels such as biodiesel or CNG, weight reduction (e.g. lightweight containers), improvements in the technical fuel efficiency of vehicles or ships (e.g. decreasing water resistance). ***Reference***: Netherlands's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Road Freight, Shipping		-
Investment	CO_2 Reduction Programme - Passenger Transport	Active	This programme, launched in 2000, provides funding for a range of initiatives which reduce CO_2 emissions in the transport sector. The range is very broad, but includes projects such as subsidising the use of biofuels in taxis, a park and ride system which reserves train passengers a car park when they purchase a train ticket, improved energy efficiency of the airconditioning systems in trains; allowing cyclists to take their bikes on trains. Every measure has the minimum result of reducing 75 kilo tonnes of CO_2. The programme also covers projects to train municipal officials in the application of energy-aware design methods for dealing with traffic in residential neighbourhoods. Funding is EUR 4 million per year. ***Reference***: Netherlands's Fourth National Communication to the UNFCCC.	Modal Shift	Cars		-
Information and Education	Improvements freight sector logistics	Active	A collection of initiatives (mostly information and education, but with some fiscal support) designed to improve logistical practices in the freight sector to increase load factors and reduce the number of vehicle kilometres driven. This initiative is expected to result in the installation of onboard devices which aid logistics. ***Reference***: Netherlands's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Road Freight	-	-
Information and Education	The New Driving Force - Ecodriving programme	Active	ECO-DRIVING is a programme designed to get motorists driving more fuel efficiently. So far 90% of driving instructors have received ECO-DRIVING training. The aim is to make ECO-DRIVING part of practical driving examinations for a licence to drive cars. A media campaign was launched in June 2004 encouraging existing drivers to adopt the ECO-DRIVING style and to maintain tyre pressures. ***Reference***: Netherlands's Fourth National Communication to the UNFCCC - Report on Progress.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	-

Information and Education	Tranport Avoidance Project	Active	The Transport Avoidance project supports enterprises in developing and using business innovations that combine new market opportunities or cost savings with a reduced need for transporting goods. Support is provided in three ways: developing and gathering knowledge about opportunities for adapting a company's organisation and production processes so as to reduce the need for transport; sharing this knowledge with enterprises; providing funding for enterprises that have promising ideas for organising their operations in a more transport-efficient way. Support has been provided for more than 100 projects and in 2006 EUR 1.4 million will be available. ***Reference***: Communication to ECMT.	Demand	Road Freight, Rail, Shipping, Air		-
New Zealand							
Fiscal	Road Pricing for Auckland	Under Investigation	Auckland Road Pricing Evaluation Study commenced in 2004 - primarily aimed at determining whether road pricing could generate good reductions in congestion and raise revenue for further investment in land transport. Potential greenhouse gas emission reductions. ***Reference***: www.mot.govt.nz; Communication to ECMT.	Fuel Efficiency - Technical	Cars	-	-
Regulatory	Biofuels	Under Investigation	The Government has committed to a mandatory biofuels sales target, to be confirmed by June 2007. Surrounding programmes include removal of legislative barriers and development of biodiesel and bioethanol fuel standards. The government, through the National Energy Efficiency and Conservation Strategy has set a provisional target to have 2 petajoules (pa) of biofuel use (around 65 million litres of biodiesel or bioethanol) by 2012. ***Reference***: www.eeca.govt.nz; Communication to ECMT.	Carbon Intensity	Cars, Road Freight, Buses		-
Investment	Procurement policies	Active	Government fleet management and procurement initiatives to increase the efficiency of the government fleet. The programme also has the ability to provide influence and leverage for decisions affecting the wider fleet. ***Reference***: Gov[3] programme www.mfe.govt.nz; Communication to ECMT.	Fuel Efficiency - Technical	Cars, Road Freight		-
Information and Education	Travel Planning	Active	Introduction by local and regional government (with funding and guidance from central government) of travel planning initiatives around schools, businesses and communities. ***Reference***: www.eeca.govt.nz; Communication to ECMT.	Modal Shift	Cars, Road Freight	-	-
Information and Education	Vehicle Fuel Efficiency Website	Active	Data from all passenger vehicles entering New Zealand along with vehicle efficiency information from vehicle manufacturers has been collated and will be presented via a fuel efficiency web site, due for release mid 2006. ***Reference***: www.mot.govt.nz; Communication to ECMT.	Fuel Efficiency - Technical	Cars		-

Information and Education	Vehicle Fuel Consumption Labelling	Under Investigation	The introduction of a scheme which provides comparative information on new vehicles' fuel consumption, at point of sale, is being investigated. ***Reference***: Communication to ECMT.	Fuel Efficiency - Technical	Cars	-	-
Norway							
Fiscal	CO_2 tax, petrol and diesel taxes	Active	The CO_2 tax is regarded as the main instrument for limiting emissions from the transport sector. Petrol will in 2006 be taxed at around 0.79 NOK/litre and 0.53 NOK/litre for diesel (on top of general taxes of 4.10 and 2.97 NOK/litre, respectively). CO_2 tax for kerosene in aviation is 0.53 NOK/litre. ***Reference***: Third National Communication to the UNFCCC (p. 34, 73); Communication of Norway to ECMT.	Fuel Efficiency - Technical	Cars, Road Freight, Buses, Rail, Shipping, Air	-	-
Fiscal	Exemption from purchase and investment tax for alternative fuels.	Active	Electric cars are exempt from purchase and investment taxes. ***Reference***: Third National Communication to the UNFCCC (p. 34, 73).	Carbon Intensity	Cars	-	-
Fiscal	Exemption of natural gas from CO_2 tax.	Active	Exemptions from CO_2 tax for the use of natural gas in buses, ferries and supply ships. Natural gas is used in buses in certain towns – 77 buses in total. Another five ferries using natural gas will be introduced in 2007. ***Reference***: Third National Communication to the UNFCCC (p. 34, 73).	Carbon Intensity	Buses, Shipping	-	-
Fiscal	Purchase tax on cars	Active	The purchase tax on cars has, since 1996, been differentiated according to car weight, engine output and engine volume. The tax structure is being evaluated. The evaluation will include the question of whether to include CO_2 emissions as part of the basis for calculating the purchase tax. ***Reference***: Third National Communication to the UNFCCC (p. 34).	Fuel Efficiency - Technical	Cars	-	-
Investment	Promotion of bicycle use and walking	Active	Promotion of bicycle use in a national strategy for cycling (presented in 2003), with focus on development and maintenance of cycle paths, safety, and increasing the attractiveness of cycling. Policy goal – bicycle travel in Norway is to comprise at least 8% of all travel (out of the total number of trips). ***Reference***: The National Transport Plan – Report No 24 to the Storting (2003-2004).	Modal Shift	Cars	-	-
Investment	Support for public transport	Active	Support for public transport through investment in infrastructure and subsidies for services. ***Reference***: Third National Communication to the UNFCCC (p. 34).	Modal Shift	Cars	-	-
Information and Education	Swan Label for tyres	Active	The Nordic Swan Label for energy efficient products introduced by the Nordic Council of Ministers recognises tyres that meet certain standards for rolling resistance and noise. ***Reference***: ECMT.	Fuel Efficiency - Technical	Cars, Road Freight	-	-

Research and Development	Promotion of clean vehicles	Active	State funding of development and demonstration projects within the transport sector focusing on hydrogen, fuel cell technology and biofuels. For 2006 the funding will be – NOK 22.3 million. This funding will be incorporated into the Government's national hydrogen programme. ***Reference***: Budgetary Report to Parliament for the Ministry of Transport and Communications nr 1(2005-2006).	Fuel Efficiency - Technical	Cars	-	-
Poland							
Regulatory	Improvement of road traffic flow and parking for heavy load vehicles in towns	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Road Freight	-	-
Regulatory	Technical projects related to vehicle design	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	-
Investment	Construction of motorways, ring roads and expressways	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	-
Investment	Development of rail transport, including combined transport	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Road Freight	-	-
Investment	Improvement of infrastructure for bicycle riders and pedestrians	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-
Investment	Improvement of the quality of waterway transport	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Road Freight	-	-
Information and Education	Implementation of local transport plans (schools and enterprises)	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-

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Information and Education	Information and upbringing activities concerning the need to change behaviour	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-
Information and Education	Measures to change patterns of long-distance travels in favour of railways	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-
Information and Education	Promotion of "environmentally clean" vehicles	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	-
Information and Education	Promotion of cycling transport	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-
Information and Education	Promotion of marine and inland navigation	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Road Freight	-	-
Information and Education	Promotion of public transport	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-
Information and Education	Promotion of transport plans to service enterprises	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	-
Policy Process	Biofuels target	Under Investigation	Target for 1.5% of road fuels to be biofuels is currently under debate. ***Reference***: ECMT Env Group 19 May 2005.	Carbon Intensity	Cars, Road Freight	-	-
Unknown	Effective organisation of rail and road systems	Unknown	[No information provided] ***Reference***: 2003 Report to EU under 93/389/EEC.	-	Cars, Road Freight, Buses, Rail	-	-

Portugal							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC)	Planned	The draft Decree-Law that will transpose EU directive 2003/30/EC into national legislation has been submitted to the Government and is undergoing final revision prior to publication. It sets out the following incentives for biofuel use: Biofuels are exempt from excise duties up to a quota set every year, (1% of road transport fuels in 2005); provides for the possibility of imposing a quota for biofuels in transport fuels, in cases where the target for the preceding year was not met; provides for the possibility of establishing voluntary agreements on the use of biofuels in blends higher than 15% with public or private undertakings operating public passenger transport fleets. ***Reference***: Report to the EU concerning directive 2003-30-EC – Portugal.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	CO_2 sales tax for cars	Planned	[No information provided] ***Reference***: Communication of Portugal to ECMT.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Fuel taxation	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	0.082
Fiscal	System of incentives to reduce environmental impact of freight	Active	Minimise the environmental impact of road freight transport (e.g. improving efficiency through minimising number of empty-haul journeys, removal from service of older vehicles). ***Reference***: Third National Communication to the UNFCCC (p. 47-8).	Fuel Efficiency - Onroad	Road Freight	-	-
Fiscal	Vehicle taxation	Active	Change of vehicle taxation base. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars	-	0.08
Regulatory	Speed limit reduction	Active	Reduction of motorway speed. ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars	-	0.03
Investment	Fuel switching for buses	Active	Increase of natural gas in bus fleet. ***Reference***: 2004 Report to EU under 93/389/EEC.	Carbon Intensity		-	0.35
Investment	Modernization and construction of light rail transport.	Active	Establishment of a hierarchy of appropriate public transport in the principal metropolitan areas, with a view to integrating collective transport systems. ***Reference***: Third National Communication to the UNFCCC (p. 47-8).	Modal Shift	Cars	-	-
Investment	Modernizing infrastructure and the service of conventional rail transport.	Active	Enhancing the attractiveness of rail transport by investing in infrastructure appropriate to the needs of different types of transport, expanding the network and improving the quality of services. ***Reference***: Third National Communication to the UNFCCC (p. 47-8).	Modal Shift	Rail	-	-

Investment	Underground network expansion	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	0.03
Information and Education	Eco-driving	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars	-	0.023
Information and Education	Local Urban Travel Plans	Planned	[No information provided] ***Reference***: Communication of Portugal to ECMT.	Modal Shift	Cars	-	-
Unknown	Management of Energy Consumption by the Transport Sector	Active	Reduction of specific energy consumption. ***Reference***: Third National Communication to the UNFCCC (p. 47-8).	-		-	-
Unknown	Modal shift in Lisbon	Active	Change of modal split to public transport in Lisbon. ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	0.086
Unknown	National Network of Logistical Platforms	Active	Promote efficiency and inter-modality of freight transport. ***Reference***: Third National Communication to the UNFCCC (p. 47-8).	-	Road Freight	-	-
Unknown	Reduction of travel time	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	-		-	0.05
Unknown	Switch from private freight fleet to public transport	Active	[No information provided] ***Reference***: 2004 Report to EU under 93/389/EEC.	Modal Shift	Cars	-	0.039
Slovakia							
Fiscal	Support for biofuels	Planned	According to the Excise Duty Act distributors of motor fuel for road transport are entitled to an exemption from payment of excise duty if the following biofuels are blended in the fuel: bioethanol, biodiesel, biogas, bio-ETBE and bio-DME. The amount of the exemption is proportionate to the percentage of biofuel added but may not exceed 25% of the excise duty paid. **Note:** Slovakia reports this policy as active, however, the European Commission does not appear to have granted State Aid approval, so it has been adjusted to "Planned". ***Reference***: Slovakia's Report to the Commission pursuant to Directive 2003/30/EC for the 2005 reporting year.	Carbon Intensity	Cars, Road Freight, Buses	-	-

Slovenia							
Fiscal	Biofuels Support Part I (in relation to Directive 2003/30/EC)	Active	Biofuels sold in pure form have been completely exempt from excise taxes since December 2003. Those sold in blends are subject to excise taxes, but may apply for a 25% rebate. ***Reference***: Second and Third National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Increased fuel excise duty	Active	Fuel excise duty increased by over 60% between 1999 and 2002. ***Reference***: Second and Third National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	0.15
Regulatory	Biofuels Support Part II (in relation to Directive 2003/30/EC)	Planned	A law requiring producers and retailers to supply a certain percentage of the market share as biofuels is planned. It will help meet a target of 1% penetration by 2010. ***Reference***: Second and Third National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	0.1
Regulatory	Exhaust emission check-ups	Active	Exhaust emissions became part of regular vehicle check-ups from the end of 2003, this will ensure vehicles are better tuned (to meet air pollution emissions standards) and will therefore increase fuel efficiency marginally. ***Reference***: Second and Third National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars	-	0.185
Regulatory	Urban planning	Planned	Strategy to encourage more "mixed" urban planning. ***Reference***: Second and Third National Communication to the UNFCCC.	Demand	Cars	-	0.056
Investment	Support for public transport	Planned	Implement measures in support of public transport - traffic priority systems for buses, better links between bus and rail transport, better charging for parking and direct subsidies to public transport. The quantification is based on public transport achieving a 10 percent market share of urban personal transport - it does not account for secondary "rebound" affects. ***Reference***: Second and Third National Communication to the UNFCCC.	Modal Shift	Cars	-	0.1
Investment	Support for rail transport	Planned	Investment in long distance railway infrastructure to encourage freight on to rail. Investment in interconnections between other modes of transport, quality of service and promotion in order to increase passenger rail patronage. ***Reference***: Second and Third National Communication to the UNFCCC.	Modal Shift	Cars, Road Freight	-	0.05

Spain							
Fiscal	Improved efficiency in air traffic	Active	***Reference***: Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Air	-	0.058 (in 2007)
Fiscal	Renovation vehicles fleets used for tourism	Active	Fiscal incentives for the tourism industry to replace older vehicles with more fuel efficient ones. ***Reference***: 2005 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Cars, Buses		0.903 (in 2007)
Fiscal	Tax rebates for environmentally friendly fuels	Planned	An excise tax exemption is planned for biofuels. ***Reference***: In-depth review of Third National Communication to the UNFCCC (p. 16); Report to the EU concerning directive 2003-30-EC – Spain.	Carbon Intensity	Cars, Road Freight, Buses		-
Fiscal	Transport infrastructure management	Under Investigation	The use of economic instruments for management of transport demand is under investigation. ***Reference***: 2005 Report to EU under 93/389/EEC.	Demand	Cars, Road Freight, Buses		2.517 (in 2007)
Regulatory	Speed limit enforcement	Active	[No information provided] ***Reference***: 2005 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses		-
Voluntary Agreement	Accelerated renovation of airline fleets	Active	Voluntary agreements with airlines to accelerate the renovation of their fleet. ***Reference***: 2005 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Air		0.02 (in 2007)
Voluntary Agreement	Accelerated renovation of the shipping fleets	Active	Voluntary agreements with shipping companies to accelerate the renovation of their fleet. ***Reference***: 2005 Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Shipping		0.038 (in 2007)
Investment	Infrastructure investment	Active	Improvement in the quality and maintenance of existing road infrastructure. ***Reference***: Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars, Road Freight, Buses	-	0.101 (in 2007)
Investment	Investment in rail infrastructure	Active	A modal shift from road to rail for both passenger and freight transport is expected to result from a large infrastructure investment programme. Investment includes: development of a high speed rail network (0.3 Mt CO_2 in 2010); improvement of the network over short distances; promotion of freight transport on railways. ***Reference***: In-depth review of Third National Communication to the UNFCCC (p. 16).	Modal Shift	Cars, Road Freight	-	0.3
Investment	Public transport	Active	Economic support for accelerated renewal of public transport fleets. ***Reference***: Report to EU under 93/389/EEC.	Fuel Efficiency - Technical	Buses	-	0.553 (in 2007)

Information and Education	Company Travel Plans	Active	All companies and centres of activity (e.g. shopping malls) of more than 200 workers must adopt travel plans to reduce the proportion of car trips and increase public transport usage. ***Reference***: 2005 Report to EU under 93/389/EEC.	Modal Shift	Cars		0.419 (in 2007)
Information and Education	Ecodriving	Active	Training for car drivers in fuel efficient driving techniques. ***Reference***: Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Cars	-	0.624 (in 2007)
Information and Education	Ecodriving for heavy vehicles	Active	Training for bus and truck drivers in fuel efficient driving techniques. ***Reference***: Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Road Freight, Buses	-	0.625 (in 2007)
Information and Education	Encourage more efficient practices in heavy vehicle fleets	Active	Development of management tools for freight operators; introduction of an accreditation scheme (to highlight the most efficient freight operators); research into fuel efficiency techniques. ***Reference***: 2005 Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Road Freight		0.387 (in 2007)
Information and Education	Fuel efficient flying	Active	Training for airline pilots in fuel efficient flying techniques. ***Reference***: Report to EU under 93/389/EEC.	Fuel Efficiency - Onroad	Air	-	0.047 (in 2007)
Unknown	Increased use of shipping for freight transport	Active	[No information provided] ***Reference***: 2005 Report to EU under 93/389/EEC.	Modal Shift	Road Freight		0.129 (in 2007)
Unknown	Plans of urban mobility	Active	[No information provided] ***Reference***: 2005 Report to EU under 93/389/EEC.	-			0.856 (in 2007)
Sweden							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC) - Fiscal Incentives	Active	Biofuels have been exempt from carbon dioxide tax and energy tax in Sweden since 2004. The tax exemption applies up to and including 2008. ***Reference***: Report to the EU concerning directive 2003-30-EC – Sweden.	Carbon Intensity	Cars, Road Freight, Buses	-	0.4
Fiscal	Graduated Vehicle Excise Duty	Planned	Legislation has been drafted which will introduce a vehicle excise duty system which is graduated on the basis of specific CO_2 emissions. ***Reference***: Communication to ECMT.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Instruments for increased introduction of green cars	Active	Green cars (defined as cars which can be run on ethanol, biogas/CNG, electricity and hybrid cars) are supported through a range of policies - predominantly fiscal: • Company cars which are 'green cars' receive lower fringe benefit taxation (since 2002 - vehicle numbers have almost doubled to 6000 cars in 2003 (**Note:** total number of green cars in 2004 was 7000). • Grants for local and national government fleets to purchase green cars. • Local incentives such as free parking.	Carbon Intensity	Cars	-	0.2

			Note: sales of flexi-fuel (E85) vehicles have shown the greatest increases, however, research shows that these vehicles are using ordinary petrol around 50 percent of the time. ***Reference***: Sweden's Fourth National Communication to the UNFCCC.				
Fiscal	Motor fuel tax	Active	Petrol and diesel are subject to an energy tax, a CO_2 tax and VAT. The total tax rate has been indexed to the consumer price index since the late 1990s. Elasticities used to model the CO_2 abatement estimate are -0.4 (petrol) and -0.1 (diesel) for the low estimate and -0.8 (petrol) and -0.2 (diesel) for the high estimate. ***Reference***: Sweden's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars, Road Freight, Buses	-	1.6 - 3.4
Fiscal	Taxation of cars received as benefit	Active	Rules on company cars were amended in 1997 to require company cars users to pay for fuel for private driving. This objective has only been fulfilled to 50%. An evaluation of the amendment shows, however, that the decision to introduce a tax on "free" fuel has had a significant effect in the form of a reduction in distance driven. Around 25% of sales of new vehicles in Sweden are company cars, which tend to be heavier and less fuel efficient. ***Reference***: Sweden's Fourth National Communication to the UNFCCC.	Demand	Cars	-	0.2
Information and Education	Eco-driving	Planned	Incorporation of eco-driving into driver licensing is planned for both the heavy and light vehicle licensing. This will encourage more fuel efficient driving practices. ***Reference***: Communication to ECMT.	Fuel Efficiency - Onroad	Cars, Road Freight	-	-
Information and Education	Swan Label for tyres	Active	The Nordic Swan Label for energy efficient products introduced by the Nordic Council of Ministers recognises tyres that meet certain standards for rolling resistance and noise. ***Reference***: ECMT.	Fuel Efficiency - Technical	Cars, Road Freight	-	-
Unknown	Biofuels Support (in relation to Directive 2003/30/EC) - Removal of 5% limit on blends	Planned	The Swedish government has given notice of its intention to remove the 5% limit on blends of rapeseed methyl ester (biodiesel) into diesel in 2006 (petrol and ethanol blends are limited by EC Directive). If the conditions to be met for low admixture are not amended, it is assumed that total use of biofuels will only increase marginally by 2010 in comparison with present-day levels. ***Reference***: Sweden's Fourth National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	-

Switzerland							
Fiscal	Climate Cent	Active	A small charge per litre on petrol and diesel agreed to voluntarily by the oil industry to fund investments in Switzerland to reduce CO_2 emissions and to purchase tradable CO_2 certificates from abroad. The charge was fixed at 1.5 centimes (1 Euro cent) on 1 October 2005 in order to raise SFr 100M a year (EUR 65M). Two thirds of the money will be invested in abatement measures in the Swiss transport, building and combined heat and power sectors. Savings of least 0.2 Mt a year between 2008 and 20 012 are targeted from these investments, with total abatement from the fund expected to be 1.8 Mt, the balance made up from measures abroad facilitated by the purchase of tradable permits. ***Reference***: ECMT Env Group 19 May 2005.	Other	Cars, Road Freight	-	-
Fiscal	Distance-related heavy vehicle fee (HVF)	Active	The distance-related heavy vehicles fee (HVF) was introduced in 2001 and is calculated on the basis of: kilometres driven; allowable maximum weight of vehicle; and, the emission class of the vehicle. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Demand	Road Freight	-	0.5
Fiscal	Motor vehicle tax	Active	Various circulation taxes, introduced at the canton level, on cars. Tax base varies by canton and include: engine volume, engine power, fiscal horsepower and vehicle weight. For example, in 1996, the Canton of Lucerne introduced a motor vehicle tax including a feebate component. The tax rate varies according to EURO standards, with rebates for the most fuel-efficient cars. ***Reference***: OECD/EEA database on instruments used for environmental policy and natural resources management.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Support for biofuels	Planned	The Federal Council proposes to amend the Mineral Oil Tax Act in 2007 to introduce tax incentives for clean fuels. The proposal includes a tax reduction of 40 Swiss cents per litre of petrol equivalent for natural and liquefied petroleum gas (LPG) and complete tax exemption for biogas and other fuels from renewable sources. The decline in revenues is to be fully offset by higher rates of tax on petrol. Petrol taxes are thus likely to rise by 1–2 Swiss cents per litre in 2007 and around 6 Swiss cents in 2010, provided the maximum technically feasible potential to add biofuels to petrol is exhausted. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	-

Regulatory	"Fahrleistungsmodell" in Berne canton	Active	A cap is placed on the car-kilometres which a new development (e.g. shopping mall) can create. If monitoring indicates the cap is being exceeded the operators can take measures on their own initiative, or they may be required to pay a fee to the Cantonal authorities, which would finance government action to reduce traffic. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Modal Shift	Cars		-
Voluntary Agreement	Voluntary agreement on fuel efficiency	Active	Agreement with the Association of Swiss Automobile Importers to reduce the specific fuel consumption of new motor cars by 24% between 2000 and 2008. The average fuel consumption of new cars decreased in 2004 by 6.9% compared to 2000, and by 2.1% compared to 2003, and now lies for the second year below 8 litres/100 km. However, the agreed mid-term target of 7.4 litres/100 km was not met, despite the increase in diesel vehicles and technological improvements. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars	-	-
Voluntary Agreement	Voluntary agreement on the use of biogas	Active	Under this agreement set up in 2003, the biogas purchased by gas distributors is to account for at least 10% of all gas sold as motor fuel (in pure or mixed form). ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Investment	Modal shift measures	Active	In addition to the HVF the modernisation of railway infrastructure and specific economic instruments such as financial contributions to combined transport solutions (rolling motorway and non accompanied combined transport) are expected to encourage a modal shift from trucks to rail. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Modal Shift	Road Freight	-	0.5
Information and Education	Eco-Driving Courses	Active	Eco-driving courses are given for professional drivers. Driving instructors, garage owners and fleet operators employ and promote a smoother method of driving which can achieve fuel savings of up to 15%. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars	-	-
Information and Education	Energy Label for Vehicles	Active	An "energy label" for vehicles was introduced on 1 October 2002. It must be displayed on all new vehicles on the market and ranks them (on a 7 point scale) according to their CO_2 emissions, energy consumption and weight. This measure aims to contribute to reducing the overall emissions from road based transport. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical	Cars	-	-

Unknown	Measures at Cantonal and Community Level	Active	The Swiss Cantons are in charge of the implementation of the Ordinance on Air Pollution Control. Measures applied within the transport sector, including speed reduction in city areas, parking measures and programmes for renewing bus fleets, often have GHG co-benefits. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Technical			-
Unknown	Mobility Car Sharing	Active	Mobility Car Sharing Switzerland offers some 40 000 participants the shared use of 1 350 vehicles at 900 locations in 350 municipalities. ***Reference***: Switzerland's Fourth National Communication to the UNFCCC.	Fuel Efficiency - Onroad	Cars	-	-
United Kingdom							
Fiscal	Biofuels Support (in relation to Directive 2003/30/EC) - Fiscal Incentives	Active	A 20 pence per litre duty incentive on biodiesel has been in place since July 2002, and a similar duty incentive for bioethanol was introduced on 1 January 2005 - these incentives are guaranteed until 2008. Support for the development of large-scale scale biofuels plants has been given via the Regional Selective Assistance system including a £1.2 million grant for a biodiesel plant built near Motherwell. ***Reference***: Report to the EU concerning directive 2003-30-EC – UK.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Fiscal	Company car tax reform	Active	Company car taxation reform: since April 2002 company car tax has been based on a percentage of their list price, which varies according to the CO_2 emissions band (of which there are 21) they fall into. This creates a significant incentive to purchase more fuel efficient vehicles and removes an incentive to drive unnecessary extra business miles that existed in the previous system. ***Reference***: Third National Communication to the UNFCCC (p. 35-7); DTI (2004) Updated emissions projections (p. 8). ***Technical Reference***: Her Majesty's Revenue and Customs, March 2006, Report on the Evaluation of the Company Car Tax Reform: Stage 2.	Fuel Efficiency - Technical	Cars	-	1.28 - 2.38
Fiscal	Enhanced Capital Allowances for Biofuel Production Plants	Under Investigation	The UK government has applied for State Aid permission for a system of enhanced capital allowances for biofuel production plant - to provide an incentive for companies to invest in the most efficient production technologies. It will be a 100% first-year allowance for biofuels plant that meet certain qualifying criteria and which make a good carbon balance inherent in the design. ***Reference***: HM Treasury, Budget 2006. ***Technical Reference***: HM Treasury, Partial Regulatory Impact Assessment on Enhanced Capital Allowances for Biofuels.	Carbon Intensity	Cars, Road Freight, Buses	-	0.22

Fiscal	Fuel Duty Escalator	No Longer Active	Introduced in 1993 the fuel duty escalator was an annual increase in the tax on petrol and diesel above the rate of inflation. On top of a 10% increase in the level of excise duty in 1993, the initial annual rate of increase was set at 3%; raised to 5% later in 1993; and increased to 6% in July 1997. The system was abandoned in 2000 when the rate of fuel excise duty was frozen for two years. ***Reference***: Third National Communication to the UNFCCC (p. 35-7); Review of Third National Communication to the UNFCCC (p. 14-6). ***Technical Reference***: DETR March 2000. *The derivation of the carbon savings figures included in the UK's 'Draft Climate Change Programme'.*	Fuel Efficiency - Technical	Cars, Road Freight	-	3.7 - 9.2
Fiscal	Increasing fuel excise duty in line with inflation	Planned	The UK government, following the abolition of the Fuel Duty Escalator has had a policy of maintaining fuel excise duty at least in line with inflation. In the 2006 Budget, the government announced that an inflation-based increase in main fuel duties would occur in 2006, but, because of continuing oil market volatility, the changes in rates would be deferred until 1 September 2006. ***Reference***: HM Treasury, Budget 2006.	Fuel Efficiency - Technical	Cars, Road Freight	-	-
Fiscal	Vehicle excise duty reform	Active	Vehicle excise duty reform: Since March 2001 the VED has been on the basis of CO_2 emissions per kilometre (a graduated system with seven bands). The most efficient vehicles do not have to pay any excise tax. ***Reference***: HM Treasury, Budget 2006.	Fuel Efficiency - Technical	Cars	-	-
Regulatory	Biofuels Support (in relation to Directive 2003/30/EC) - Renewable Transport Fuel Obligation	Planned	A Renewable Transport Fuel Obligation will be introduced in 2008/09. It will require 5% of all transport fuels in sold in the UK to be from renewable sources in 2010-11. The level of obligation will be 2.5% in 2008-09 and 3.75% in 2009-10. The buy-out price – the price paid by fuel suppliers who fail to meet their obligation – for 2008-09 will be set at 15 pence/litre. The combination of duty incentive and buy-out price is also guaranteed at 35 pence / litre in 2009-10 but will reduce to 30 pence/litre in 2010-11. ***Reference***: www.dft.gov.uk	Carbon Intensity	Cars, Road Freight, Buses	-	3.7
Investment	"Future of Transport" White Paper, July 2004	Active	The "Future of Transport" White Paper sets out the Government's strategic transport policies and investment plans for the transport sector. ***Reference***: Communication to ECMT Jan 2006.	Modal Shift	Cars, Road Freight	-	-

Investment	Transport plans for Scotland and Wales	Active	The Scottish Executive's 'Transport Delivery Plan' sets investment priorities for the next 10-15 years, these include substantial investment in public transport, a more sustainable distribution system, and efforts to double cycle use between 1996 and 2002 and to double it again by 2012. The 'Transport Framework for Wales' seeks to achieve substantial improvements in and greater accessibility to public transport; supports the UK Government's policies on sustainable distribution and increased rail freight. ***Reference***: Third National Communication to the UNFCCC (p. 35-7). ***Technical Reference***: DEFRA March 2000. *The derivation of the carbon savings figures included in the UK's 'Draft Climate Change Programme'*.	Modal Shift	Cars, Road Freight	-	0.4
Information and Education	Free Fleet Management Advice	Active	Business fleets over a certain size are eligible for free fleet management advice which includes information on how to improve fuel efficiency and reduce fuel costs. ***Reference***: www.est.org.uk	Fuel Efficiency - Onroad	Cars	-	-
Information and Education	Freight Best Practice	Active	Freight Best Practice (formally the "Transport Energy Best Practice Programme) provides free information on improving fleet fuel efficiency to freight operators. Advice is provided on the following areas: reducing fuel use, developing staff skills, equipment selection and performance measurement. ***Reference***: www.freightbestpractice.org.uk	Fuel Efficiency - Onroad	Road Freight	-	-
Information and Education	Fuel efficiency labeling	Active	Colour-coded fuel efficiency labels were launched in February 2005 and are now in most UK car showrooms. These enable people to make more informed car purchase decisions. ***Reference***: www.dft.gov.uk	Fuel Efficiency - Technical	Cars	-	-
Information and Education	Smarter choices	Active	A range of measures aimed at helping people choose sustainable travel options. They include promoting travel plans in schools, creating 'Sustainable Travel Towns' and 'Cycle Demonstration Towns' to act as models for other Local Authorities. ***Reference***: www.dft.gov.uk	Modal Shift	Cars	-	-
United States of America							
Fiscal	Air quality measure (Smart Growth and Brownfields policies)	Active	Technical assistance and air quality credits (under state implementation plans) for development of brownfield site (old industrial areas) with land use policies that help reduce vehicle miles travelled. ***Reference***: Third National Communication to the UNFCCC (p. 203).	Modal Shift	Cars	-	11

Fiscal	Federal Tax Credit for Ethanol	Active	Reduction of fuel tax for ethanol blended with petrol (up to 10%), equivalent to 52 cents per gallon of ethanol or roughly 14 Eurocents per litre. The measure is designed to promote attainment of local air quality under 1990 Clean Air Act Amendments by increasing the oxygenation of gasoline. Some, unquantified, CO_2 abatement co-benefit is to be expected. ***Reference***: IEA, Biofuels for Transport, 2004.	Carbon Intensity	Cars	-	-
Fiscal	Gas guzzler tax	Active	A purchase tax applies to any car with a fuel efficiency that is worse than 10.4 litres per 100km. The tax increases as fuel efficiency gets worse.	Fuel Efficiency - Technical	Cars	-	-
Fiscal	Tax credits for hybrid vehicles	Active	Buyers of new hybrid cars and SUVs can claim a tax credit of up to $3 400.	Fuel Efficiency - Technical	Cars	-	-
Regulatory	CAFE standards	Active	Corporate Average Fuel Economy (CAFE) standards. For passenger cars standards are set at roughly the same level they have been at for the last two decades (27.5 mpg). New standards for light trucks were set in 2004 (for model years 2005–2007), increasing them from 20.7 to 22.2 miles per gallon by 2007. **Note:** the quantification only includes the impact of the part of the standard which applies to light duty trucks. ***Reference***: Third National Communication to the UNFCCC (p. 206). In-depth review of Third National Communication to the UNFCCC (para. 71).	Fuel Efficiency - Technical	Cars	-	20
Voluntary Agreement - Freight	Ground freight measures (Smart Way Transport)	Active	A voluntary programmme in the freight sector aimed at the implementation of advanced management practices and efficient technologies. To become part of the Partnership, fleet operators have to commit to measuring environmental performance, set a goal for improved performance, develop an action plan to achieve this goal and report progress annually. Shippers must commit to similar actions for their freight facility operations as well as for increasing the percentage of their freight moved by SmartWay Partnership members to at least 50%. The EPA will provide technical guidance and promote the SmartWay brand as recognition of superior environmental practice. ***Reference***: Third National Communication to the UNFCCC (p. 204).	Fuel Efficiency - Onroad	Road Freight	-	33 - 66
Investment	DOT Emission-Reducing Initiatives	Active	The Department of Transport provides funding for public transport infrastructure and services, and for cycling and walking infrastructure. ***Reference***: Third National Communication to the UNFCCC (p. 206).	Modal Shift	Cars	-	-

Investment	Hybrid Retrofit and Electric Conversion Programme	Active	A programmme for awarding grants of up to 85% for retrofitting hybrid and electric conversion technologies which achieve low-emission standards consistent with the Voluntary National Low Emission Vehicle Programme for cars or light-duty trucks. Grants of up to 85%. ***Reference***: US Energy Policy Act.	Fuel Efficiency - Technical	Cars	US$100 million	-
Information and Education	Clean Cities	Active	Supports public–private partnerships to deploy alternative-fuel vehicles and build supporting infrastructure, including community networks. Clean Cities works directly with local businesses and governments, guiding them through each step in the process of building the foundation for a vibrant local organization, including goal setting, coalition-building, and securing commitments. ***Reference***: Third National Communication to the UNFCCC (p. 200).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Information and Education	Commuter Options Programme (Commuter Choice Leadership)	Active	The *Commuter Choice Leadership Initiative* is a voluntary employer-adopted programme that increases commuter flexibility by expanding mode options, using flexible scheduling, and increasing work location choices. *Parking Cash-Out* offers employees the option to receive taxable income in lieu of free or subsidized parking, and *Transit Check* offers non-taxable transit/vanpool benefits, currently up to $100 monthly. ***Reference***: Third National Communication to the UNFCCC (p. 57).	Modal Shift	Cars	-	14
Research and Development	Biofuels Programme	Active	Research, develop, demonstrate, and facilitate the commercialization of biomass-based, environmentally sound fuels for transportation. The programme is currently pursuing the development of conversion technologies for bioethanol and biodiesel fuels. ***Reference***: Third National Communication to the UNFCCC (p. 201).	Carbon Intensity	Cars, Road Freight, Buses	-	-
Research and Development	Clean Automotive Technology	Active	A research partnership program with the automotive industry to develop advanced clean and fuel efficient automotive technology. ***Reference***: Third National Communication to the UNFCCC (p. 205).	Fuel Efficiency - Technical	Cars	-	-
Research and Development	FreedomCAR and other R&D programmes	Active	A public–private partnership with automobile manufacturers to research the development of hydrogen as a primary fuel for cars and trucks: development of hydrogen from domestic renewable sources; end-use technologies (in particular fuel cells); the hydrogen-supply infrastructure; interim technologies. ***Reference***: Third National Communication to the UNFCCC (p. 57).	Carbon Intensity	Cars, Road Freight	-	-
Research and Development	Vehicle Systems R&D	Active	The Department of Energy's Office of Heavy Vehicle Technologies works with industry partners and their suppliers to research and develop technologies that make heavy vehicles more energy efficient and able to use alternative fuels, while reducing vehicle emissions. ***Reference***: Third National Communication to the UNFCCC (p. 199).	Fuel Efficiency - Technical	Road Freight, Buses	-	-

United States of America - Alaska							
Fiscal	Fiscal incentives for ethanol	Active	A reduction in fuel excised duty for petrol/ethanol blends. ***Reference***: http://www.taxadmin.org/fta/rate/motor_fl.html.	Carbon Intensity	Cars, Road Freight, Buses	-	-
Regulatory	Emissions Reductions from Light-Duty Vehicles	Active	In July 2002, California's Governor signed legislation (AB 1493) to reduce GHG emissions from light-duty vehicles. The California Air Resources Board has subsequently adopted regulations that require manufactures to progressively reduce CO_2 emissions per mile from 2009 (323 and 439 grams of CO_2/mile for cars and light trucks respectively) to 2016 (205 and 332 grams of CO_2/mile for cars and light trucks respectively). When fully phased in, the near term (2009-2012) standards will result in a 22% reduction in greenhouse gas emissions as compared to the 2002 fleet, and the mid-term (2013-2016) standards will result in a 30% reduction. Implementation is suspended awaiting the outcome of legal action by car manufacturers that contests the State's powers to regulate CO_2 emissions, equating these to fuel efficiency standards which are a Federal Government responsibility. ***Reference***: IEA database http://www.iea.org/dbtw-wpd/textbase/envissu/pamsdb/index.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Fuel Efficiency - Technical	Cars	-	32 (in 2020)
Regulatory	Fuel efficient tyre program	Planned	Requires tyre manufacturers of light duty tyres sold in CA to report fuel economy information for light duty tyre models sold (estimated completion date Jan 2008). The aim is to adopt regulations specifying minimum fuel economy standards for tyres in Jan 2009. ***Reference***: http://www.iea.org/Textbase/work/2005/EnerEffTyre/boyd.pdf.	Fuel Efficiency - Technical	Cars		-
Research and Development	California Hydrogen Highway	Active	On July 21, 2005, the State Governor signed Senate Bill 76 providing funding to implement recommendations of the CA H2 Net Blueprint Plan. The bill provides $6.5 million in funding for hydrogen demonstration projects until January 1, 2007. The funds may be used for co-funding the establishment of up to three hydrogen fuelling station demonstration projects and the State lease and purchase of a variety of hydrogen fuelled vehicles. ***Reference***: http://www.hydrogenhighway.ca.gov/sb76/sb76.htm.	Carbon Intensity	Cars		-
United States of America - Hawaii							
Regulatory	Biofuels obligation	Planned	Hawaii passed a requirement that at least 85% of all gasoline in the state should contain 10% ethanol. The measure goes into effect in April 2006. ***Reference***: http://www.ethanol.org/ethanolinstatelegislation.html.	Carbon Intensity	Cars, Road Freight, Buses	-	-

United States of America - Idaho							
Fiscal	Fiscal incentives for ethanol	Active	A reduction in fuel excised duty for petrol/ethanol blends. ***Reference***: http://www.taxadmin.org/fta/rate/motor_fl.html.	Carbon Intensity	Cars, Road Freight, Buses	-	-
United States of America - Iowa							
Fiscal	Fiscal incentives for ethanol	Active	A tax break is granted for petrol/ethanol blends. ***Reference***: http://www.taxadmin.org/fta/rate/motor_fl.html.	Carbon Intensity	Cars, Road Freight, Buses	-	-
United States of America - Maryland							
Fiscal	Tax credits for employee public transport expenses	Active	[No information provided] ***Reference***: www.commuterchoicemaryland.com/; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Modal Shift	Cars	-	-
Fiscal	Tax exemption for hybrid vehicles	Active	An excise tax exemption of $1 500 for qualifying hybrid vehicles for model year 2000 cars or later. ***Reference***: www.energy.state.md.us/cleanincentives.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Fuel Efficiency - Technical	Cars	-	-
Investment	Smart Growth	Active	Maryland has adopted the goal of doubling transit ridership by 2020 which it plans to achieve through smart growth; its policies include emphasizing mixed land-use developments and providing incentives to encourage businesses to relocate in urban areas. State infrastructure funding is limited to “Priority Funding Areas” that local governments designate for growth; the State withholds funds for development outside of these areas. ***Reference***: www.op.state.md.us/smartgrowth/; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Modal Shift	Cars, Road Freight	-	-
United States of America - Minnesota							
Regulatory	Biofuels obligation	Active	State law requires that all gasoline sold in the State contain 10% ethanol oxygenate. In 2005, Minnesota announced their intention to make the blending requirement 20% from 2013. ***Reference***: www.commerce.state.mn.us/pages/Energy/MainModTech.htm; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Carbon Intensity	Cars, Road Freight, Buses	-	-

United States of America - Montana							
Regulatory	Biofuels obligation	Active	A law requiring a 10% ethanol blend in all (91 octane) gasoline sold in the State has been introduced. It is tied to developing in-state production capacity and will go into effect 12 months after the state has 40 million gallons of annual ethanol production capacity. ***Reference***: http://www.ethanol.org/ethanolinstatelegislation.html.	Carbon Intensity	Cars, Road Freight, Buses	-	-
United States of America - New Jersey							
Investment	Smart Growth	Active	A Smart Growth Policy Council was established in 2002 to (1) ensure State funding issued to promote economic activity is consistent with the State plan and smart growth; (2) ensure State transportation, redevelopment, water resource protection, and school construction are consistent with the state plan and smart growth; and (3) empower municipalities by providing them with legal support through the attorney general's office. ***Reference***: www.state.nj.us/cgi-bin/governor/njnewsline/view_article.pl?id=624; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Modal Shift	Cars, Road Freight	-	-
United States of America - New York							
Fiscal	Rail property tax reform	Unknown	The New York State legislature adopted a rail property tax reform bill, which, by reducing the ceiling for state rail property taxes, aims to encourage additional investment in track infrastructure by both public and private freight rail carriers. ***Reference***: 2002 Center for Clean Air Policy, *State and Local Climate Change Policy Actions.* (p. 11-16).	Modal Shift	Road Freight	-	-
Fiscal	Tax credits for low emission vehicles	Active	Tax credits for a variety of low-GHG emitting vehicles. A $2 000 personal income or corporate tax credit matches the current federal deduction allowance for vehicles powered by natural gas, propane, methanol, ethanol, and hydrogen as well as for hybrid electric vehicles. Credits are as much as $5 000 for light-duty vehicles and $10 000 for heavier vehicles. In addition, for qualified alternative fuel vehicles, the incremental cost of the vehicle is exempt from New York state sales tax. In the case of hybrid electric vehicles, for which incremental costs cannot always be determined, recently adopted State legislation creates a $3 000 sales tax credit. ***Reference***: www.nyserda.org/afvprogram.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Fuel Efficiency - Technical	Cars, Road Freight	-	-

Regulatory	Emissions reductions from light duty vehicles - new CAFÉ standard	Planned	New Corporate Average Fuel Efficiency standards for cars, equivalent to new California standards. ***Reference***: Car Lines; Proposal by Governor Pataki on 18 May 2005.	Fuel Efficiency - Technical	Cars	-	14.8 (in 2030)
Investment	Biofuels support	Active	The State is actively supporting biofuels through the purchase of B100 (100% biodiesel) for state fleets and marine passenger ferries in New York City (approximately 3 million gallons). Current efforts are also underway for the use of biodiesel on the New York Thruway as well as expanding the use of biodiesel to meet federal Energy Policy Act of Act of 1992 fleet requirements. ***Reference***: www.nyserda.org/exorder111guidelines.pdf; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions (p. 11-16).	Carbon Intensity	Cars, Buses, Shipping	-	-
Policy Process	State energy plan	Planned	The State Energy Plan of 2002 charges the State with improving the efficiency of the transportation sector through a set of actions that are based on the following recommendations: redirecting State spending toward energy efficient alternatives; targeting open space funding to prevent sprawl and reduce vehicle miles travelled; and, working with regional and local planning bodies to track CO_2 emissions and energy use of transportation plans and programs. ***Reference***: www.nyserda.org/sep.html; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Modal Shift	Cars, Road Freight	-	-
United States of America - Oregon							
Fiscal	Tax exemption for hybrid vehicles	Active	A $1 500 state income tax credit for hybrid electric vehicles through the State's residential energy tax credit programme. The electric drive system and the on-board electric charging system each qualify for a $750 tax credit. ***Reference***: www.energy.state.or.us/trans/hybridcr.htm; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions (p. 11-16).	Fuel Efficiency - Technical	Cars	-	-
United States of America - South Dakota							
Fiscal	Fiscal incentives for ethanol	Active	A reduction in fuel excise duty for petrol/ethanol blends. ***Reference***: http://www.taxadmin.org/fta/rate/motor_fl.html.	Carbon Intensity	Cars, Road Freight, Buses	-	-

United States of America - Utah							
Policy Process	Envision Utah	Active	Envision Utah is pursuing strategies to discourage sprawl, train public officials in the Tools for Quality Growth, and build community support for smart growth concepts. ***Reference***: www.envisionutah.org; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions. (p. 11-16).	Modal Shift	Cars	-	-
United States of America - Various							
Research and Development	Distance based vehicle insurance	Under investigation	Distance-based vehicle insurance is being tested in Texas and authorizing legislation is in place in Washington, Oregon, Massachusetts, Georgia, and Pennsylvania. ***Reference***: 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions (p. 11-16).	Demand	Cars	-	-
United States of America - Washington							
Investment	Commuter Trip Reduction	Active	The Commuter Trip Reduction (CTR) Law (1991) aims to reduce single-occupant travel through employer-based programs. The CTR office is funded at $5.2 million on a biannual basis. The CTR law also created a Travel Demand Management (TDM) Resource Centre which would be responsible for implementing a proposed $450 million TDM programme focusing on vanpooling and other strategies. ***Reference***: www.metrokc.gov/earthlegacy/smartgrowth.htm; 2002 Center for Clean Air Policy, State and Local Climate Change Policy Actions (p. 11-16).	Modal Shift	Cars	-	-

ANNEX 1.

NATIONAL TRANSPORT SECTOR AND CO_2 EMISSIONS DATA

Summary Data

The country data sheets include information for the following variables in each country for 1990, 1995, 2000, 2002 and 2003. Emissions data from both UNFCCC and IEA are included for completeness.

- **Total population**: Data for OECD countries have been extracted from the OECD, Annual National Accounts. For non-OECD countries data are from the United Nations Statistics Division. Website: http://unstats.un.org/unsd/cdb/cdb_series_xrxx.asp?series_code=15

- **Total GDP, a measure of the overall level of economic activity**: GDP is measured in 2000 US dollar purchasing power parities for all countries based on the IEA report - *CO_2* Emissions *from Fuel Combustion 1971-2003: 2005 Edition*.

- Total road passenger kilometres, a measure of the level of passenger transport activity: ECMT data from country surveys covering private cars, buses and coaches.

- Total road freight tonne kilometres, a measure of the level of freight transport activity: ECMT data from country surveys covering road haulage only.

- **Road passenger-kms per head of population ('000s km) and road tonne-kms per unit of GDP (tonne km per $).**

- **UNFCCC total CO_2 equivalent (CO_2-e) greenhouse gas (ghg) emissions from the transport sector:** For all countries that are "Annex I" signatories to the Kyoto Protocol data have been extracted from the 2005 GHG Inventory Submissions.

- **Transport sector ghg emissions per head of the population and per unit of GDP.**

- **UNFCCC total CO_2 emissions from the transport sector[1]:** For all countries that are "Annex I" signatories to the Kyoto Protocol data have been extracted from the 2005 GHG Inventory Submissions.

- **IEA total CO_2 emissions from the transport sector[1]:** Data extracted from IEA report - *CO_2 Emissions from Fuel Combustion 1971-2003: 2005 Edition.*

- **Charts of CO_2 emissions shares between sectors[2] and within the transport sector[3] based on the UNFCCC submissions.**

- **Charts of CO_2 emissions shares between sectors[2] and within the transport sector[3] based on the IEA estimates.**

- **Charts of the changes between 1990 and 2003** in energy sector emissions, transport sector emissions, road transport emissions, passenger kilometres and tonne kilometres.

Remarks on the differences between UNFCCC Submissions and IEA Estimates

There are many reasons why the IEA estimates may not be the same as the national data in submissions to the UNFCCC, even if a country has accounted for all of its energy use and correctly applied *IPCC Guidelines*:

- Energy activity data are extracted from the IEA energy balances and may differ from those used nationally.

- IEA uses average net calorific values. National experts may have the possibility of using more detailed data.

- IEA uses average emission factors. National experts may have better information available.

- IEA can not allocate emissions from autoproducers into the end-use sectors.

- Military emissions may be treated differently.

- The IEA estimates include emissions from coke inputs to blast furnaces in energy sector emissions. National experts may have included these emissions in the IPCC category Industrial Processes.

- IEA uses a Tier 1 Sectoral Approach based on the IPCC. National experts may be using a Tier 2 or Tier 3 method.

(For further explanation see the IEA report - *CO_2 Emissions from Fuel Combustion 1971-2003: 2005 Edition*, p. I.5-I.6)

NOTES

1. CO_2 emissions from the combustion of fuel for all tranport activities with the exception of international marine bunkers and international aviation.

2. These pie charts show shares for IPCC categories 1A1-1A5, the sub-division of category 1A, Fuel Combustion. In the case of IPCC category 1A1 (Energy Industries), the dominant sub-category is 1A1a (Public Electricity and Heat Production).

3. These pie charts show shares of IPCC categories 1A3a-1A3e within the Transport Sector (1A3).

Australia

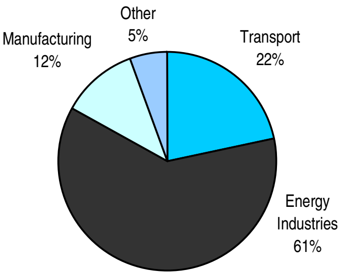
Key Indicators

Transport and the Economy

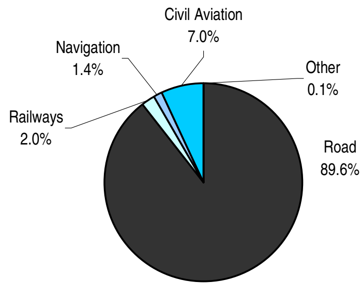
	1990	1995	2000	2002	2003
Population (thousands)	17 177	18 192	19 282	19 757	19 984
GDP at 2000 prices (PPP US$ m)	358 790	420 890	508 880	545 590	566 180
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	61 911	69 091	77 021	79 070	79 772
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.17	0.16	0.15	0.14	0.14
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	3.60	3.80	3.99	4.00	3.99
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	59 724	65 490	72 095	73 521	74 033
IEA Total transport sector CO_2 emissions (kt of CO_2)	61 760	67 250	74 750	75 640	77 910

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

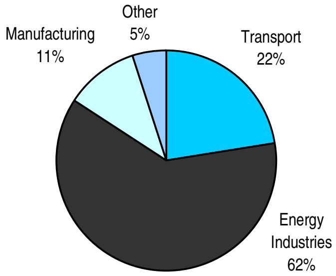


Within transport:



IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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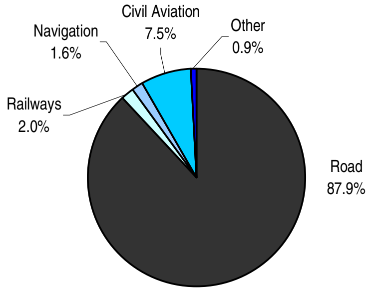
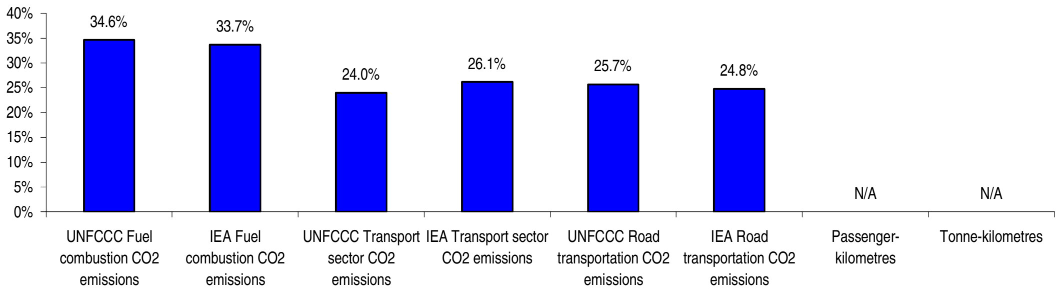


Changes (1990 to 2003)



Austria

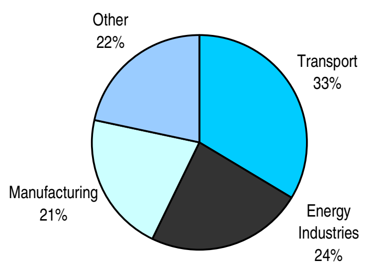
Key Indicators

Transport and the Economy

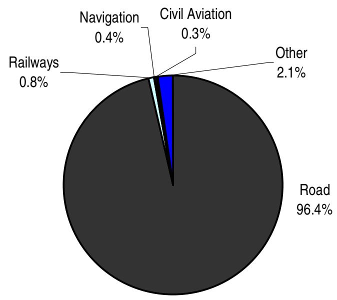
	1990	1995	2000	2002	2003
Population (thousands)	7 678	7 948	8 012	8 084	8 118
GDP at 2000 prices (PPP US$ m)	178 930	199 170	230 190	234 540	236 320
Road passenger-kms (m)	67 722	70 880	73 461	74 861	75 048
Road freight tonne-kms (m)	9 015	14 879	17 154	17 827	18 141
Road passenger-kms per head of population ('000s km)	8.82	8.92	9.17	9.26	9.24
Road freight tonne-kms per unit of GDP (tonne km per $)	0.05	0.07	0.07	0.08	0.08
UNFCCC total transport ghg emissions (kt of CO_2-e)	12 637	14 825	18 039	21 280	22 996
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.07	0.07	0.08	0.09	0.10
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.65	1.87	2.25	2.63	2.83
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	12 405	14 466	17 735	20 974	22 692
IEA Total transport sector CO_2 emissions (kt of CO_2)	12 440	13 840	16 530	19 140	21 040

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

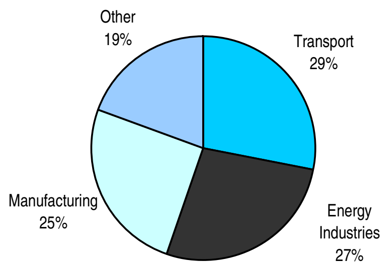


Within transport:



IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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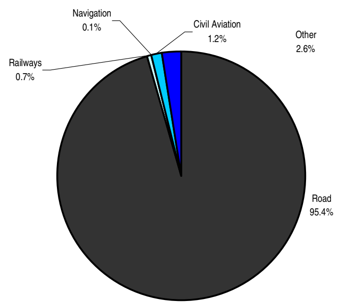
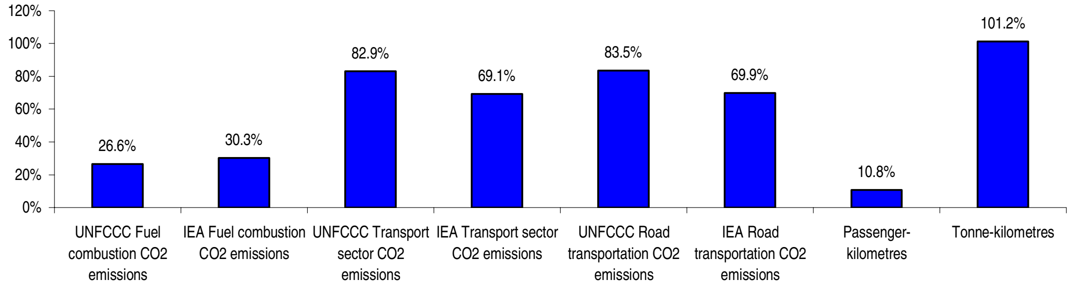


Changes (1990 to 2003)



Azerbaijan

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	7 175	7 685	8 049	8 141	8 234
GDP at 2000 prices (PPP US$ m)	33 230	13 970	20 690	25 300	28 140
Road passenger-kms (m)	6 698	4 664	9 153	9 603	9 861
Road freight tonne-kms (m)	3 287	527	3 485	5 534	6 241
Road passenger-kms per head of population ('000s km)	0.93	0.61	1.14	1.18	1.20
Road freight tonne-kms per unit of GDP (tonne km per $)	0.10	0.04	0.17	0.22	0.22
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	3 050	2 070	2 620	2 850

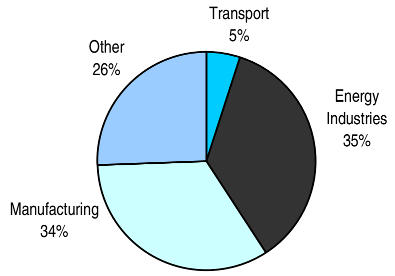
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

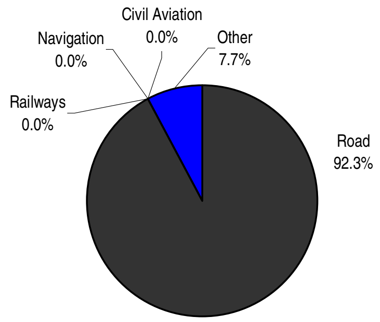
Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

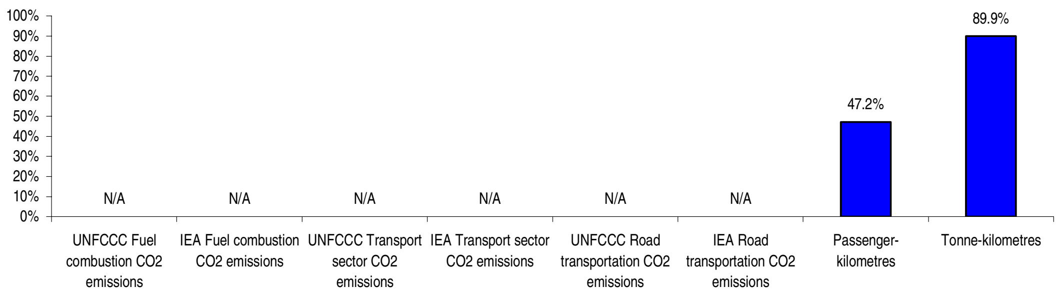
By sector:



Within transport:



Changes (1990 to 2003)



Belarus

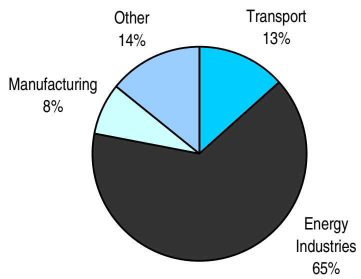
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	10 189	10 281	10 005	9 925	9 874
GDP at 2000 prices (PPP US$ m)	54 250	35 440	48 050	52 910	56 500
Road passenger-kms (m)	19 787	9 308	9 235	9 090	9 800
Road freight tonne-kms (m)	22 361	9 539	8 982	7 945	7 655
Road passenger-kms per head of population ('000s km)	1.94	0.91	0.92	0.92	0.99
Road freight tonne-kms per unit of GDP (tonne km per $)	0.41	0.27	0.19	0.15	0.14
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	6 574	6 856
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	0.12	0.12
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	0.66	0.69
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	6 529	6 783
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	7 010	6 130	5 730	6 160

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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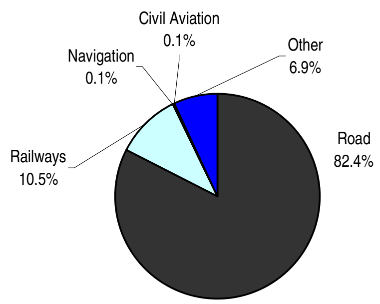
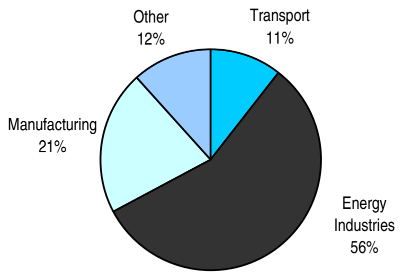


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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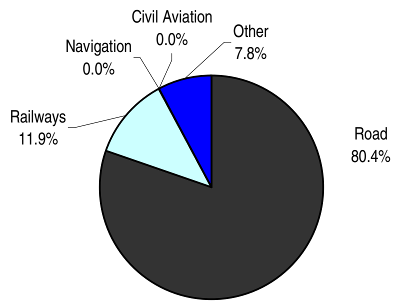
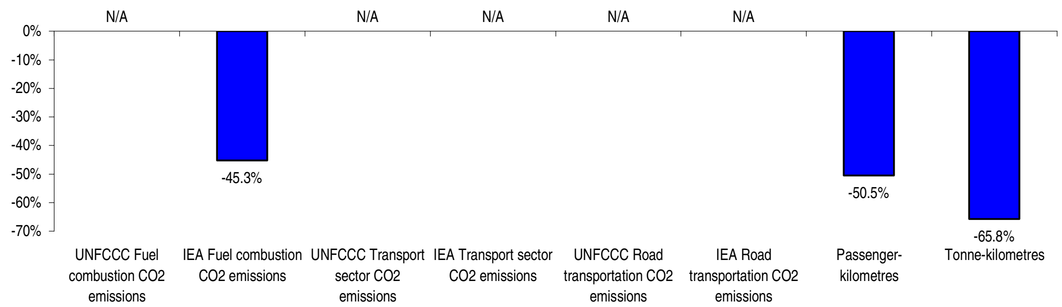


Changes (1990 to 2003)



Belgium

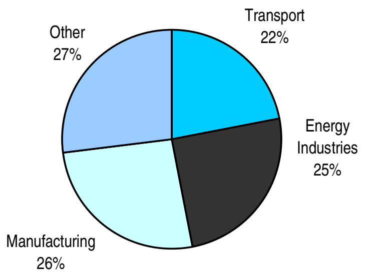
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	9 968	10 137	10 246	10 330	10 374
GDP at 2000 prices (PPP US$ m)	217 190	235 050	269 100	273 480	276 920
Road passenger-kms (m)	85 788	96 830	119 320	123 060	123 590
Road freight tonne-kms (m)	32 049	47 136	51 023	53 538	50 542
Road passenger-kms per head of population ('000s km)	8.61	9.55	11.65	11.91	11.91
Road freight tonne-kms per unit of GDP (tonne km per $)	0.15	0.20	0.19	0.20	0.18
UNFCCC total transport ghg emissions (kt of CO_2-e)	20 180	22 250	24 614	25 599	26 209
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.09	0.09	0.09	0.09	0.09
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.02	2.19	2.40	2.48	2.53
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	19 862	21 772	23 867	24 837	25 371
IEA Total transport sector CO_2 emissions (kt of CO_2)	20 350	22 990	24 730	25 470	26 390

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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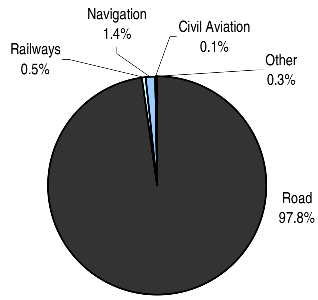
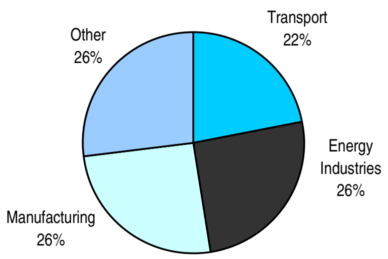


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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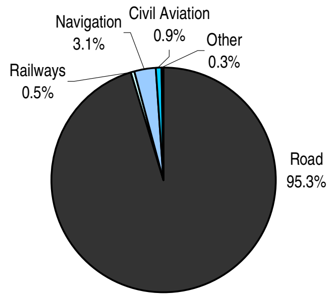
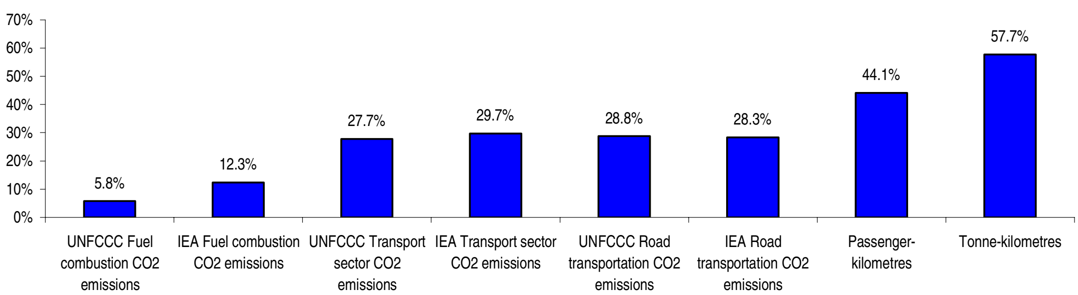


Changes (1990 to 2003)



Bosnia Herzegovina

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	4 474	4 180	3 781	3 828	3 832
GDP at 2000 prices (PPP US$ m)	6 860	7 410	20 890	22 790	23 340
Road passenger-kms (m)	2 737	112	1 198	1 184	1 212
Road freight tonne-kms (m)	3 066	55	318	355	384
Road passenger-kms per head of population ('000s km)	0.61	0.03	0.32	0.31	0.32
Road freight tonne-kms per unit of GDP (tonne km per $)	0.45	0.01	0.02	0.02	0.02
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	1 120	1 800	1 950	2 030

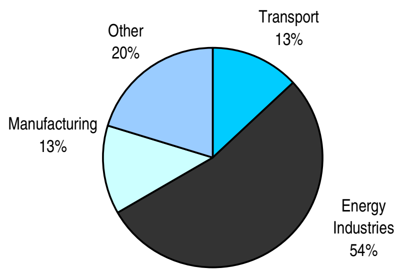
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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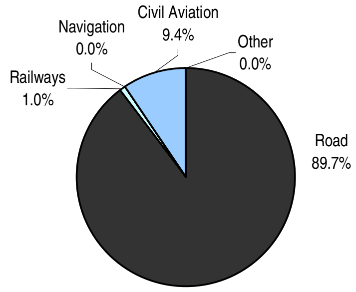
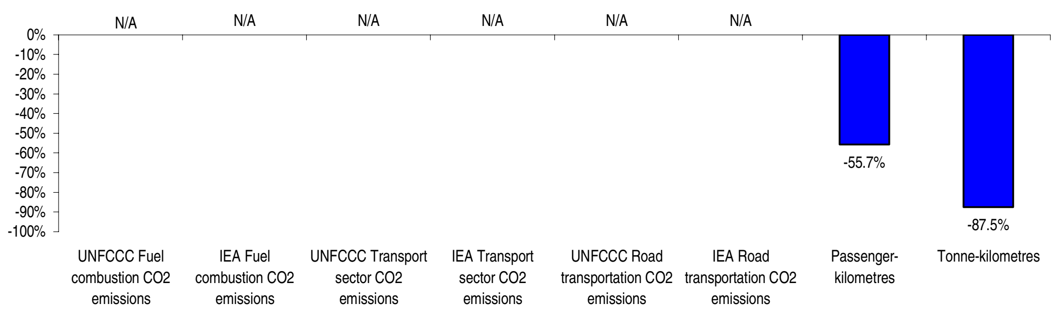


Changes (1990 to 2003)



Bulgaria

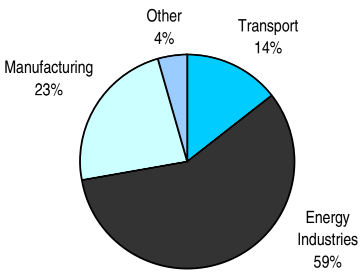
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	8 718	8 406	8 170	7 869	7 824
GDP at 2000 prices (PPP US$ m)	63 330	52 790	50 210	54 360	57 140
Road passenger-kms (m)	25 881	11 508	13 879	15 966	12 954
Road freight tonne-kms (m)	13 770	18 562	3 060	3 931	4 586
Road passenger-kms per head of population ('000s km)	2.97	1.37	1.70	2.03	1.66
Road freight tonne-kms per unit of GDP (tonne km per $)	0.22	0.35	0.06	0.07	0.08
UNFCCC total transport ghg emissions (kt of CO_2-e)	11 003	6 931	5 943	6 378	7 165
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.17	0.13	0.12	0.12	0.13
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.26	0.82	0.73	0.81	0.92
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	10 864	6 845	5 881	6 317	7 098
IEA Total transport sector CO_2 emissions (kt of CO_2)	6 490	4 220	5 470	5 880	6 470

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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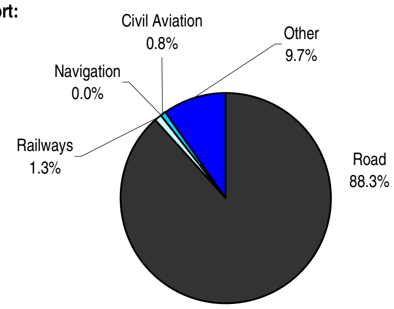
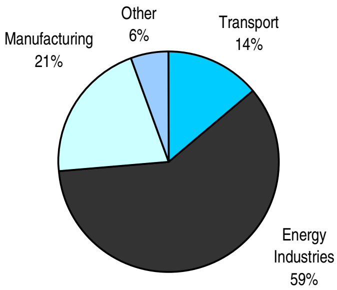


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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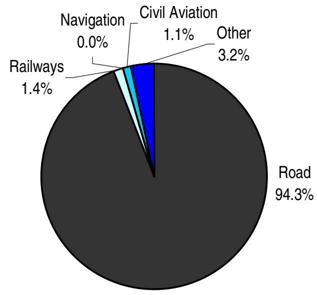
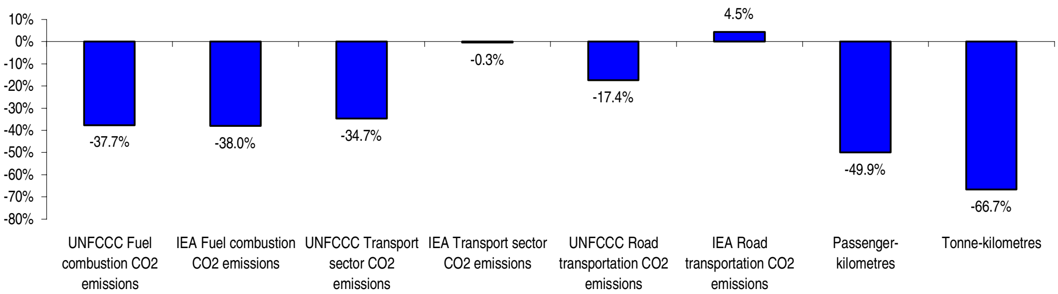


Changes (1990 to 2003)



Canada

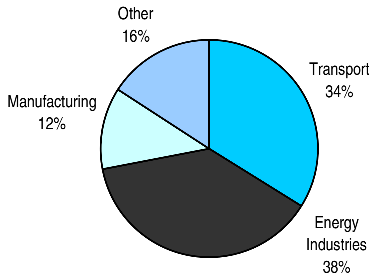
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	27 698	29 302	30 689	31 373	31 661
GDP at 2000 prices (PPP US$ m)	644 890	701 930	860 190	905 510	923 610
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	148 866	164 039	183 226	183 173	187 800
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.23	0.23	0.21	0.20	0.20
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	5.37	5.60	5.97	5.84	5.93
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	141 931	154 692	173 734	174 448	179 147
IEA Total transport sector CO_2 emissions (kt of CO_2)	124 260	136 500	150 030	150 480	153 190

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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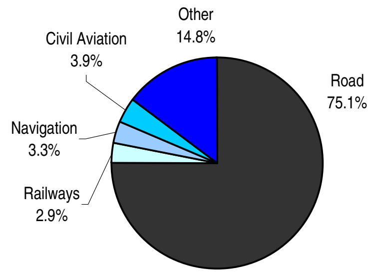
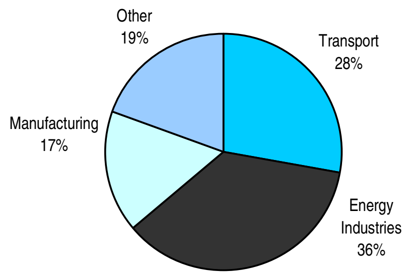


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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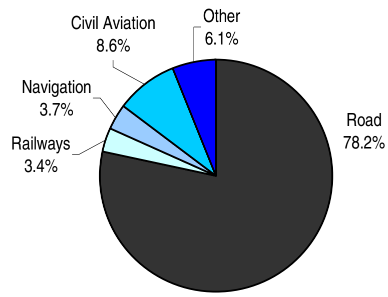
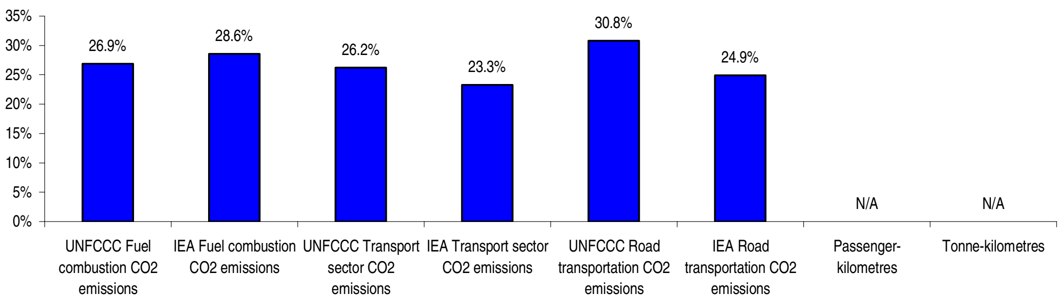


Changes (1990 to 2003)



Croatia

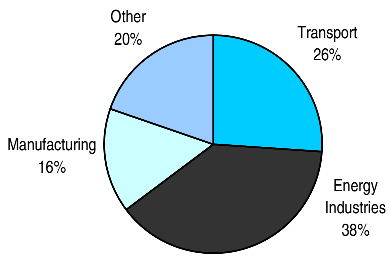
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	4 778	4 669	4 381	4 443	4 442
GDP at 2000 prices (PPP US$ m)	45 740	32 940	39 770	43 700	46 530
Road passenger-kms (m)	7 004	4 052	3 331	3 557	3 716
Road freight tonne-kms (m)	2 852	1 251	2 816	7 413	8 241
Road passenger-kms per head of population ('000s km)	1.47	0.87	0.76	0.80	0.84
Road freight tonne-kms per unit of GDP (tonne km per $)	0.06	0.04	0.07	0.17	0.18
UNFCCC total transport ghg emissions (kt of CO_2-e)	4 070	3 391	4 532	5 038	5 470
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.09	0.10	0.11	0.12	0.12
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.85	0.73	1.03	1.13	1.23
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	4 041	3 330	4 396	4 871	5 284
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	3 390	4 490	4 890	5 280

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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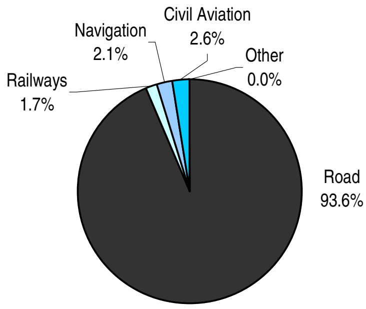
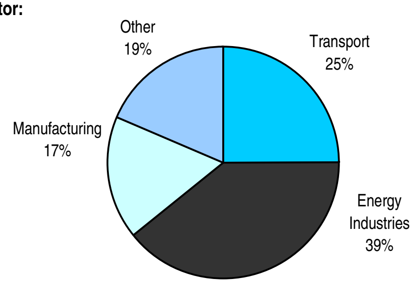


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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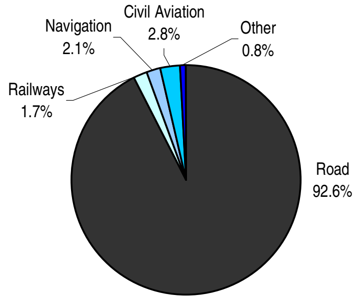
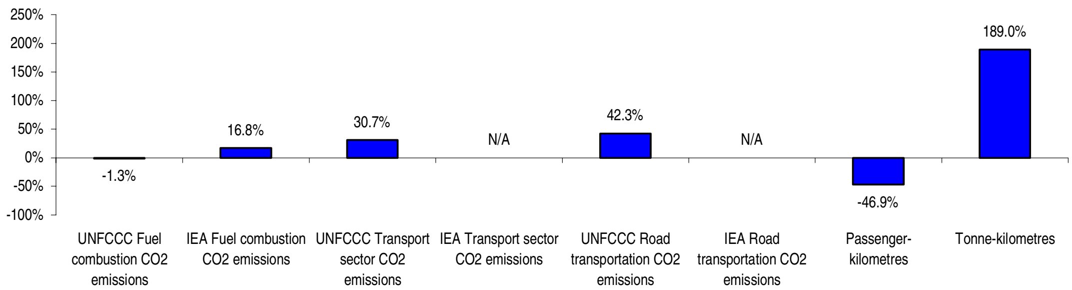


Changes (1990 to 2003)



Czech Republic

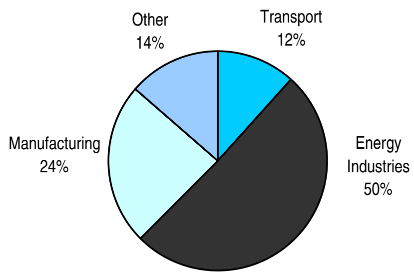
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	10 363	10 331	10 273	10 201	10 202
GDP at 2000 prices (PPP US$ m)	146 180	139 290	149 700	155 940	161 730
Road passenger-kms (m)		65 473	73 271	74 855	78 049
Road freight tonne-kms (m)		31 267	39 036	45 059	46 564
Road passenger-kms per head of population ('000s km)		6.34	7.13	7.34	7.65
Road freight tonne-kms per unit of GDP (tonne km per $)		0.22	0.26	0.29	0.29
UNFCCC total transport ghg emissions (kt of CO_2-e)	7 420	9 787	11 665	13 070	14 101
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.05	0.07	0.08	0.08	0.09
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.72	0.95	1.14	1.28	1.38
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	7 275	9 502	11 110	12 428	13 431
IEA Total transport sector CO_2 emissions (kt of CO_2)	7 290	7 570	13 600	14 850	16 720

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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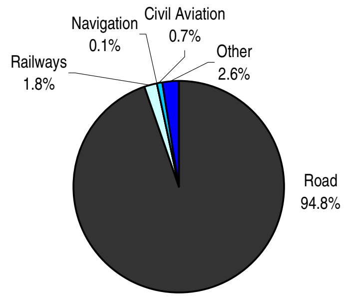
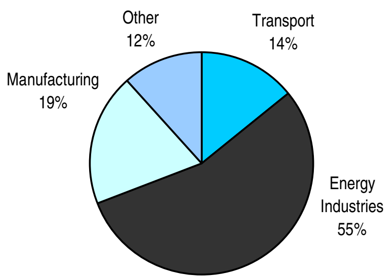


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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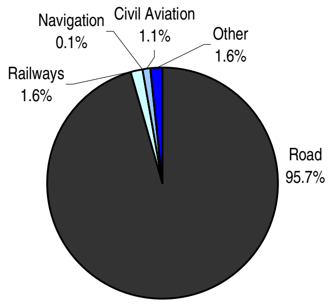
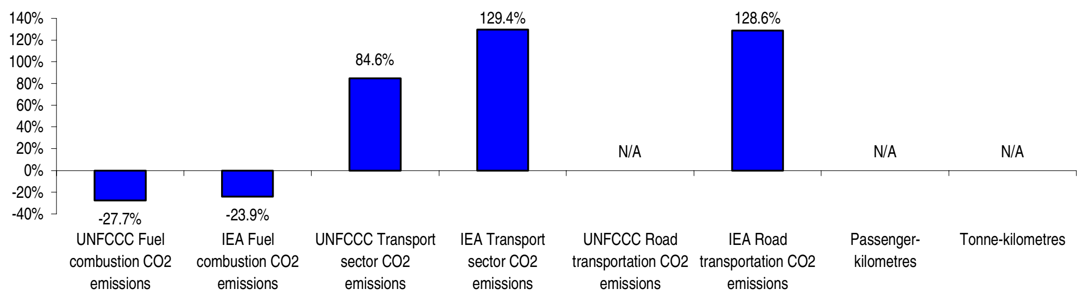


Changes (1990 to 2003)



Denmark

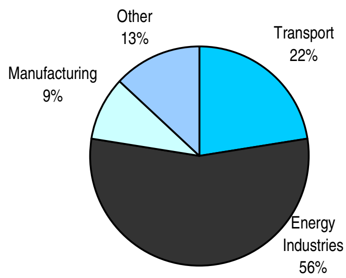
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	5 140	5 230	5 338	5 376	5 390
GDP at 2000 prices (PPP US$ m)	120 870	133 250	152 120	156 060	156 750
Road passenger-kms (m)	57 868	62 767	68 968	69 639	70 528
Road freight tonne-kms (m)	9 352	9 326	11 000	11 057	11 012
Road passenger-kms per head of population ('000s km)	11.26	12.00	12.92	12.95	13.08
Road freight tonne-kms per unit of GDP (tonne km per $)	0.08	0.07	0.07	0.07	0.07
UNFCCC total transport ghg emissions (kt of CO_2-e)	10 645	12 171	12 570	12 793	13 279
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.09	0.09	0.08	0.08	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.07	2.33	2.35	2.38	2.46
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	10 441	11 823	12 118	12 319	12 785
IEA Total transport sector CO_2 emissions (kt of CO_2)	10 400	11 850	12 010	12 180	12 670

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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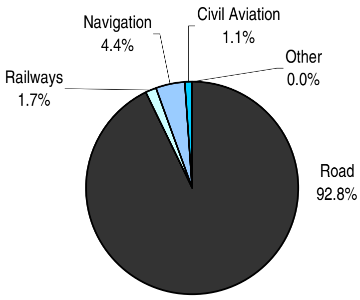
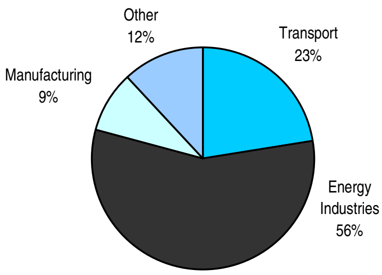


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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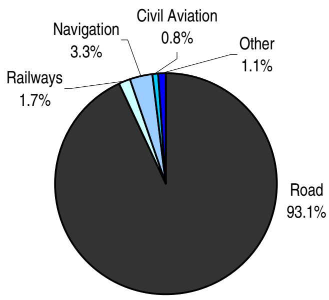
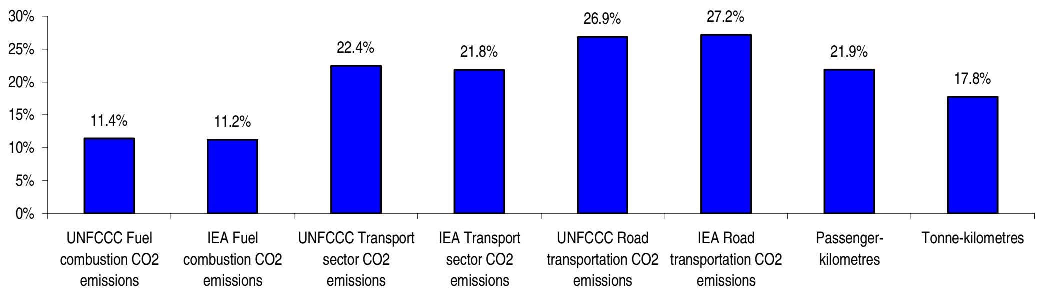


Changes (1990 to 2003)



Estonia

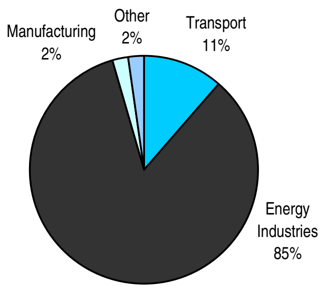
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	1 571	1 484	1 370	1 359	1 354
GDP at 2000 prices (PPP US$ m)	14 710	10 320	14 040	16 170	17 310
Road passenger-kms (m)	4 454	2 048	2 630	2 330	2 299
Road freight tonne-kms (m)	4 510	1 549	3 932	4 387	6 428
Road passenger-kms per head of population ('000s km)	2.84	1.38	1.92	1.71	1.70
Road freight tonne-kms per unit of GDP (tonne km per $)	0.31	0.15	0.28	0.27	0.37
UNFCCC total transport ghg emissions (kt of CO_2-e)	2 706	1 109	1 036	2 188	2 160
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.18	0.11	0.07	0.14	0.12
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.72	0.75	0.76	1.61	1.59
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	2 693	1 103	1 030	2 175	2 147
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	1 410	1 660	1 950	1 870

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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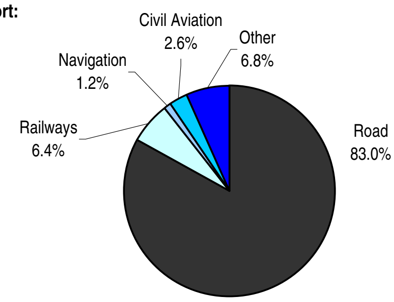
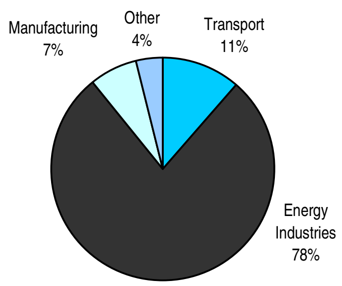
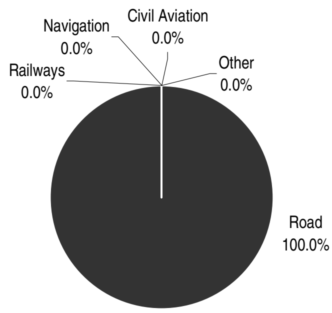


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

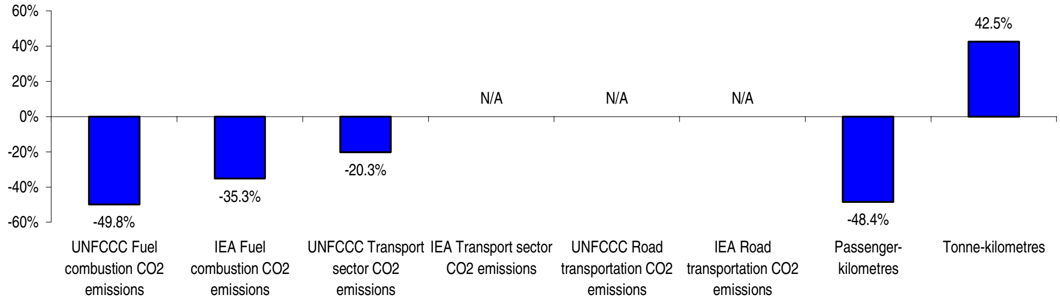
By sector:



Within transport:



Changes (1990 to 2003)



Finland

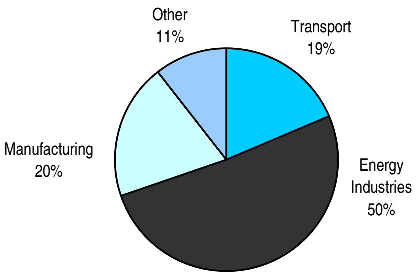
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	4 986	5 108	5 176	5 201	5 213
GDP at 2000 prices (PPP US$ m)	110 410	105 560	132 950	137 420	140 200
Road passenger-kms (m)	59 700	58 000	63 400	66 000	67 260
Road freight tonne-kms (m)	25 400	22 400	27 800	28 100	26 900
Road passenger-kms per head of population ('000s km)	11.97	11.35	12.25	12.69	12.90
Road freight tonne-kms per unit of GDP (tonne km per $)	0.23	0.21	0.21	0.20	0.19
UNFCCC total transport ghg emissions (kt of CO_2-e)	12 592	11 540	12 042	13 371	13 655
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.11	0.11	0.09	0.10	0.10
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.53	2.26	2.33	2.57	2.62
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	12 316	11 679	12 460	12 810	13 067
IEA Total transport sector CO_2 emissions (kt of CO_2)	11 800	11 440	12 200	12 660	12 880

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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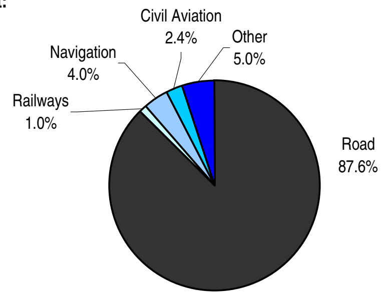
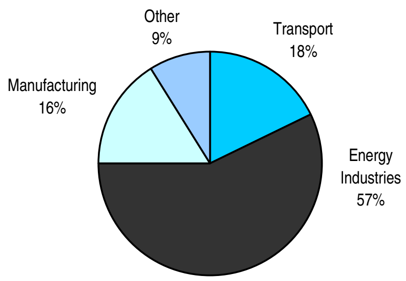


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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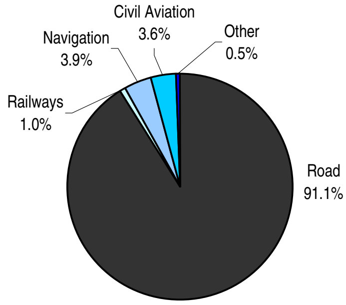
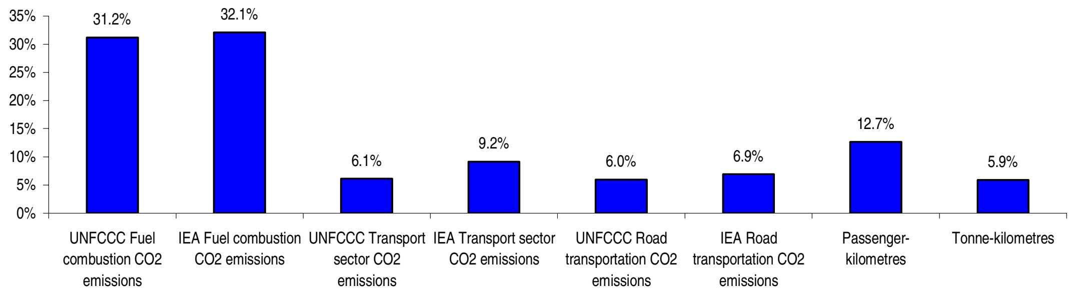


Changes (1990 to 2003)



France

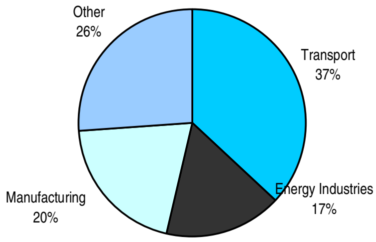
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	58 171	59 419	60 667	61 426	61 800
GDP at 2000 prices (PPP US$ m)	1 290 010	1 359 980	1 552 090	1 603 400	1 610 890
Road passenger-kms (m)	627 300	681 700	742 600	775 700	781 300
Road freight tonne-kms (m)	114 800	157 084	184 222	188 596	189 226
Road passenger-kms per head of population ('000s km)	10.78	11.47	12.24	12.63	12.64
Road freight tonne-kms per unit of GDP (tonne km per $)	0.09	0.12	0.12	0.12	0.12
UNFCCC total transport ghg emissions (kt of CO_2-e)	121 536	132 631	142 054	146 597	146 246
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.09	0.10	0.09	0.09	0.09
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.09	2.23	2.34	2.39	2.37
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	119 100	129 267	137 705	141 840	141 384
IEA Total transport sector CO_2 emissions (kt of CO_2)	115 850	125 450	139 070	140 840	138 630

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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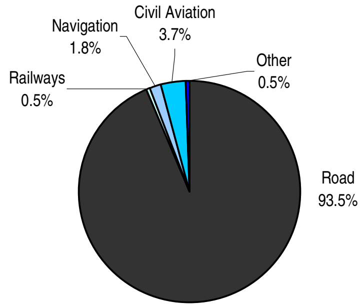
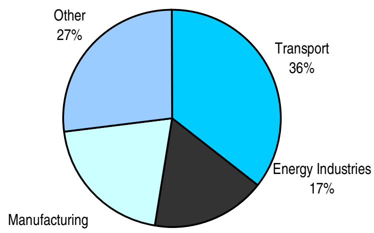


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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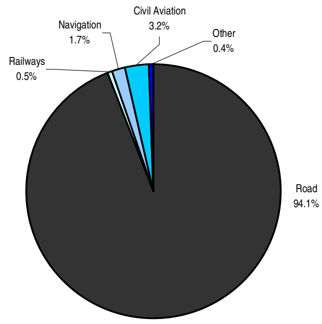
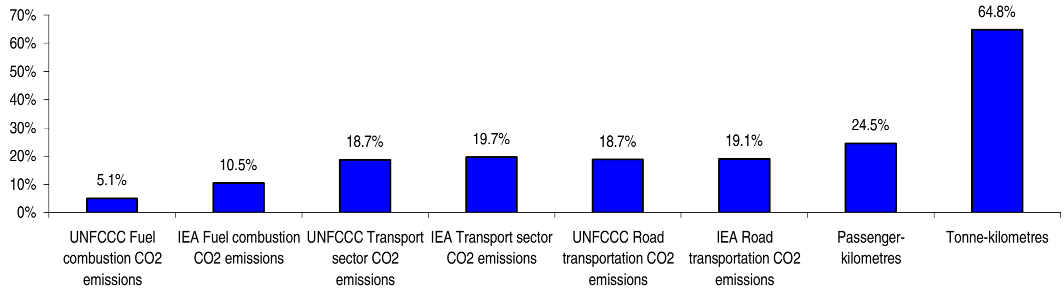


Changes (1990 to 2003)



FYR Macedonia

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	2 028	1 963	2 024	2 031	2 027
GDP at 2000 prices (PPP US$ m)	14 590	11 460	13 310	12 750	13 150
Road passenger-kms (m)	1 492	971	774	1 042	1 344
Road freight tonne-kms (m)	2 189	1 174	776	2 693	4 130
Road passenger-kms per head of population ('000s km)	0.74	0.49	0.38	0.51	0.66
Road freight tonne-kms per unit of GDP (tonne km per $)	0.15	0.10	0.06	0.21	0.31
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	770	890	1 000	1 000	1 010

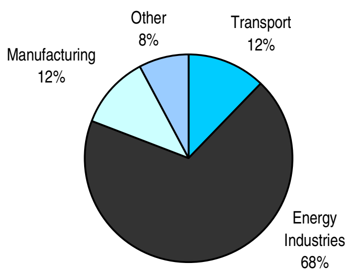
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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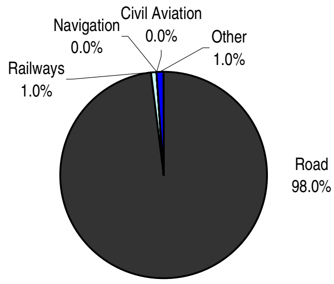
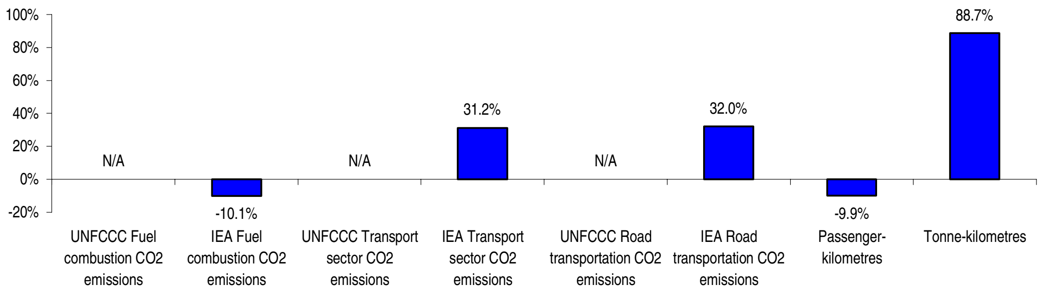


Changes (1990 to 2003)



Georgia

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	5 439	4 734	4 418	4 357	4 329
GDP at 2000 prices (PPP US$ m)	27 390	8 100	9 890	11 230	12 530
Road passenger-kms (m)	8 335	1 607	4 510	4 920	5 150
Road freight tonne-kms (m)	2 577	130	475	543	562
Road passenger-kms per head of population ('000s km)	1.53	0.34	1.02	1.13	1.19
Road freight tonne-kms per unit of GDP (tonne km per $)	0.09	0.02	0.05	0.05	0.04
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	1 030	960	1 220	1 250

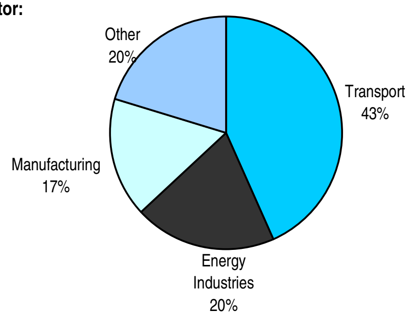
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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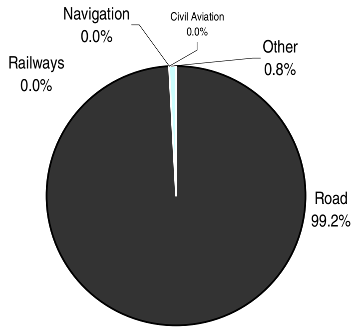
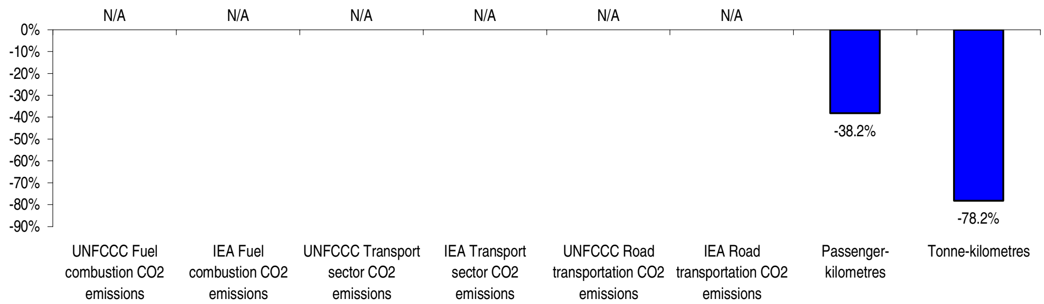


Changes (1990 to 2003)



Germany

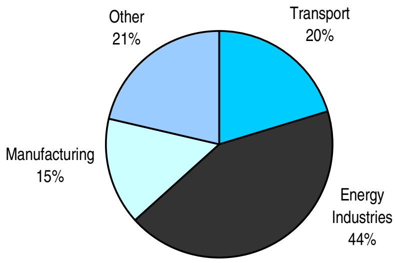
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	79 364	81 661	82 188	82 482	82 520
GDP at 2000 prices (PPP US$ m)	1 709 990	1 892 190	2 068 880	2 087 900	2 085 370
Road passenger-kms (m)	649 800	888 800	905 400	934 000	921 600
Road freight tonne-kms (m)	169 900	237 515	280 699	285 207	290 918
Road passenger-kms per head of population ('000s km)	8.19	10.88	11.02	11.32	11.17
Road freight tonne-kms per unit of GDP (tonne km per $)	0.10	0.13	0.14	0.14	0.14
UNFCCC total transport ghg emissions (kt of CO_2-e)	166 772	182 623	187 791	181 134	174 687
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.10	0.09	0.09	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.10	2.24	2.28	2.20	2.12
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	162 360	176 536	182 269	176 234	170 209
IEA Total transport sector CO_2 emissions (kt of CO_2)	160 040	168 840	174 220	168 550	162 400

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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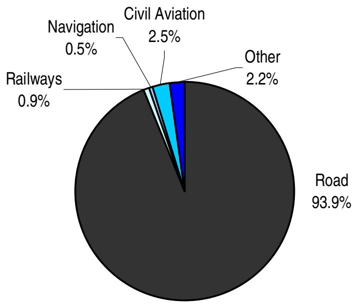
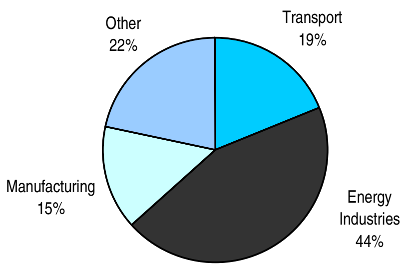


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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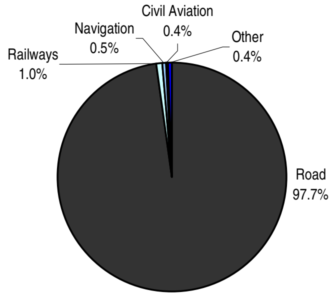
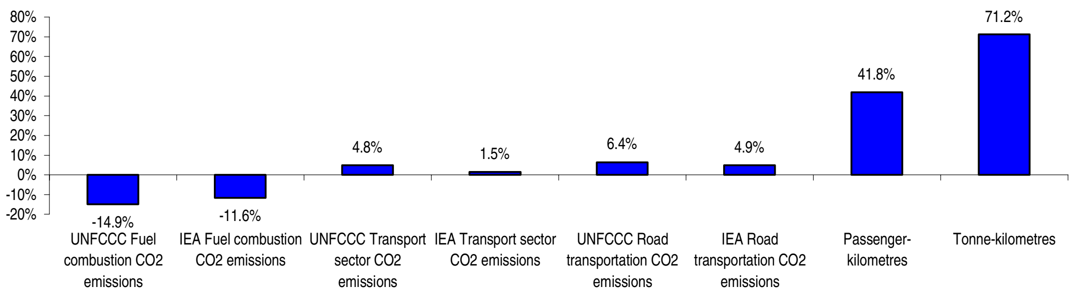


Changes (1990 to 2003)



Greece

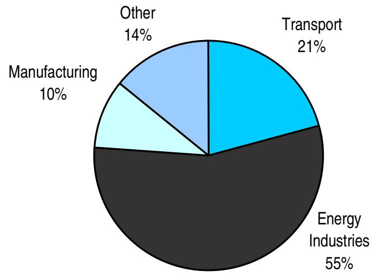
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	10 337	10 634	10 918	10 988	11 024
GDP at 2000 prices (PPP US$ m)	141 070	150 080	177 810	192 130	200 770
Road passenger-kms (m)	24 233	31 452	40 078	41 634	42 159
Road freight tonne-kms (m)	12 486	12 356	14 123	14 667	14 912
Road passenger-kms per head of population ('000s km)	2.34	2.96	3.67	3.79	3.82
Road freight tonne-kms per unit of GDP (tonne km per $)	0.09	0.08	0.08	0.08	0.07
UNFCCC total transport ghg emissions (kt of CO_2-e)	15 645	17 317	19 802	20 842	21 858
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.11	0.12	0.11	0.11	0.11
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.51	1.63	1.81	1.90	1.98
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	15 355	16 966	19 304	20 262	21 230
IEA Total transport sector CO_2 emissions (kt of CO_2)	15 360	16 940	19 300	20 260	21 230

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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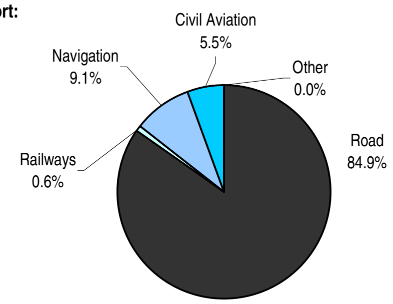
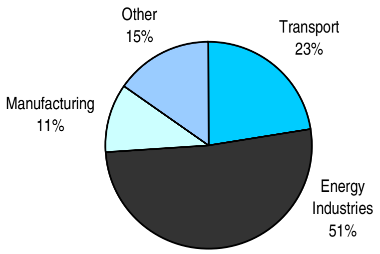


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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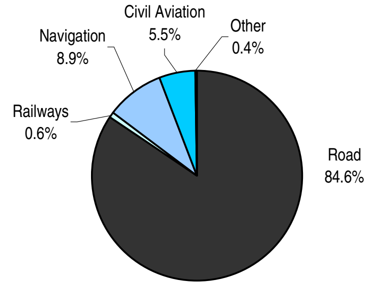
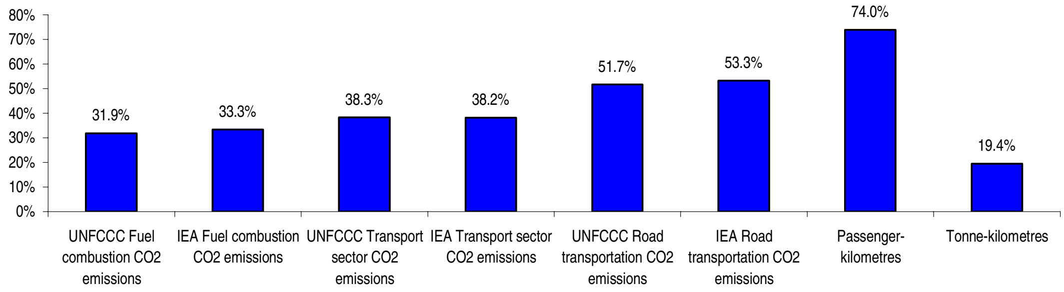


Changes (1990 to 2003)



Hungary

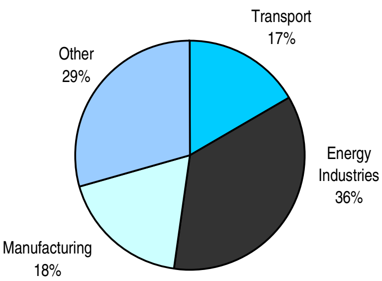
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	10 365	10 329	10 211	10 159	10 130
GDP at 2000 prices (PPP US$ m)	113 670	100 810	122 720	131 900	135 920
Road passenger-kms (m)	71 104	64 542	64 622	64 702	64 965
Road freight tonne-kms (m)	15 159	13 040	12 146	10 608	10 670
Road passenger-kms per head of population ('000s km)	6.86	6.25	6.33	6.37	6.41
Road freight tonne-kms per unit of GDP (tonne km per $)	0.13	0.13	0.10	0.08	0.08
UNFCCC total transport ghg emissions (kt of CO_2-e)	8 394	7 130	8 996	9 844	10 171
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.07	0.07	0.07	0.07	0.07
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.81	0.69	0.88	0.97	1.00
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	7 984	6 796	8 517	9 270	9 589
IEA Total transport sector CO_2 emissions (kt of CO_2)	8 470	7 170	8 930	10 090	10 560

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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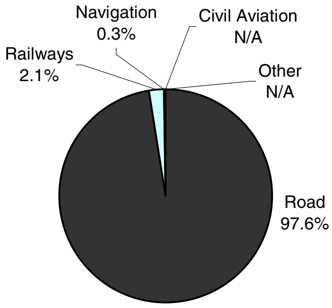
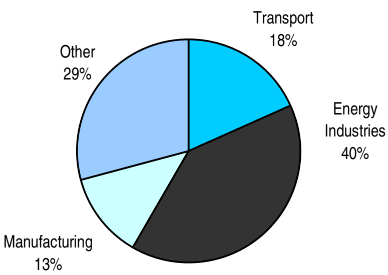


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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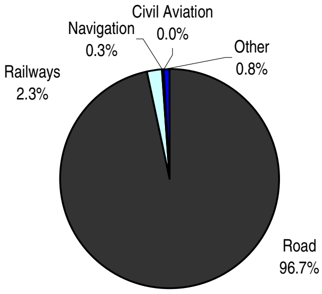
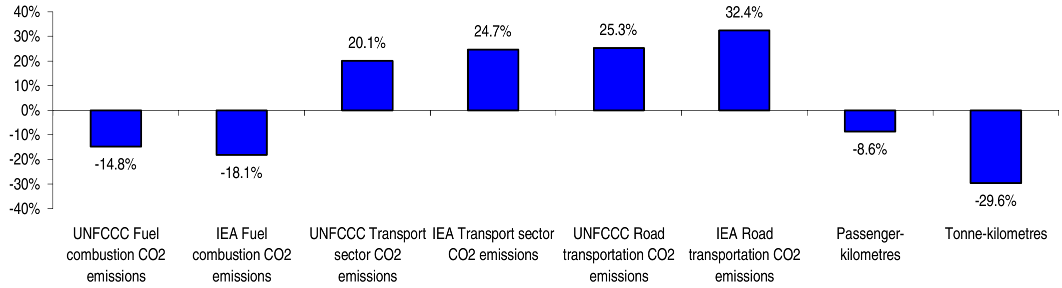


Changes (1990 to 2003)



Iceland

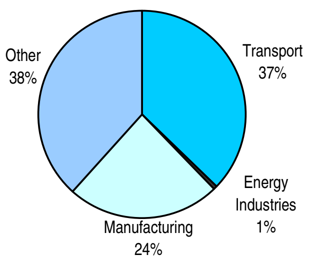
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	255	267	281	288	289
GDP at 2000 prices (PPP US$ m)	6 130	6 230	7 960	8 100	8 450
Road passenger-kms (m)	3 004	3 467	4 250	4 583	4 711
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	11.79	12.97	15.11	15.94	16.28
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	608	615	659	674	698
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.10	0.08	0.08	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.39	2.30	2.35	2.34	2.41
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	600	600	629	644	667
IEA Total transport sector CO_2 emissions (kt of CO_2)	630	610	630	640	650

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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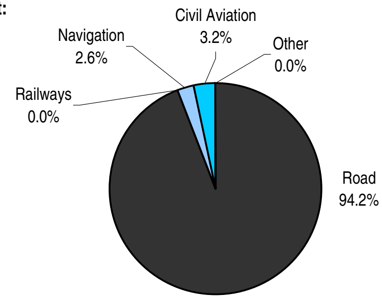
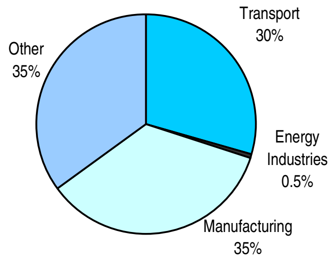


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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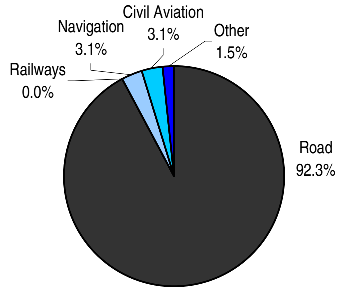
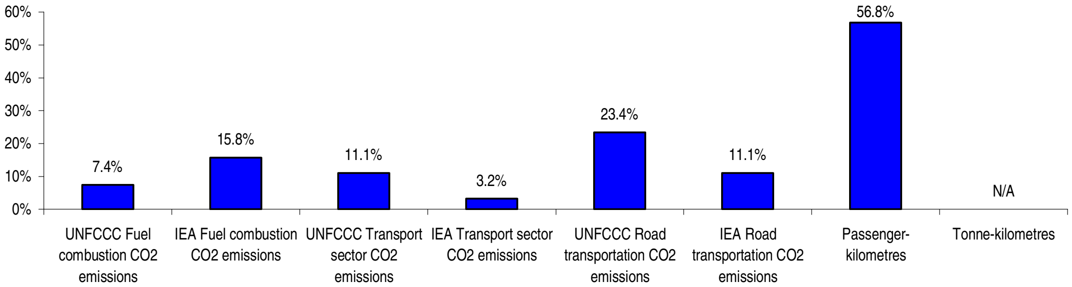


Changes (1990 to 2003)



Ireland

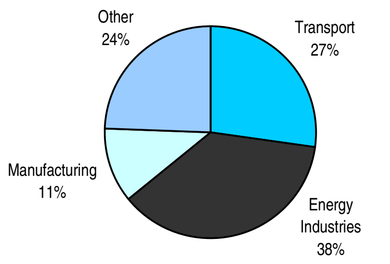
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	3 506	3 601	3 800	3 926	3 991
GDP at 2000 prices (PPP US$ m)	54 020	67 750	108 110	121 630	126 080
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	5 130	5 493	12 348	14 448	15 898
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	0.09	0.08	0.11	0.12	0.13
UNFCCC total transport ghg emissions (kt of CO_2-e)	5 143	6 582	10 639	11 678	11 851
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.10	0.10	0.10	0.09
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.47	1.83	2.80	2.97	2.97
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	5 020	6 369	10 211	11 231	11 393
IEA Total transport sector CO_2 emissions (kt of CO_2)	4 990	5 960	10 440	11 100	11 280

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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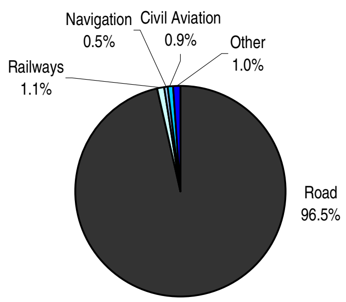
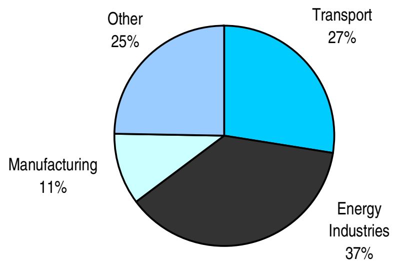


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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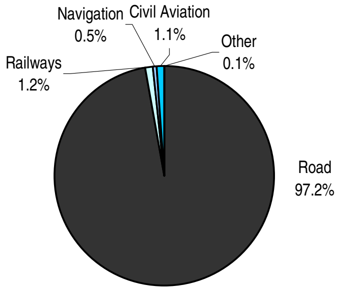
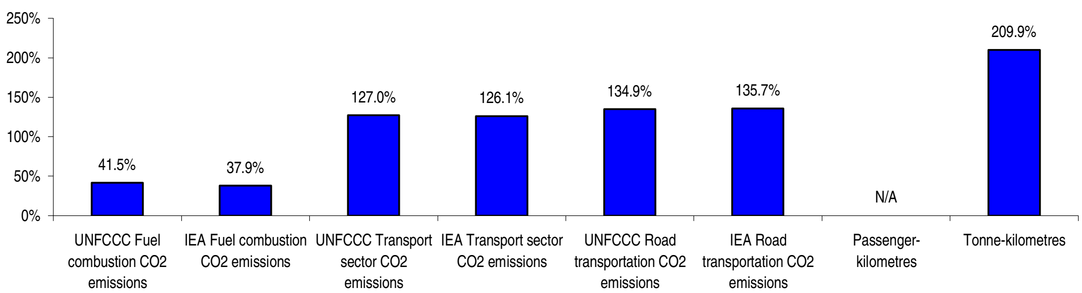


Changes (1990 to 2003)



Italy

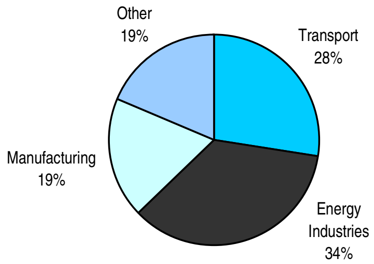
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	56 719	57 301	57 762	58 050	58 054
GDP at 2000 prices (PPP US$ m)	1 232 810	1 313 190	1 444 110	1 474 870	1 478 660
Road passenger-kms (m)	606 549	701 860	819 784	808 228	808 589
Road freight tonne-kms (m)	177 945	195 327	158 562	160 036	174 084
Road passenger-kms per head of population ('000s km)	10.69	12.25	14.19	13.92	13.93
Road freight tonne-kms per unit of GDP (tonne km per $)	0.14	0.15	0.11	0.11	0.12
UNFCCC total transport ghg emissions (kt of CO_2-e)	104 357	115 146	124 487	129 220	130 400
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.08	0.09	0.09	0.09	0.09
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.84	2.01	2.16	2.23	2.25
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	101 858	112 023	120 452	124 907	126 015
IEA Total transport sector CO_2 emissions (kt of CO_2)	96 550	107 830	112 970	116 970	117 770

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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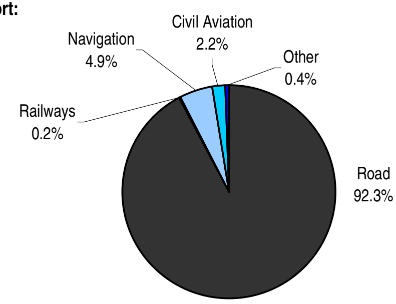
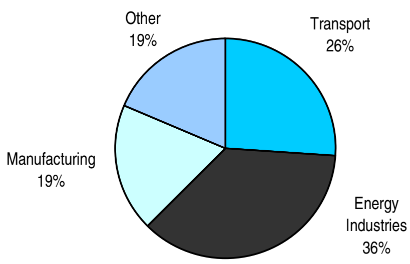


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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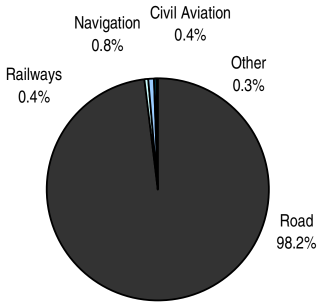
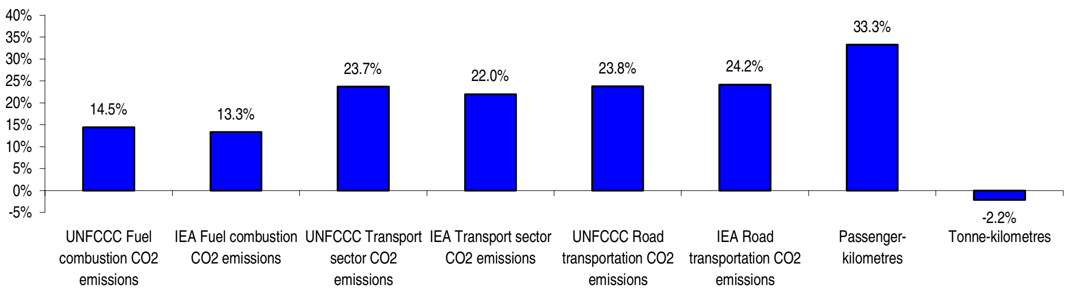


Changes (1990 to 2003)



Japan

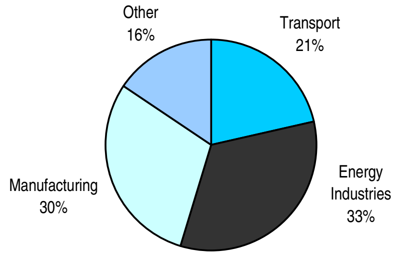
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	123 540	125 570	126 926	127 435	127 619
GDP at 2000 prices (PPP US$ m)	2 863 680	3 087 260	3 308 630	3 311 240	3 399 280
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	215 881	256 726	264 784	262 200	259 885
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.08	0.08	0.08	0.08	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.75	2.04	2.09	2.06	2.04
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	210 663	250 655	258 060	255 291	252 930
IEA Total transport sector CO_2 emissions (kt of CO_2)	208 200	245 500	257 000	252 570	250 100

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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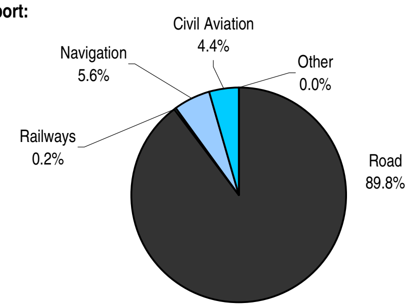
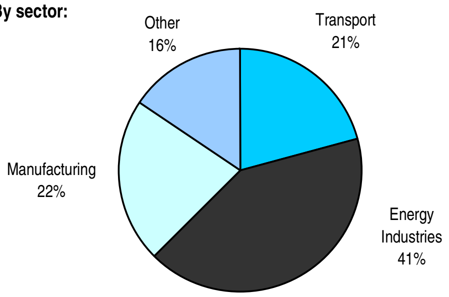


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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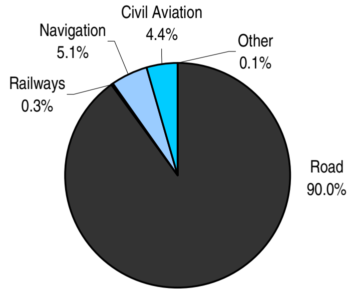
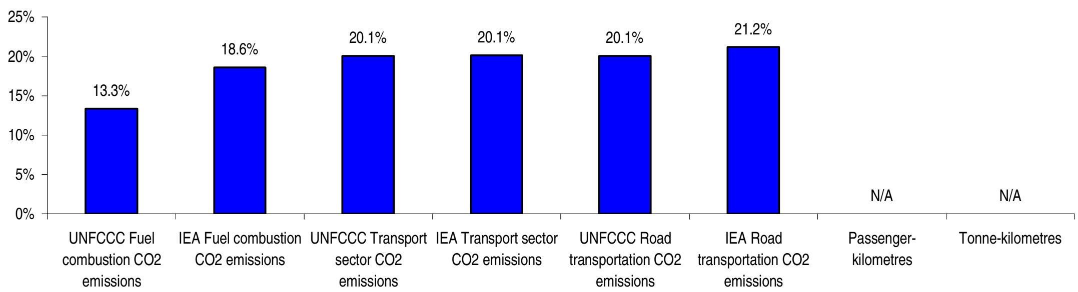


Changes (1990 to 2003)



Korea

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	42 869	45 093	47 008	47 615	47 849
GDP at 2000 prices (PPP US$ m)	433 140	620 450	768 650	853 770	879 970
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	43 470	78 280	87 880	95 790	97 980

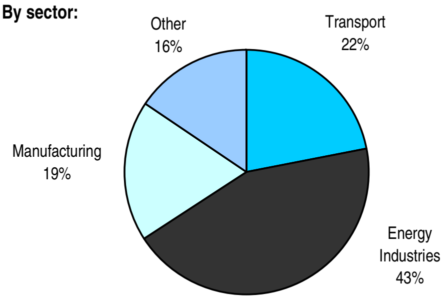
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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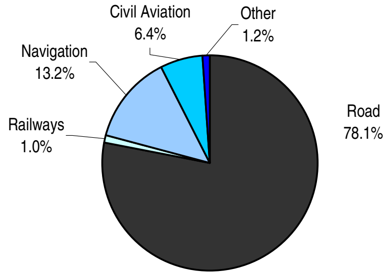
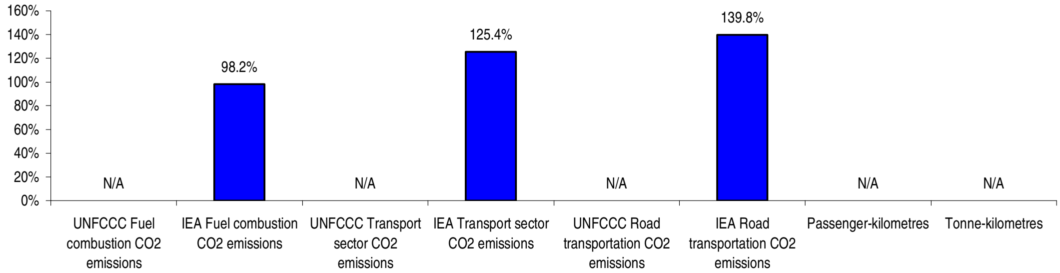


Changes (1990 to 2003)



Latvia

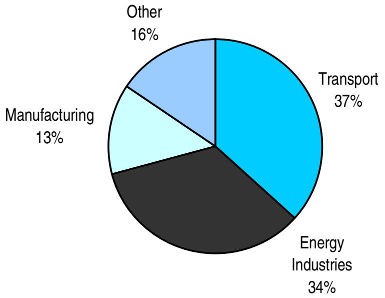
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	2 671	2 485	2 373	2 339	2 325
GDP at 2000 prices (PPP US$ m)	24 460	13 900	18 070	20 860	22 520
Road passenger-kms (m)	5 862	1 835	2 348	2 361	2 550
Road freight tonne-kms (m)	5 853	1 834	4 788	6 160	6 763
Road passenger-kms per head of population ('000s km)	2.19	0.74	0.99	1.01	1.10
Road freight tonne-kms per unit of GDP (tonne km per $)	0.24	0.13	0.26	0.30	0.30
UNFCCC total transport ghg emissions (kt of CO_2-e)	2 539	1 909	2 190	2 649	2 683
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.14	0.12	0.13	0.12
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.95	0.77	0.92	1.13	1.15
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	2 445	1 851	2 120	2 560	2 590
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	2 060	2 170	2 560	2 640

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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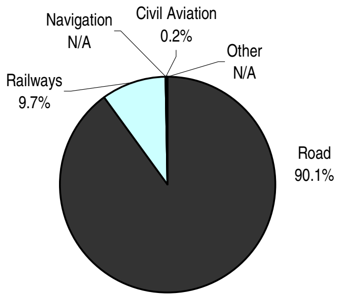
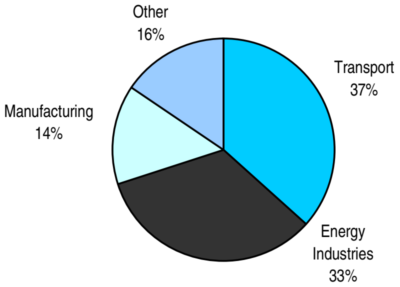


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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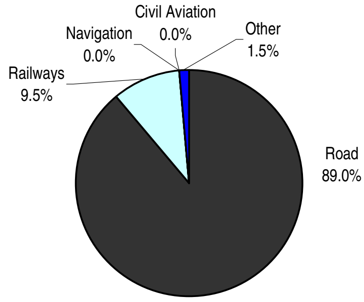
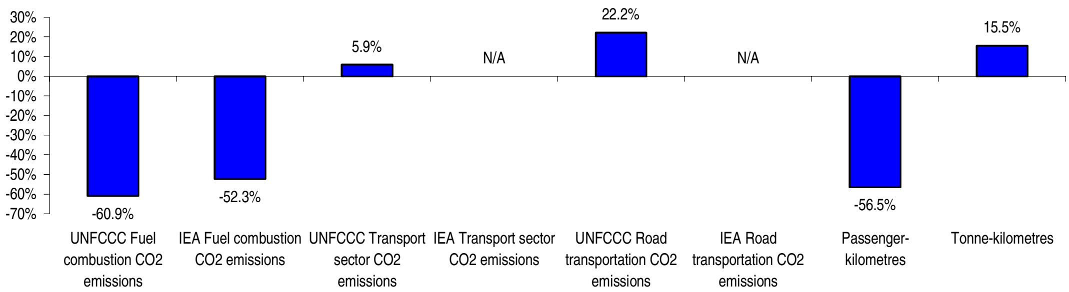


Changes (1990 to 2003)



Lithuania

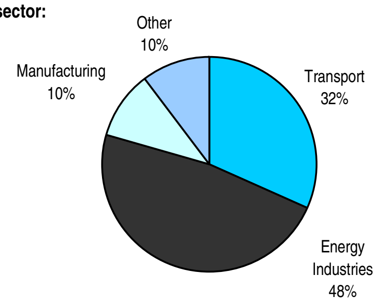
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	3 698	3 629	3 500	3 469	3 454
GDP at 2000 prices (PPP US$ m)	42 190	24 510	30 550	34 530	38 180
Road passenger-kms (m)	6 677	3 334	2 266	18 542	21 976
Road freight tonne-kms (m)	7 336	5 160	7 769	10 709	11 463
Road passenger-kms per head of population ('000s km)	1.81	0.92	0.65	5.35	6.36
Road freight tonne-kms per unit of GDP (tonne km per $)	0.17	0.21	0.25	0.31	0.30
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	3 670	3 625
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	0.11	0.09
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	1.06	1.05
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	3 594	3 550
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	2 980	3 090	3 500	3 550

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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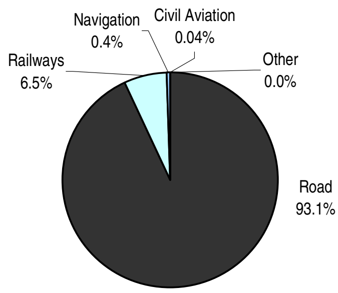
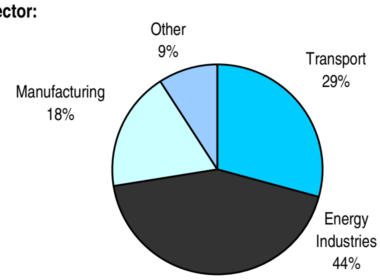


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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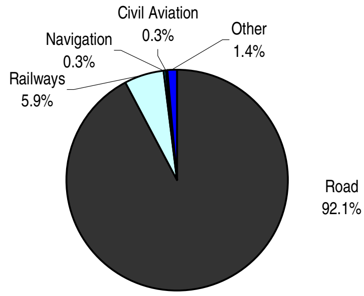
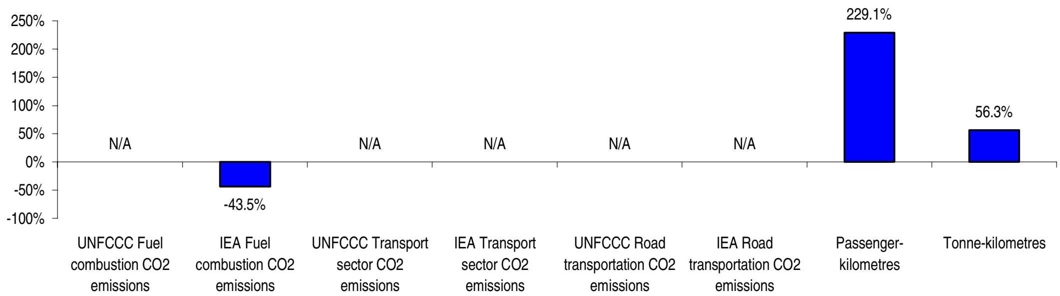


Changes (1990 to 2003)



Mexico

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	81 250	90 164	98 658	101 398	102 708
GDP at 2000 prices (PPP US$ m)	638 700	689 050	897 240	903 150	914 920
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	86 250	94 200	101 210	106 620	113 310

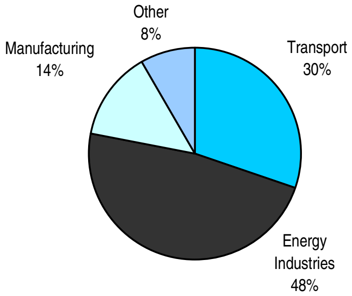
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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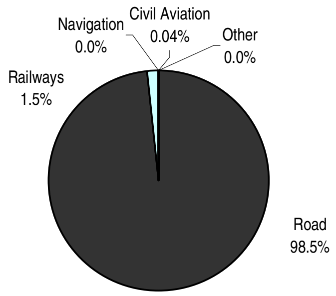
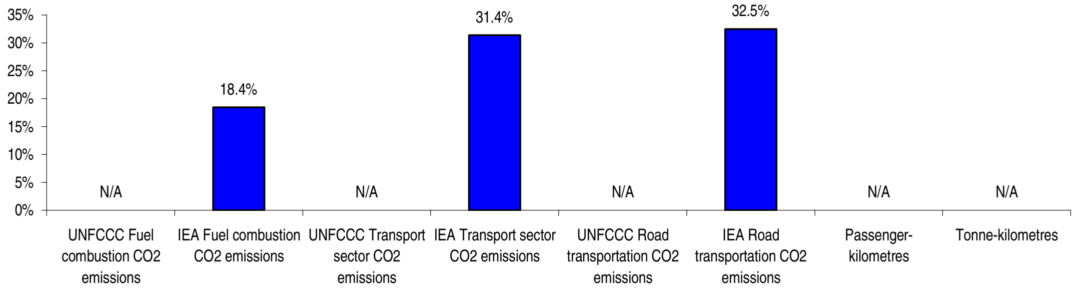


Changes (1990 to 2003)



Moldova

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	4 364	4 348	3 639	3 623	3 613
GDP at 2000 prices (PPP US$ m)	16 370	6 680	5 520	6 040	6 050
Road passenger-kms (m)	4 878	1 163	1 021	1 298	1 640
Road freight tonne-kms (m)	6 305	1 121	1 001	1 152	1 459
Road passenger-kms per head of population ('000s km)	1.12	0.27	0.28	0.36	0.45
Road freight tonne-kms per unit of GDP (tonne km per $)	0.39	0.17	0.18	0.19	0.24
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	1 080	510	720	860

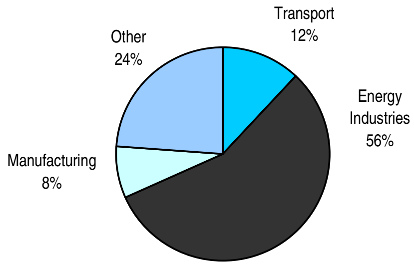
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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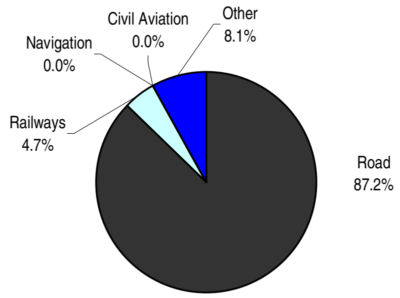
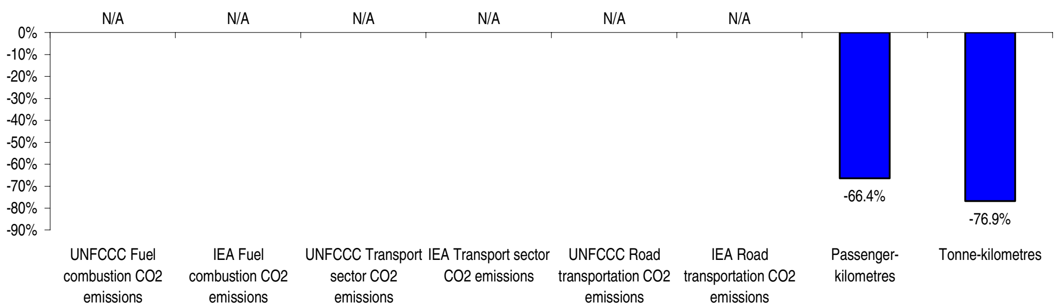


Changes (1990 to 2003)



Netherlands

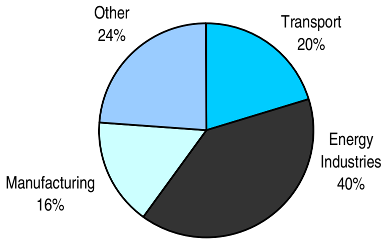
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	14 947	15 460	15 922	16 147	16 224
GDP at 2000 prices (PPP US$ m)	326 700	362 200	435 130	443 840	439 950
Road passenger-kms (m)	150 400	145 600	156 716	160 118	162 110
Road freight tonne-kms (m)	22 891	27 006	31 560	30 088	29 874
Road passenger-kms per head of population ('000s km)	10.06	9.42	9.84	9.92	9.99
Road freight tonne-kms per unit of GDP (tonne km per $)	0.07	0.07	0.07	0.07	0.07
UNFCCC total transport ghg emissions (kt of CO_2-e)	26 437	29 743	32 933	34 142	34 702
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.08	0.08	0.08	0.08	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.77	1.92	2.07	2.11	2.14
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	26 008	29 146	32 365	33 580	34 157
IEA Total transport sector CO_2 emissions (kt of CO_2)	26 360	29 320	32 810	33 860	34 330

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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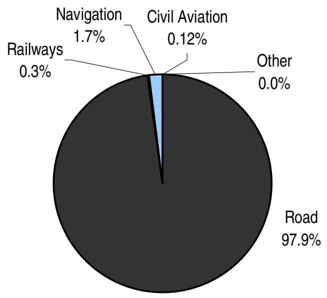
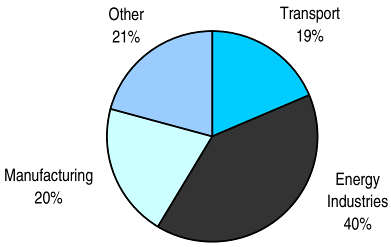


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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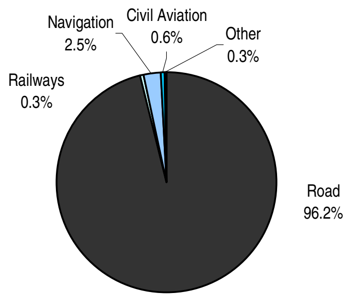
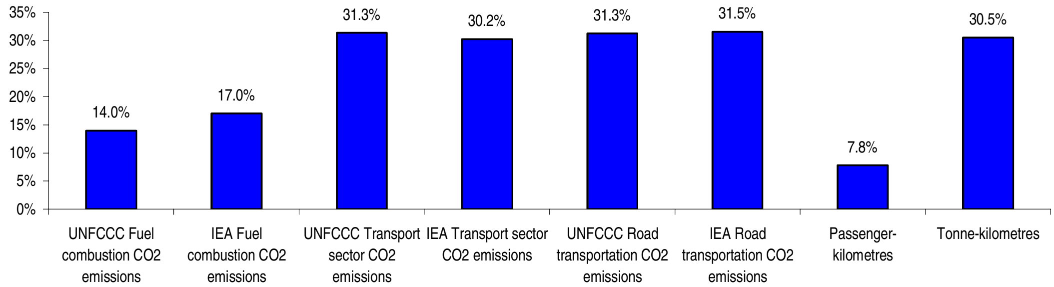


Changes (1990 to 2003)



New Zealand

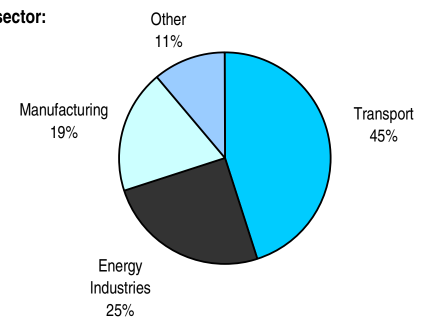
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	3 410	3 707	3 873	3 976	4 039
GDP at 2000 prices (PPP US$ m)	60 060	69 940	79 430	85 870	89 000
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	8 857	11 095	12 486	13 432	13 986
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.15	0.16	0.16	0.16	0.16
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.60	2.99	3.22	3.38	3.46
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	8 633	10 856	12 281	13 231	13 788
IEA Total transport sector CO_2 emissions (kt of CO_2)	8 960	11 060	12 770	13 710	14 290

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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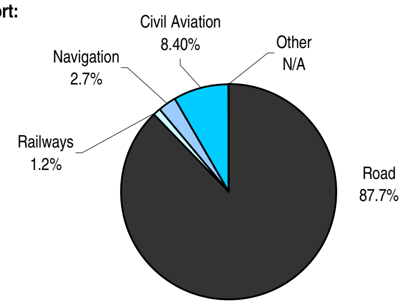
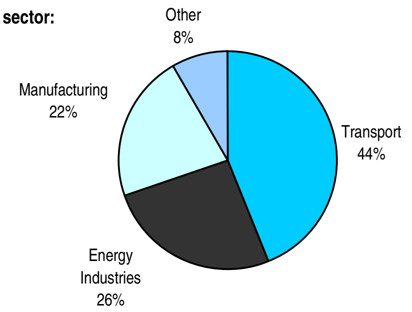


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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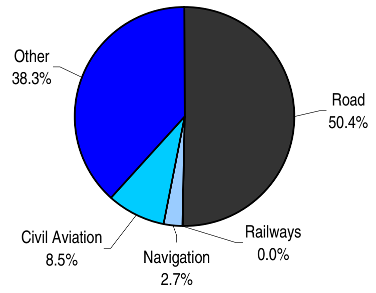
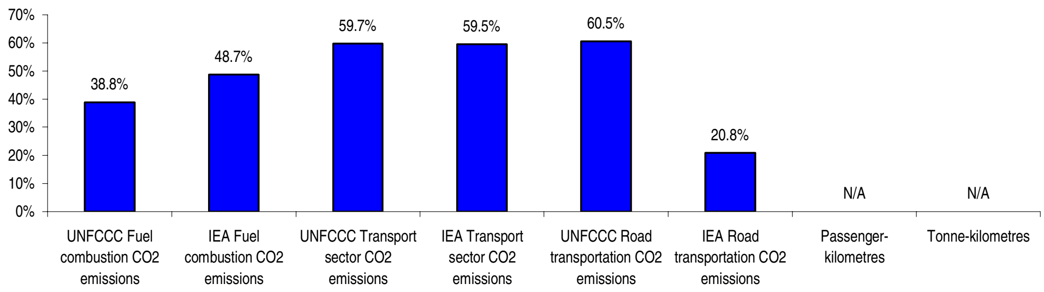


Changes (1990 to 2003)



Norway

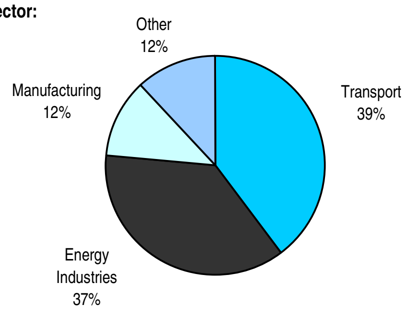
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	4 241	4 358	4 491	4 539	4 565
GDP at 2000 prices (PPP US$ m)	113 120	136 620	163 040	169 800	170 510
Road passenger-kms (m)	47 327	48 482	53 091	55 517	56 344
Road freight tonne-kms (m)	8 231	9 654	13 017	13 614	14 115
Road passenger-kms per head of population ('000s km)	11.16	11.12	11.82	12.23	12.34
Road freight tonne-kms per unit of GDP (tonne km per $)	0.07	0.07	0.08	0.08	0.08
UNFCCC total transport ghg emissions (kt of CO_2-e)	11 333	12 454	13 681	13 922	14 561
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.09	0.08	0.08	0.09
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.67	2.86	3.05	3.07	3.19
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	11 099	12 075	13 028	13 124	13 704
IEA Total transport sector CO_2 emissions (kt of CO_2)	11 020	11 610	12 160	12 350	13 190

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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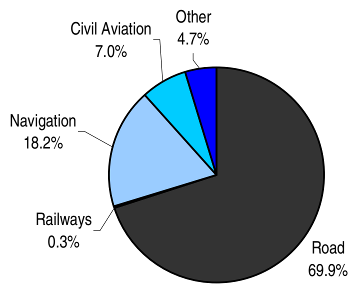
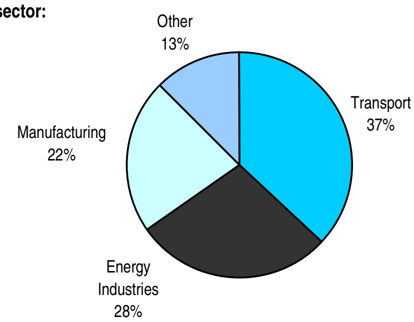


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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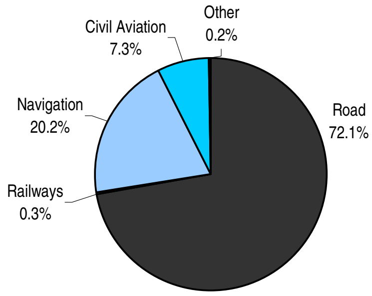
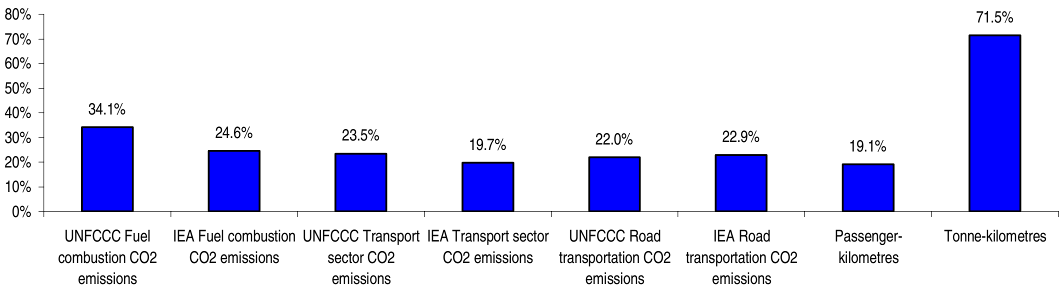


Changes (1990 to 2003)



Poland

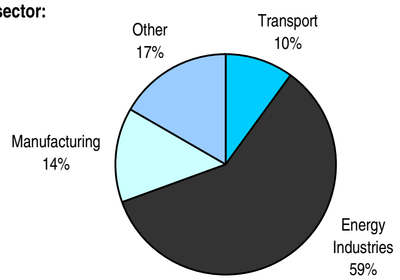
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	38 119	38 588	38 256	38 232	38 195
GDP at 2000 prices (PPP US$ m)	311 400	309 850	397 800	407 350	423 030
Road passenger-kms (m)	114 400	144 724	181 435	196 695	202 396
Road freight tonne-kms (m)	40 293	51 200	75 023	80 318	85 989
Road passenger-kms per head of population ('000s km)	3.00	3.75	4.74	5.14	5.30
Road freight tonne-kms per unit of GDP (tonne km per $)	0.13	0.17	0.19	0.20	0.20
UNFCCC total transport ghg emissions (kt of CO_2-e)	29 685	25 868	28 902	30 261	31 217
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.08	0.07	0.07	0.07
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.78	0.67	0.76	0.79	0.82
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	29 103	25 285	28 207	29 553	30 490
IEA Total transport sector CO_2 emissions (kt of CO_2)	20 840	22 530	27 530	26 370	28 930

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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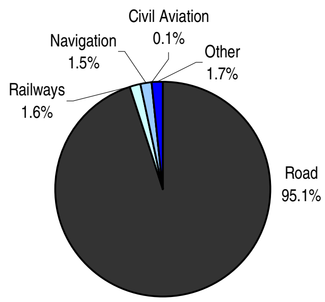
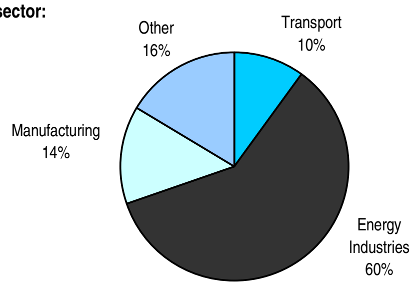


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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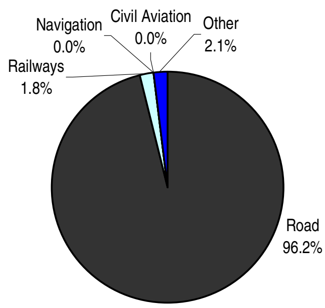
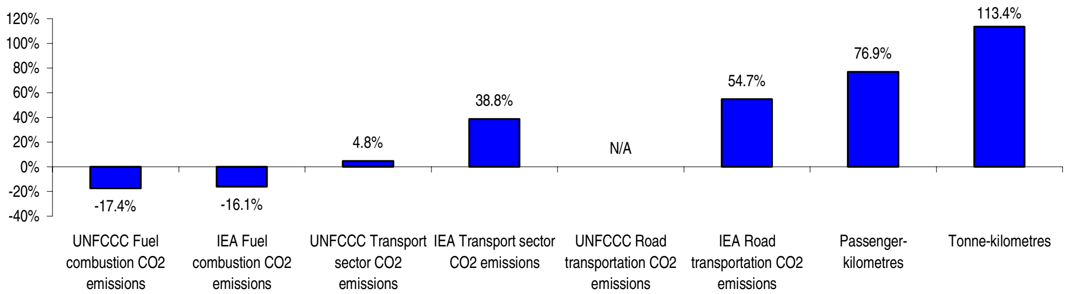


Changes (1990 to 2003)



Portugal

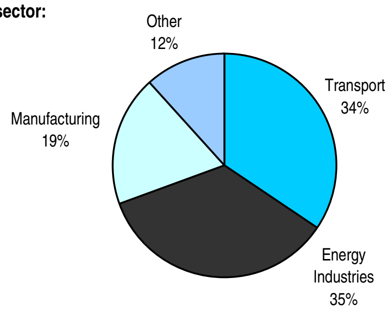
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	9 995	10 030	10 226	10 368	10 441
GDP at 2000 prices (PPP US$ m)	135 160	147 070	177 670	181 250	179 080
Road passenger-kms (m)	50 800	74 490	93 144	94 701	96 472
Road freight tonne-kms (m)	10 922	11 119	7 473	8 768	8 053
Road passenger-kms per head of population ('000s km)	5.08	7.43	9.11	9.13	9.24
Road freight tonne-kms per unit of GDP (tonne km per $)	0.08	0.08	0.04	0.05	0.04
UNFCCC total transport ghg emissions (kt of CO_2-e)	10 340	13 502	19 374	20 116	20 167
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.08	0.09	0.11	0.11	0.11
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.03	1.35	1.89	1.94	1.93
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	10 137	13 166	18 835	19 539	19 583
IEA Total transport sector CO_2 emissions (kt of CO_2)	9 850	13 250	18 180	18 790	19 780

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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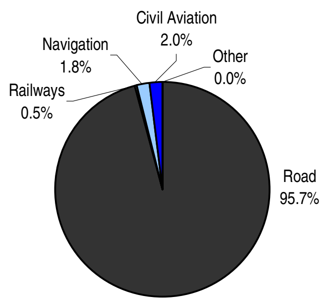
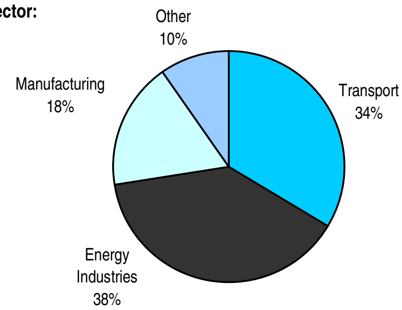


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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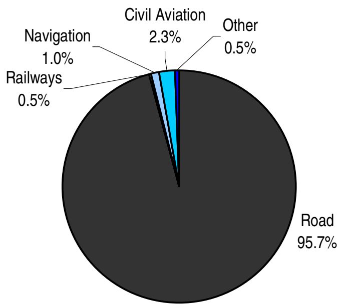
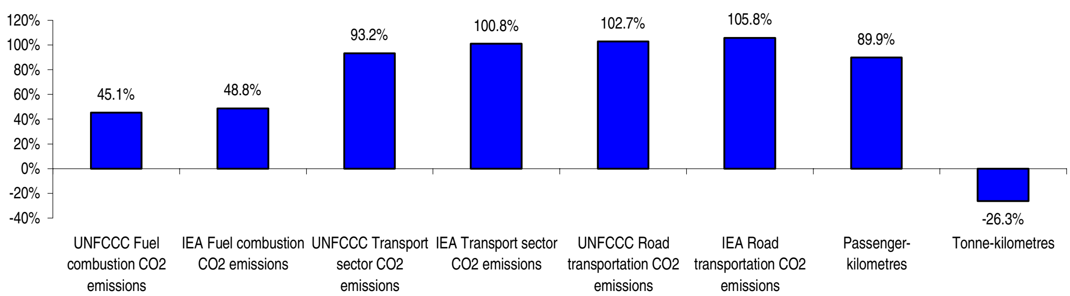


Changes (1990 to 2003)



Romania

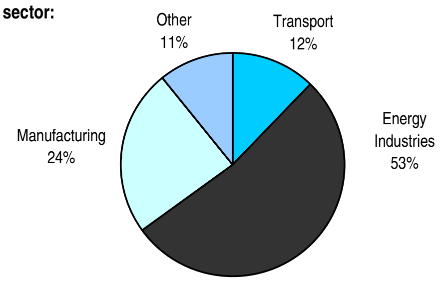
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	23 207	22 681	22 435	21 795	21 734
GDP at 2000 prices (PPP US$ m)	152 740	138 710	128 260	141 200	149 480
Road passenger-kms (m)	24 007	12 343	7 700	5 282	9 443
Road freight tonne-kms (m)	5 208	4 186	9 879	10 979	13 637
Road passenger-kms per head of population ('000s km)	1.03	0.54	0.34	0.24	0.43
Road freight tonne-kms per unit of GDP (tonne km per $)	0.03	0.03	0.08	0.08	0.09
UNFCCC total transport ghg emissions (kt of CO_2-e)	8 717	8 100	9 341	11 970	12 032
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.06	0.06	0.07	0.08	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.38	0.36	0.42	0.55	0.55
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	8 668	8 054	9 287	11 899	11 964
IEA Total transport sector CO_2 emissions (kt of CO_2)	11 810	8 260	9 630	11 940	12 590

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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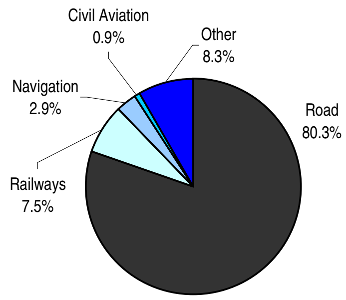
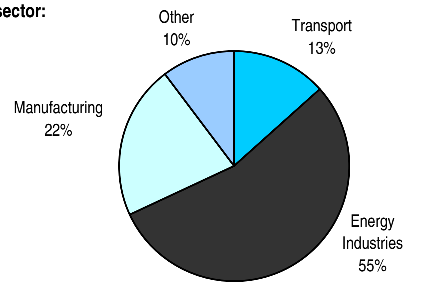


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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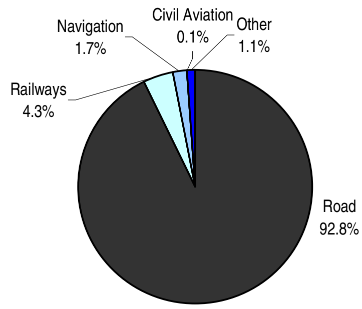
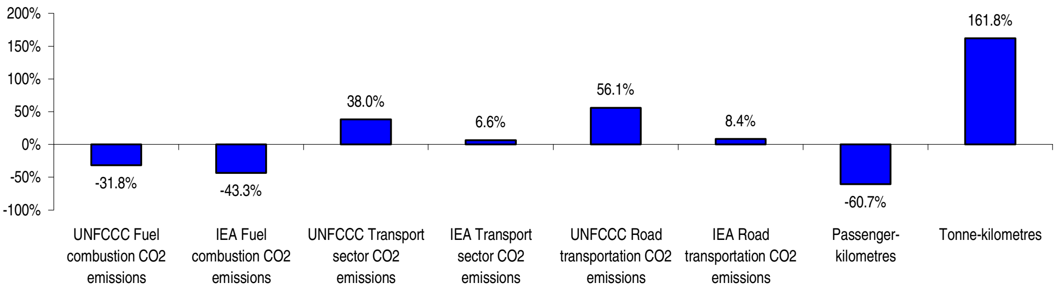


Changes (1990 to 2003)



Russia

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	148 292	148 376	146 597	145 306	144 566
GDP at 2000 prices (PPP US$ m)	1 528 800	955 900	1 054 200	1 151 500	1 250 600
Road passenger-kms (m)	262 152	188 246	164 369	149 914	137 945
Road freight tonne-kms (m)	299 362	156 483	152 735	167 238	173 146
Road passenger-kms per head of population ('000s km)	1.77	1.27	1.12	1.03	0.95
Road freight tonne-kms per unit of GDP (tonne km per $)	0.20	0.16	0.14	0.15	0.14
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	177 250	176 250	184 830	193 510

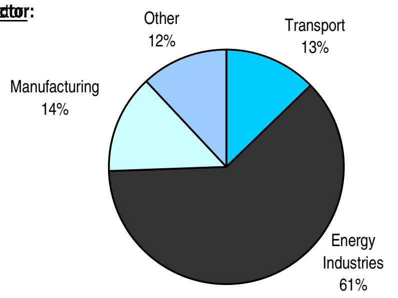
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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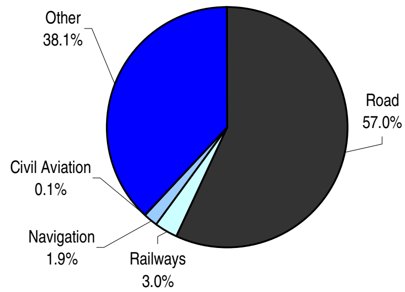
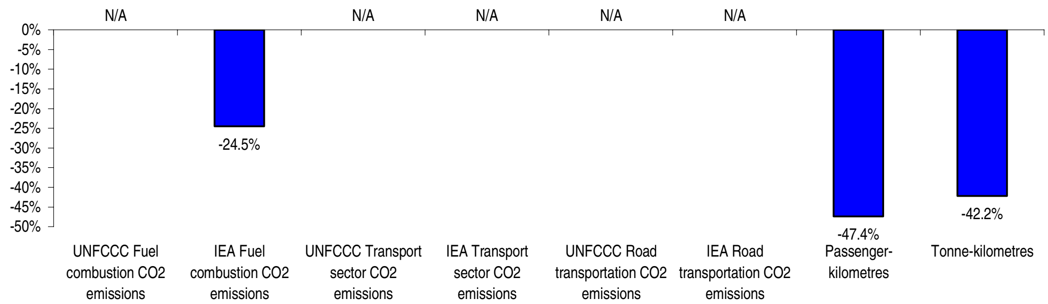


Changes (1990 to 2003)



Serbia & Montenegro

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	10 529	10 547	10 634	8 114	8 153
GDP at 2000 prices (PPP US$ m)	17 850	17 910	17 960	19 710	20 300
Road passenger-kms (m)	23 264	12 896	14 464	18 807	19 135
Road freight tonne-kms (m)	8 567	4 534	4 697	5 596	5 746
Road passenger-kms per head of population ('000s km)	2.21	1.22	1.36	2.32	2.35
Road freight tonne-kms per unit of GDP (tonne km per $)	0.48	0.25	0.26	0.28	0.28
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	2 750	2 340	4 520	4 950

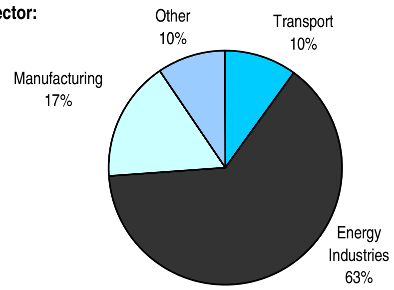
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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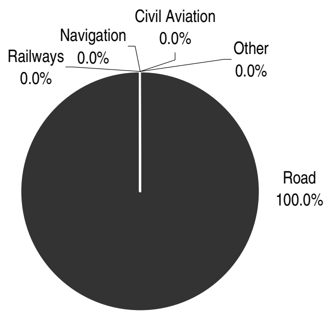

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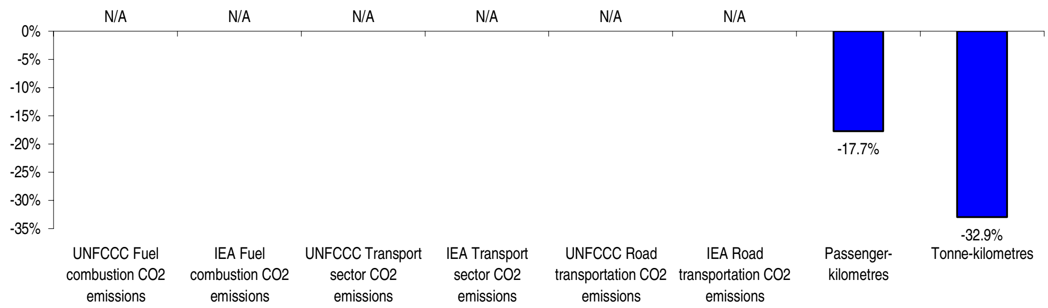


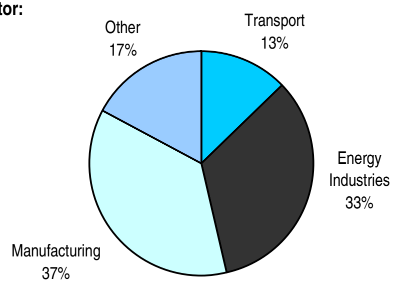
Slovakia

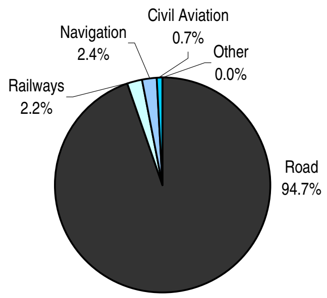
Key Indicators

Transport and the Economy

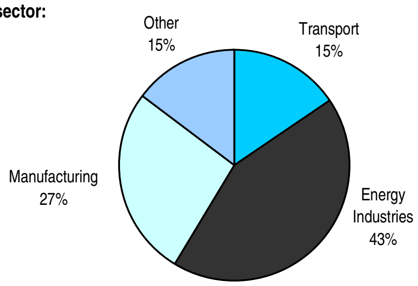
	1990	1995	2000	2002	2003
Population (thousands)	5 298	5 363	5 401	5 391	5 380
GDP at 2000 prices (PPP US$ m)	53 250	48 530	58 140	63 130	65 950
Road passenger-kms (m)	-	29 168	32 364	33 214	32 981
Road freight tonne-kms (m)	-	26 536	14 341	14 929	16 859
Road passenger-kms per head of population ('000s km)	-	5.44	5.99	6.16	6.13
Road freight tonne-kms per unit of GDP (tonne km per $)	-	0.55	0.25	0.24	0.26
UNFCCC total transport ghg emissions (kt of CO_2-e)	5 170	4 538	4 507	5 827	5 371
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.09	0.08	0.09	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.98	0.85	0.83	1.08	1.00
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	5 071	4 378	4 319	5 590	5 143
IEA Total transport sector CO_2 emissions (kt of CO_2)	2 920	3 620	3 970	6 190	6 000

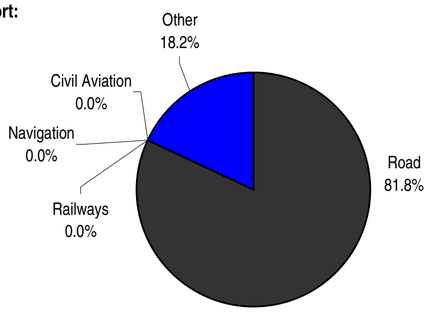
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)



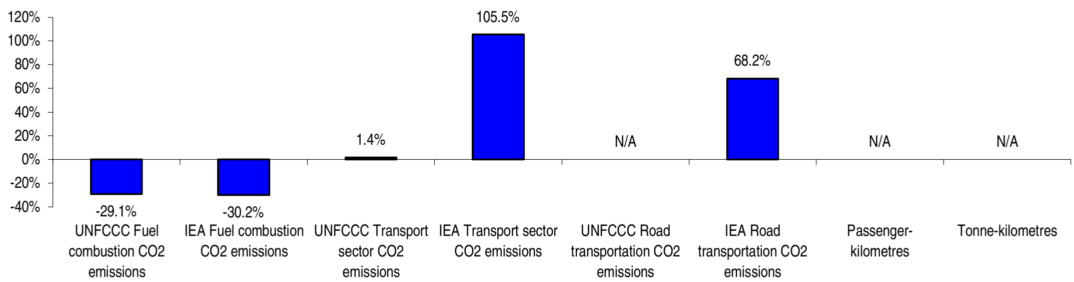


IEA CO_2 Emissions Shares from Fuel Combustion (2003)





Changes (1990 to 2003)



Slovenia

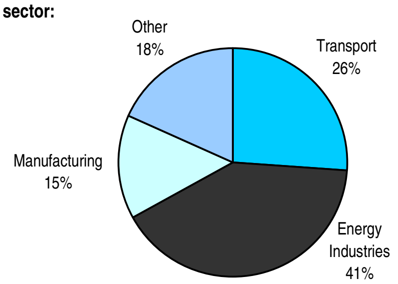
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	1 998	1 988	1 990	1 996	1 997
GDP at 2000 prices (PPP US$ m)	28 000	26 680	33 040	35 370	36 090
Road passenger-kms (m)	6 556	2 532	1 488	1 073	1 002
Road freight tonne-kms (m)	4 887	1 702	1 937	1 945	1 995
Road passenger-kms per head of population ('000s km)	3.28	1.27	0.75	0.54	0.50
Road freight tonne-kms per unit of GDP (tonne km per $)	0.17	0.06	0.06	0.05	0.06
UNFCCC total transport ghg emissions (kt of CO_2-e)	2 708	3 711	3 791	3 965	4 108
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.14	0.11	0.11	0.11
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.36	1.87	1.90	1.99	2.06
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	2 660	3 624	3 653	3 800	3 941
IEA Total transport sector CO_2 emissions (kt of CO_2)	2 640	3 870	3 830	4 060	3 900

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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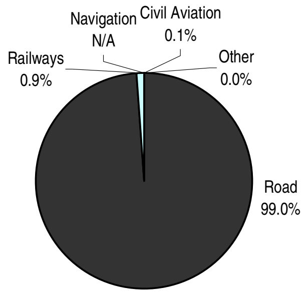
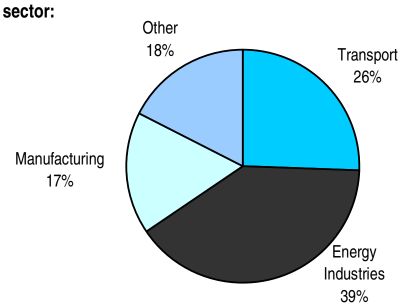


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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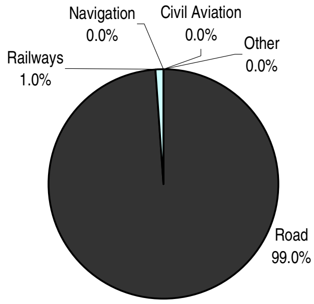
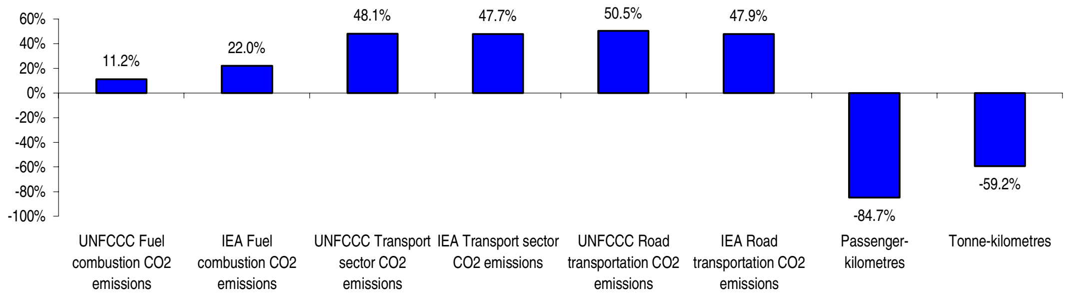


Changes (1990 to 2003)



Spain

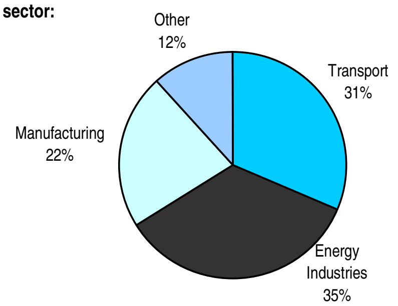
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	39 014	39 338	40 264	41 314	42 005
GDP at 2000 prices (PPP US$ m)	630 980	679 970	822 710	864 590	886 190
Road passenger-kms (m)	207 765	251 189	352 889	385 925	395 189
Road freight tonne-kms (m)	90 530	101 874	148 714	179 519	187 045
Road passenger-kms per head of population ('000s km)	5.33	6.39	8.76	9.34	9.41
Road freight tonne-kms per unit of GDP (tonne km per $)	0.14	0.15	0.18	0.21	0.21
UNFCCC total transport ghg emissions (kt of CO_2-e)	57 532	67 009	86 967	93 422	98 104
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.09	0.10	0.11	0.11	0.11
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	1.47	1.70	2.16	2.26	2.34
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	56 513	65 597	84 810	90 981	95 499
IEA Total transport sector CO_2 emissions (kt of CO_2)	64 090	72 730	91 810	97 990	103 200

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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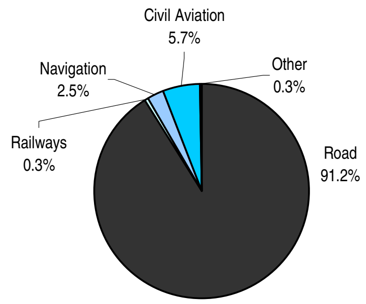
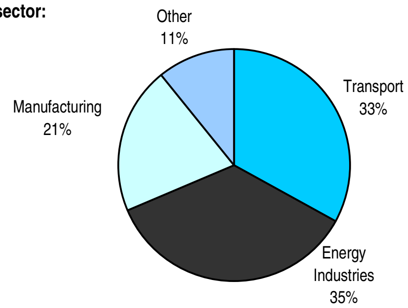


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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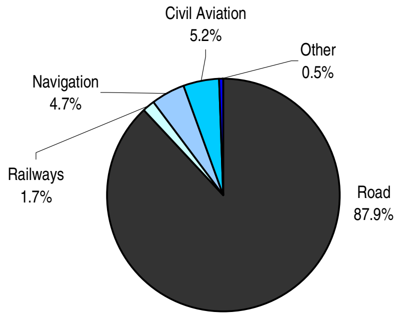
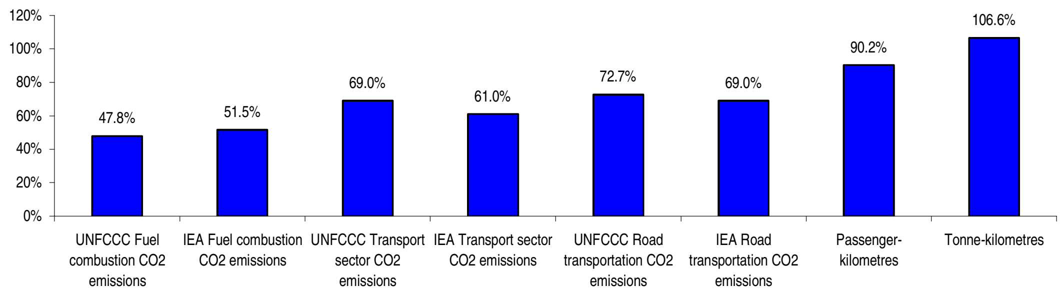


Changes (1990 to 2003)



Sweden

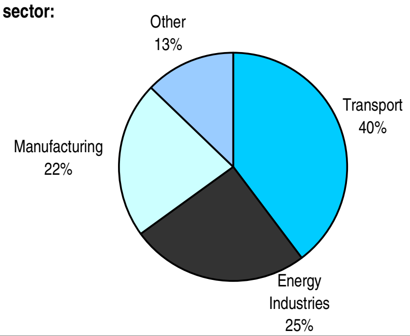
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	8 559	8 827	8 872	8 925	8 958
GDP at 2000 prices (PPP US$ m)	196 030	203 550	238 830	246 100	249 710
Road passenger-kms (m)	95 600	97 300	101 400	104 700	105 400
Road freight tonne-kms (m)	29 200	32 400	38 100	36 500	36 604
Road passenger-kms per head of population ('000s km)	11.17	11.02	11.43	11.73	11.77
Road freight tonne-kms per unit of GDP (tonne km per $)	0.15	0.16	0.16	0.15	0.15
UNFCCC total transport ghg emissions (kt of CO_2-e)	18 945	19 501	20 060	20 646	20 911
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.10	0.08	0.08	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.21	2.21	2.26	2.31	2.33
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	18 352	18 811	19 253	19 802	20 057
IEA Total transport sector CO_2 emissions (kt of CO_2)	20 140	20 600	21 640	21 970	22 390

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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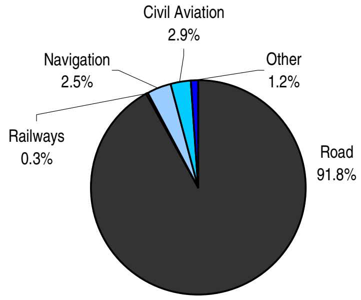
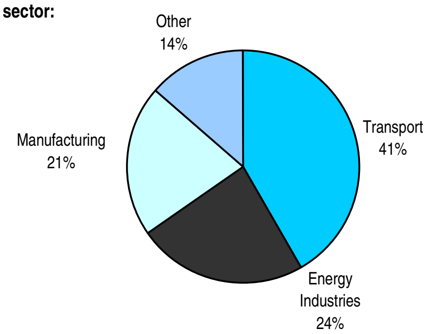


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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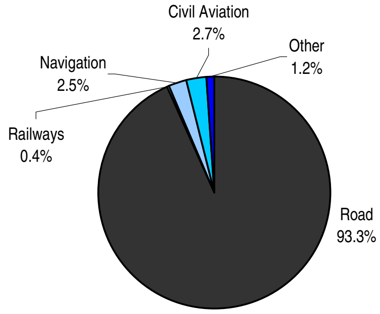
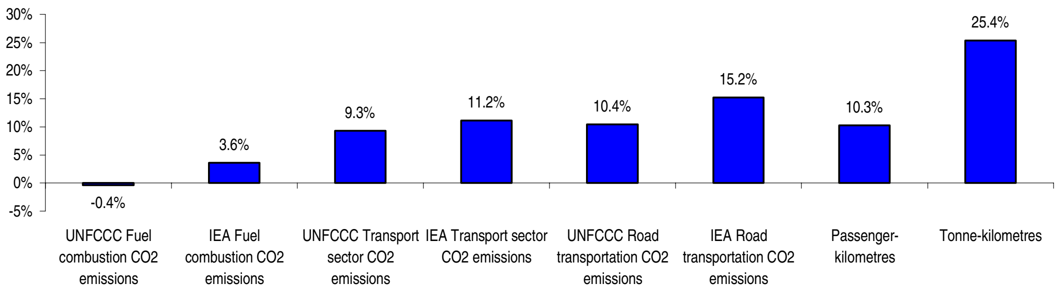


Changes (1990 to 2003)



Switzerland

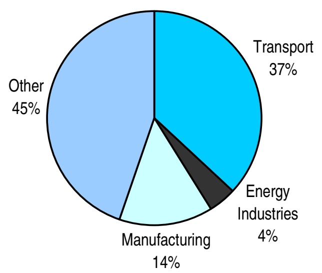
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	6 796	7 081	7 209	7 343	7 405
GDP at 2000 prices (PPP US$ m)	197 360	198 160	219 040	222 040	221 250
Road passenger-kms (m)	78 878	81 061	85 815	89 233	90 731
Road freight tonne-kms (m)	11 548	14 956	21 949	22 795	23 176
Road passenger-kms per head of population ('000s km)	11.61	11.45	11.90	12.15	12.25
Road freight tonne-kms per unit of GDP (tonne km per $)	0.06	0.08	0.10	0.10	0.10
UNFCCC total transport ghg emissions (kt of CO_2-e)	14 382	14 036	15 811	15 406	15 588
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.07	0.07	0.07	0.07	0.07
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.12	1.98	2.19	2.10	2.11
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	14 187	13 813	15 587	15 215	15 409
IEA Total transport sector CO_2 emissions (kt of CO_2)	14 680	14 530	16 330	15 990	16 130

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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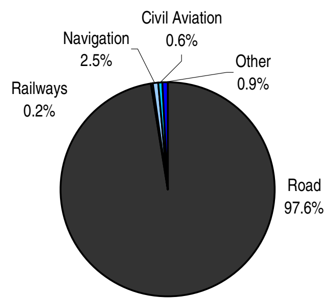
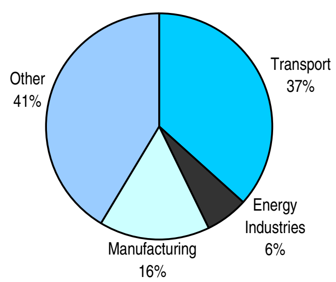


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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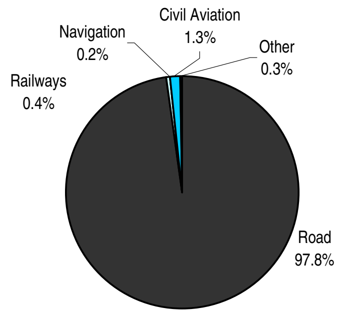
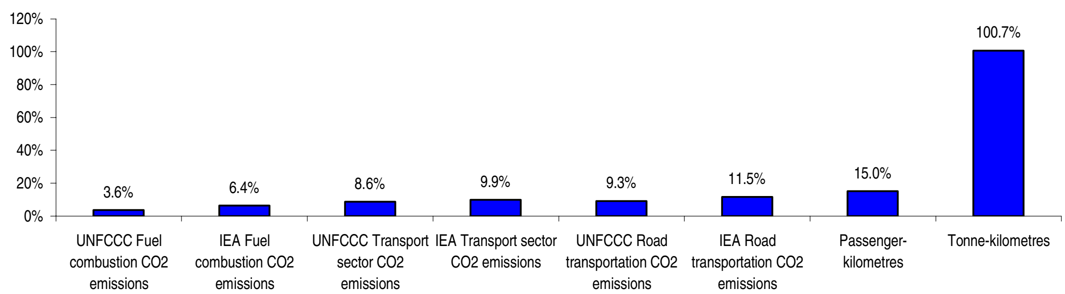


Changes (1990 to 2003)



Turkey

Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	56 203	61 646	67 461	69 626	70 712
GDP at 2000 prices (PPP US$ m)	323 520	378 910	459 810	459 130	485 730
Road passenger-kms (m)	134 991	155 202	185 681	163 327	164 311
Road freight tonne-kms (m)	65 710	112 515	161 552	150 912	152 163
Road passenger-kms per head of population ('000s km)	2.40	2.52	2.75	2.35	2.32
Road freight tonne-kms per unit of GDP (tonne km per $)	0.20	0.30	0.35	0.33	0.31
UNFCCC total transport ghg emissions (kt of CO_2-e)	-	-	-	-	-
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	-	-	-	-	-
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	-	-	-	-	-
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	-	-	-	-	-
IEA Total transport sector CO_2 emissions (kt of CO_2)	28 250	35 770	35 370	35 780	35 830

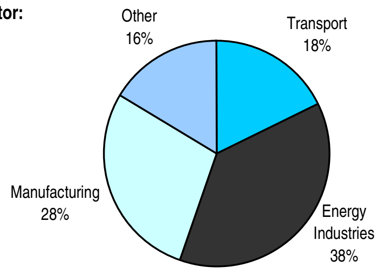
UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:

Within transport:

IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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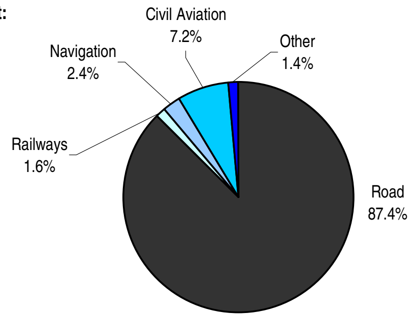
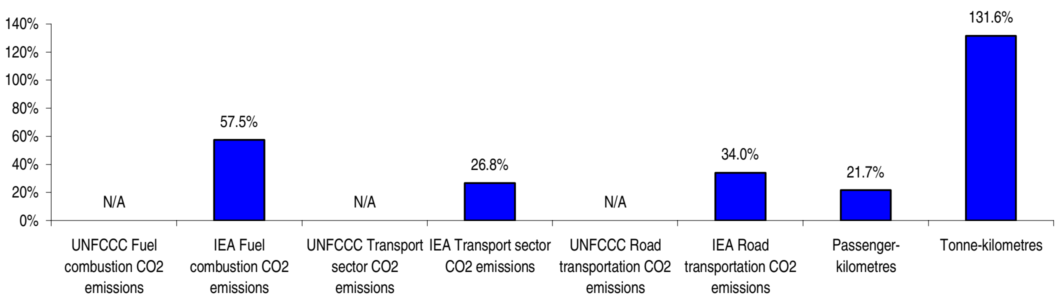


Changes (1990 to 2003)



Ukraine

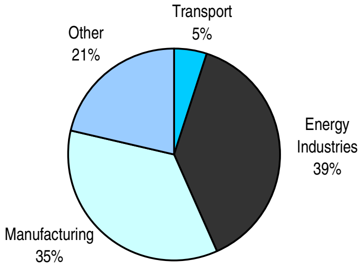
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	51 838	51 728	49 711	48 402	47 633
GDP at 2000 prices (PPP US$ m)	444 030	221 680	203 380	229 890	250 850
Road passenger-kms (m)	90 323	34 789	28 829	79 710	40 131
Road freight tonne-kms (m)	14 794	3 567	7 542	9 126	11 580
Road passenger-kms per head of population ('000s km)	1.74	0.67	0.58	1.65	0.84
Road freight tonne-kms per unit of GDP (tonne km per $)	0.03	0.02	0.04	0.04	0.05
UNFCCC total transport ghg emissions (kt of CO_2-e)	41 188	26 106	12 825	13 151	13 675
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.09	0.12	0.06	0.06	0.05
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	0.79	0.50	0.26	0.27	0.29
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	40 808	26 029	12 795	13 123	13 646
IEA Total transport sector CO_2 emissions (kt of CO_2)	-	21 020	17 020	19 660	18 250

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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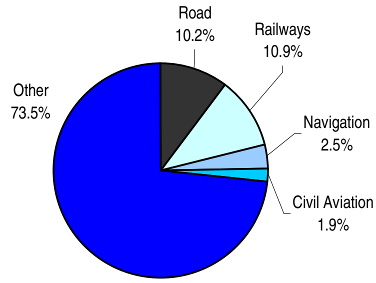
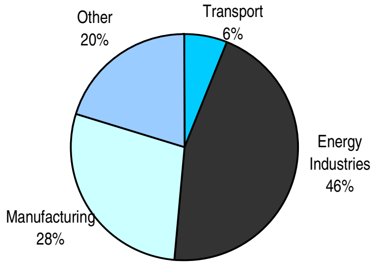


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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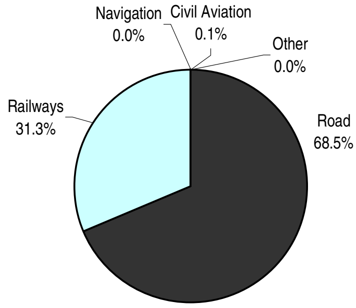
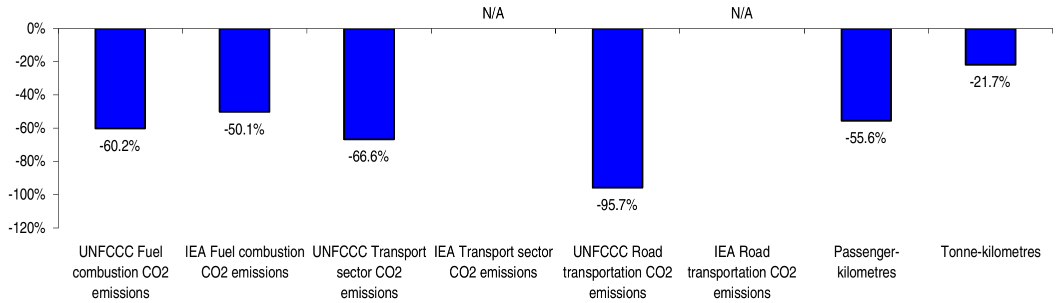


Changes (1990 to 2003)



United Kingdom

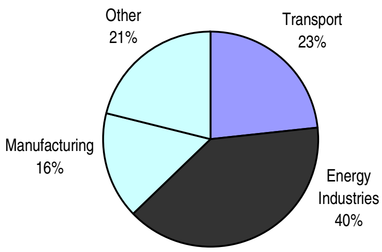
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	57 237	58 025	58 886	59 322	59 554
GDP at 2000 prices (PPP US$ m)	1 183 230	1 285 230	1 503 020	1 564 800	1 599 950
Road passenger-kms (m)	633 590	639 300	664 500	692 000	694 288
Road freight tonne-kms (m)	132 900	146 714	153 704	154 047	157 030
Road passenger-kms per head of population ('000s km)	11.07	11.02	11.28	11.67	11.66
Road freight tonne-kms per unit of GDP (tonne km per $)	0.11	0.11	0.10	0.10	0.10
UNFCCC total transport ghg emissions (kt of CO_2-e)	119 171	121 511	127 964	129 806	131 236
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.10	0.09	0.09	0.08	0.08
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	2.08	2.09	2.17	2.19	2.20
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	117 209	118 501	123 370	124 706	125 974
IEA Total transport sector CO_2 emissions (kt of CO_2)	122 930	126 070	132 190	132 140	133 440

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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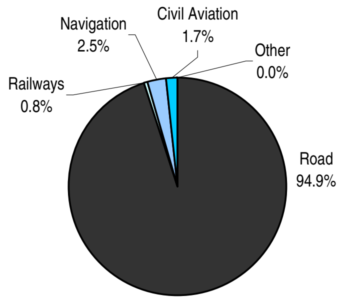
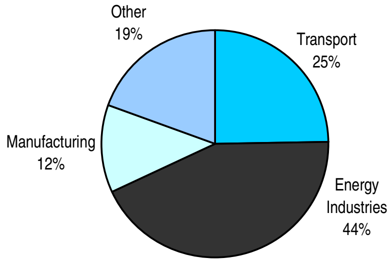


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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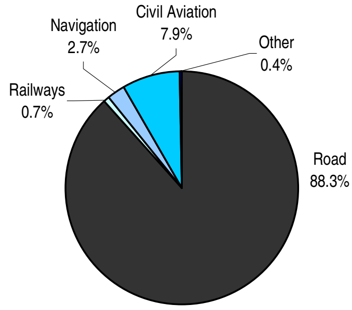
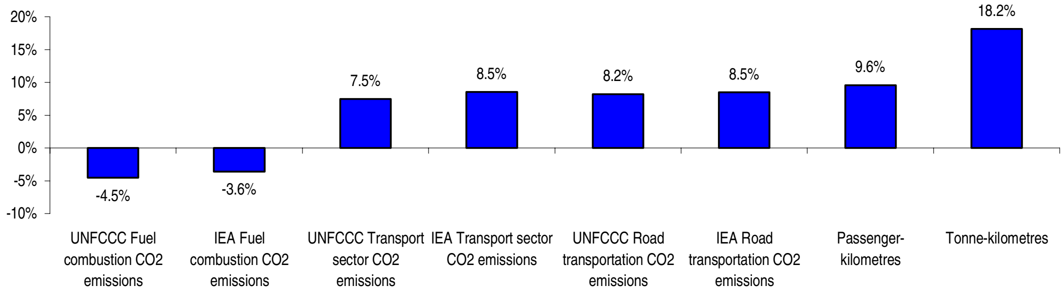


Changes (1990 to 2003)



United States of America

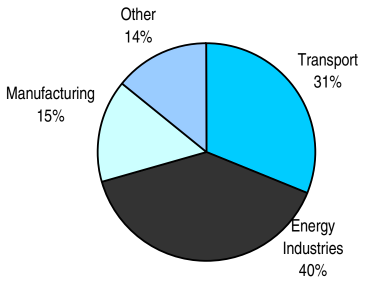
Key Indicators

Transport and the Economy

	1990	1995	2000	2002	2003
Population (thousands)	250 181	266 588	282 429	288 240	291 085
GDP at 2000 prices (PPP US$ m)	7 055 000	7 972 800	9 764 800	10 023 500	10 330 000
Road passenger-kms (m)	-	-	-	-	-
Road freight tonne-kms (m)	-	-	-	-	-
Road passenger-kms per head of population ('000s km)	-	-	-	-	-
Road freight tonne-kms per unit of GDP (tonne km per $)	-	-	-	-	-
UNFCCC total transport ghg emissions (kt of CO_2-e)	1 494 387	1 608 493	1 793 034	1 799 452	1 810 587
Transport sector ghg emissions per unit of GDP (kgs of CO_2-e per $1 of GDP)	0.21	0.20	0.18	0.18	0.18
Transport sector ghg emissions per head of population (tonnes of CO_2-e per person)	5.97	6.03	6.35	6.24	6.22
UNFCCC Total transport sector CO_2 emissions (kt of CO_2)	1 446 837	1 551 436	1 737 685	1 752 267	1 767 214
IEA Total transport sector CO_2 emissions (kt of CO_2)	1 423 950	1 537 710	1 719 870	1 755 180	1 794 020

UNFCCC CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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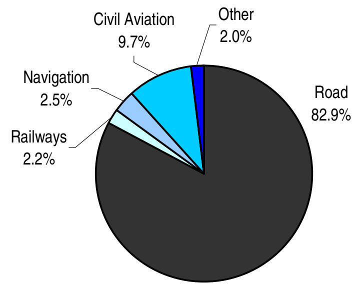
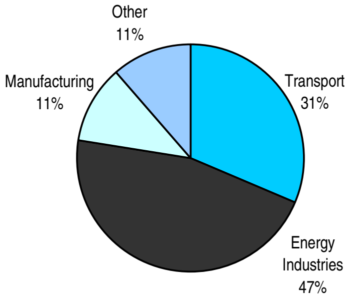


IEA CO_2 Emissions Shares from Fuel Combustion (2003)

By sector:



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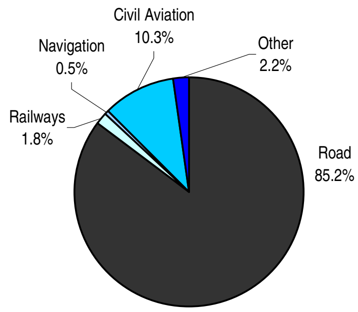
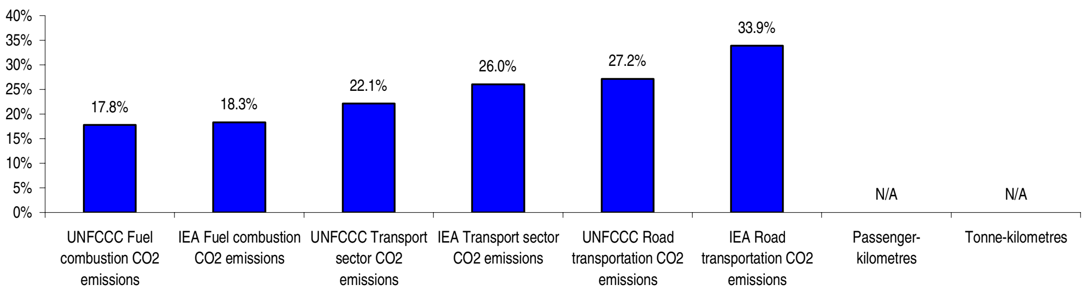


Changes (1990 to 2003)



ANNEX 2.

FUEL TAX DATA

Average Prices and Taxes of Premium Unleaded Gasoline (95 RON)

Figures in real 2000 Euros per litre

Legend:

1990	Tax Component
1995	Ex-Tax Price
2000	
2002	
2003	
2004	
2005	

Data sources:

Fuel taxes and prices in nominal national currency: *IEA Energy Prices and Taxes database,* (http://data.iea.org).

National Currency/Euro exchange rates: OANDA.com, The Currency Site (http://www.oanda.com/).

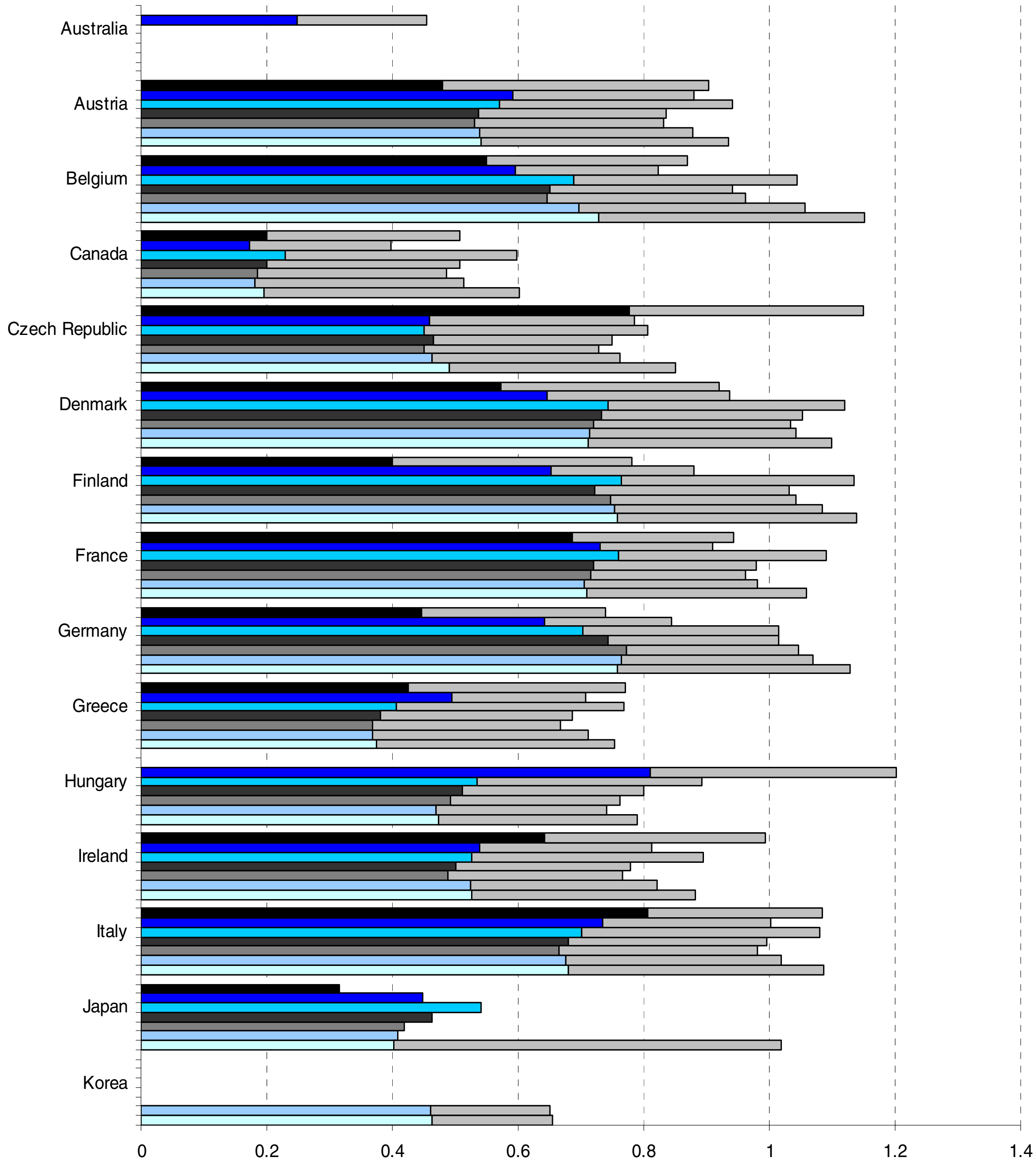
National Consumer Price Indices: *OECD Economic Outlook database*

Completed with national and EU data sources, where necessary:

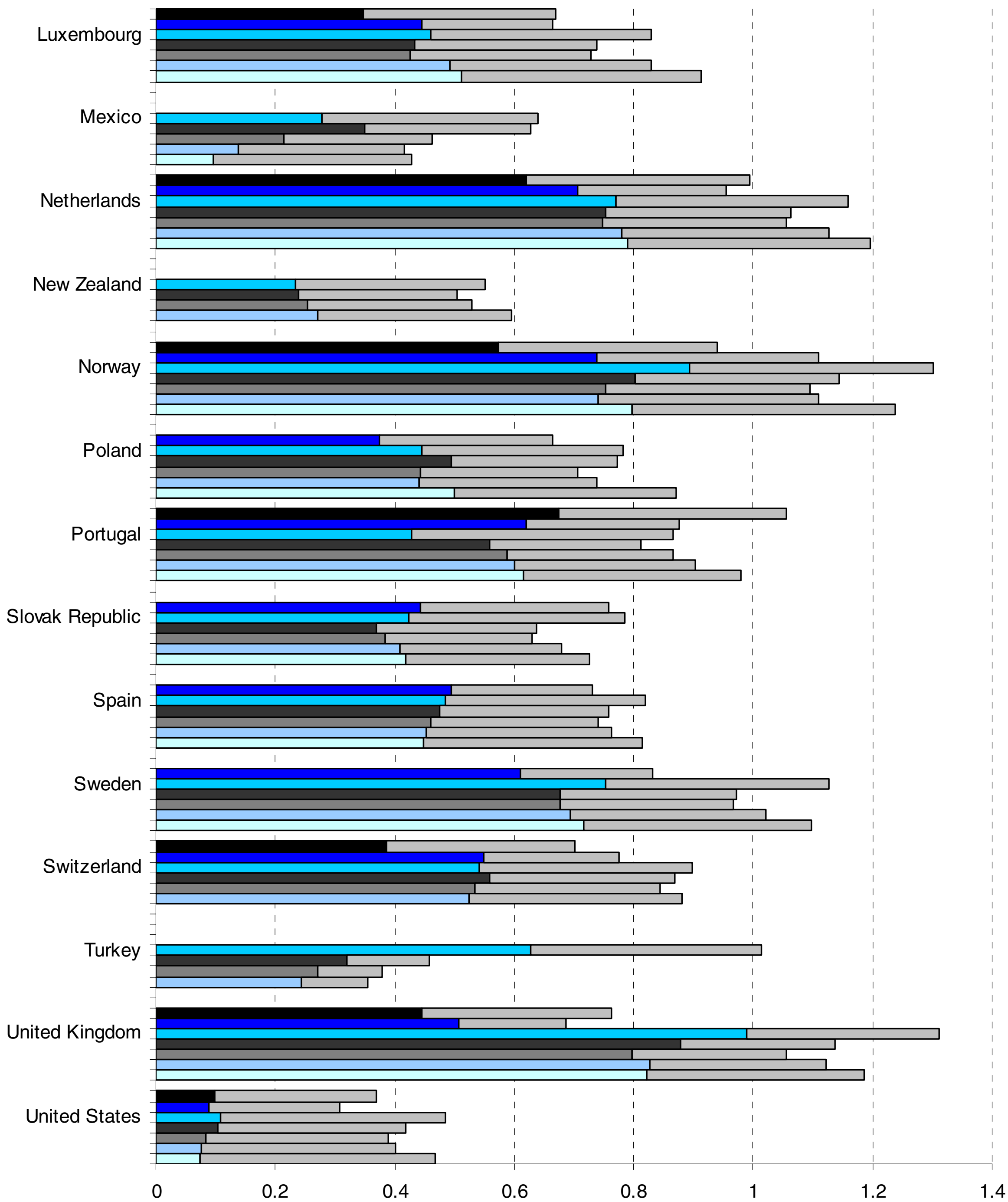
- 98RON data were used for completeness in the case of Canada, Denmark and Mexico;
- Source of Japanese data: The Oil Information Center (http://oil-info.ieej.or.jp/cgi-bin/topframemake.cgi?ParaSession=OWF7-1&ParaID=OWF7-1z).
- Source of Korean data: Korea Institute of Energy Research (http://unit.aist.go.jp/internat/biomassws/material/Jin%20Suk%20Lee.pdf).
- For the Czech Republic, Greece, Ireland, Poland, Portugal and the United Kingdom 2005 data from the EU Oil Bulletin (http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm).

Average Prices and Taxes of Premium Unleaded Gasoline (95 RON)

Figures in real 2000 Euros per litre

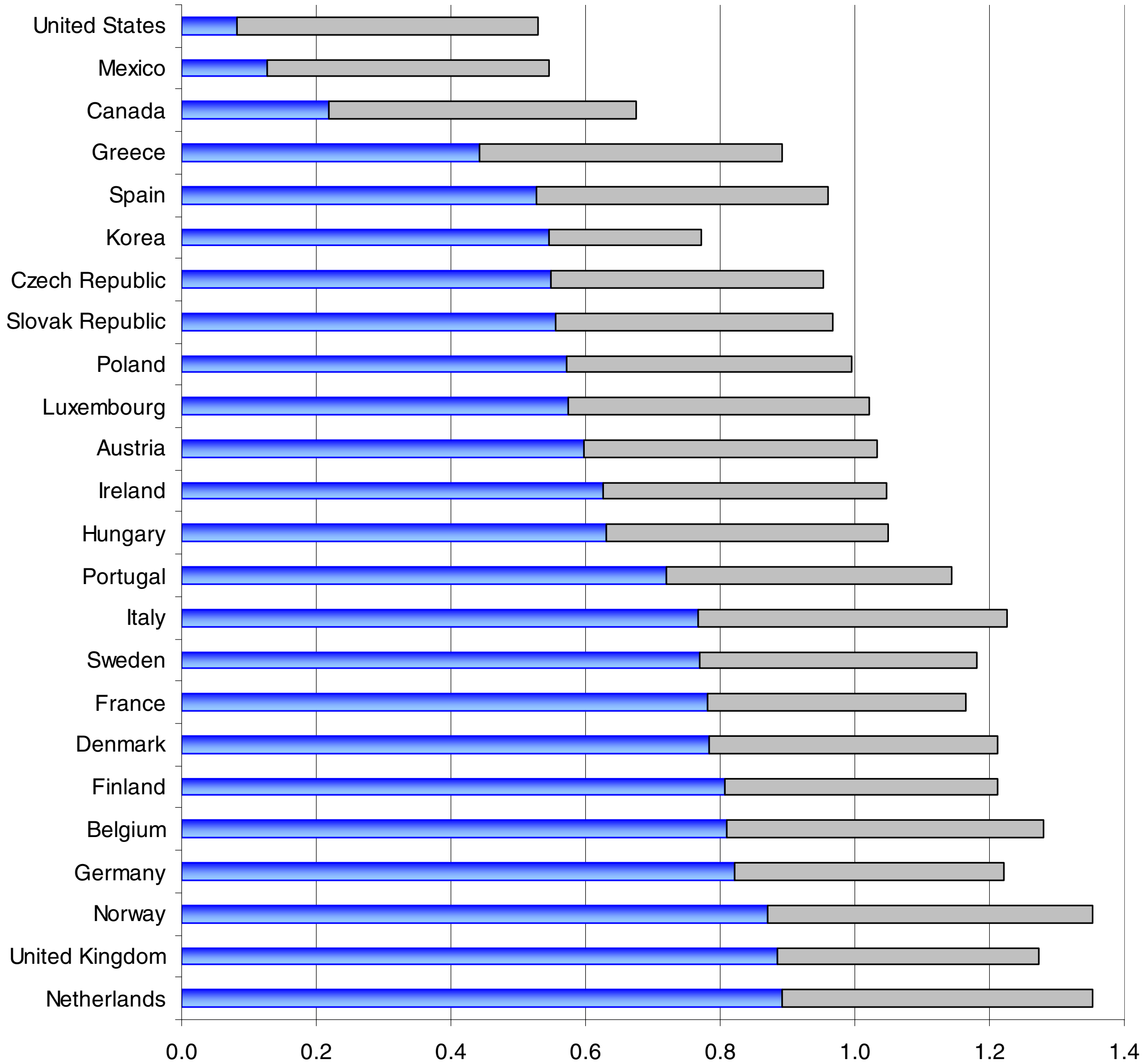


Average Prices and Taxes of Premium Unleaded Gasoline (95 RON) ….. (continued)
Figures in real 2000 Euros per litre



Average 2005 Prices and Taxes of Premium Unleaded Gasoline (95 RON)

2005 Euros per litre



Average Prices and Taxes of Diesel

Figures in real 2000 Euros per litre

Legend:

1990	Tax Component
1995	Ex-Tax Price
2000	
2002	
2003	
2004	
2005	

Data sources:

Fuel taxes and prices in nominal national currency: *IEA Energy Prices and Taxes database,* (http://data.iea.org).

National Currency/Euro exchange rates: OANDA.com, The Currency Site (http://www.oanda.com/).

National Consumer Price Indices: *OECD Economic Outlook database*

Completed with national and EU data sources, where necessary:

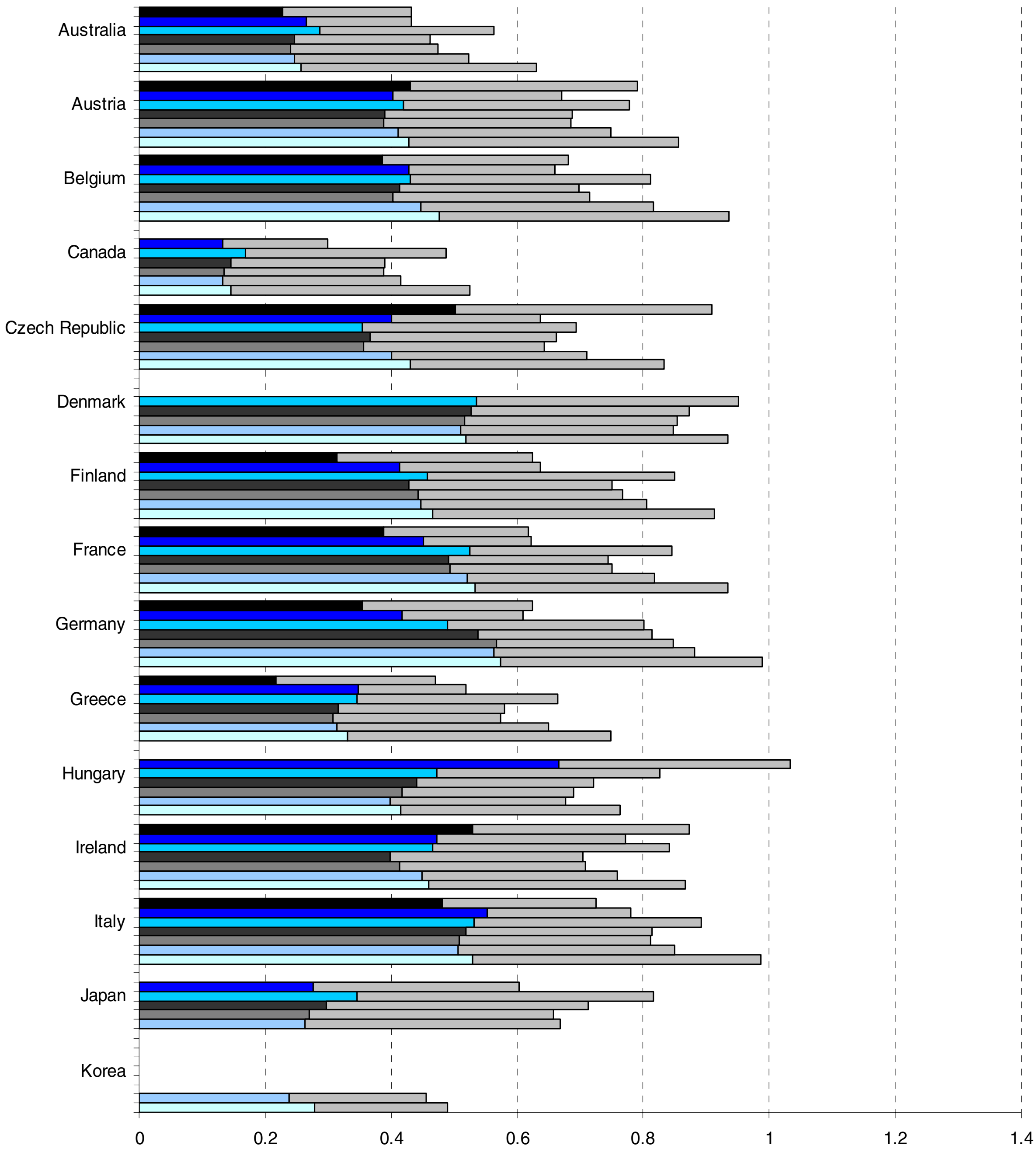
- For Canada, prices and taxes for Ontario are displayed. Taxes vary from province to province with rates in Ontario in the middle of the range (http://www.energy.gov.on.ca/index.cfm?fuseaction=oilandgas.fuelprices).

- Source of Korean data: Korea Institute of Energy Research (http://unit.aist.go.jp/internat/biomassws/material/Jin%20Suk%20Lee.pdf).

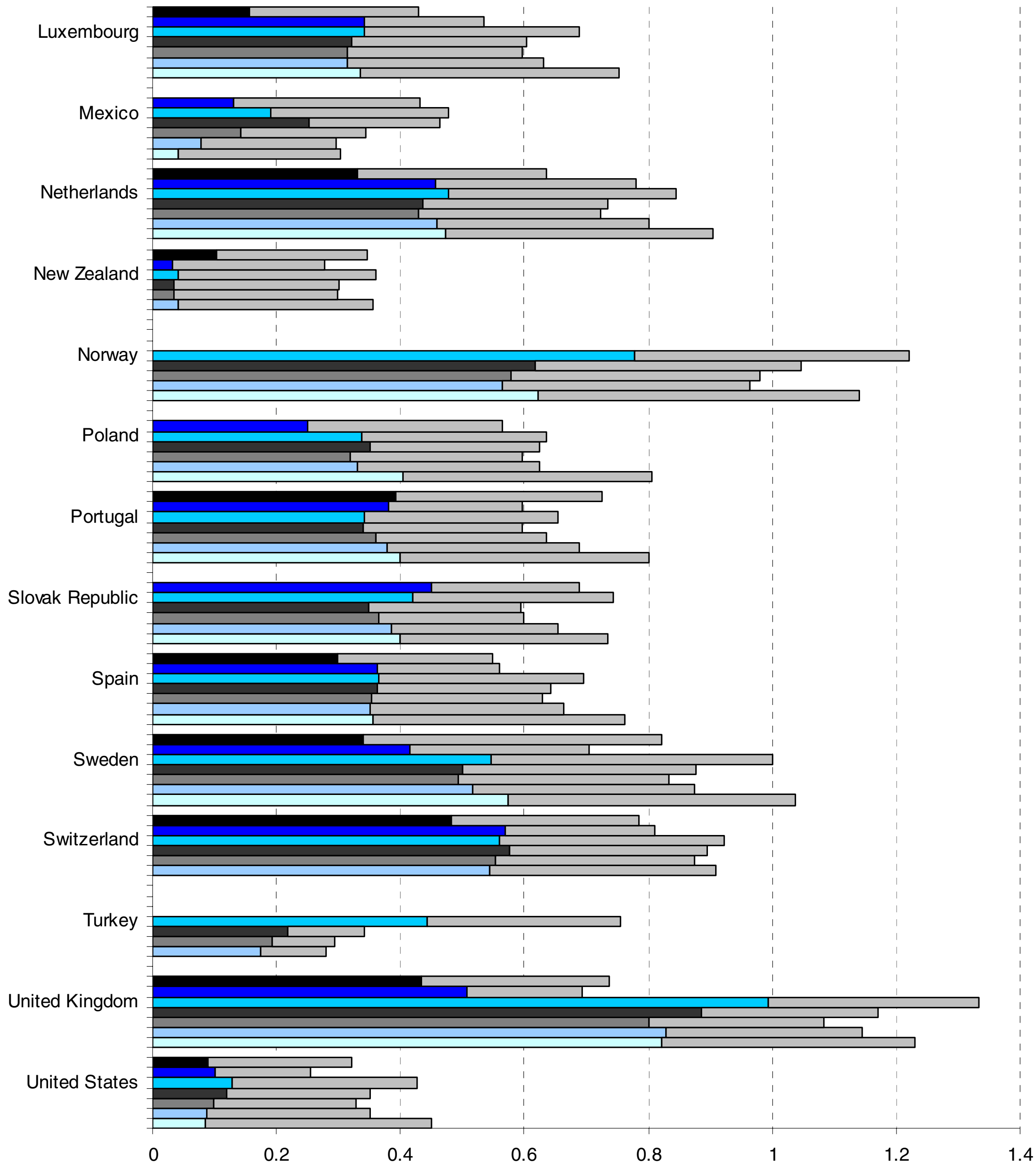
- For the Czech Republic, Greece, Ireland, Poland, Portugal and the United Kingdom 2005 data from the EU Oil Bulletin (http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm).

Average Prices and Taxes of Diesel

Figures in real 2000 Euros per litre

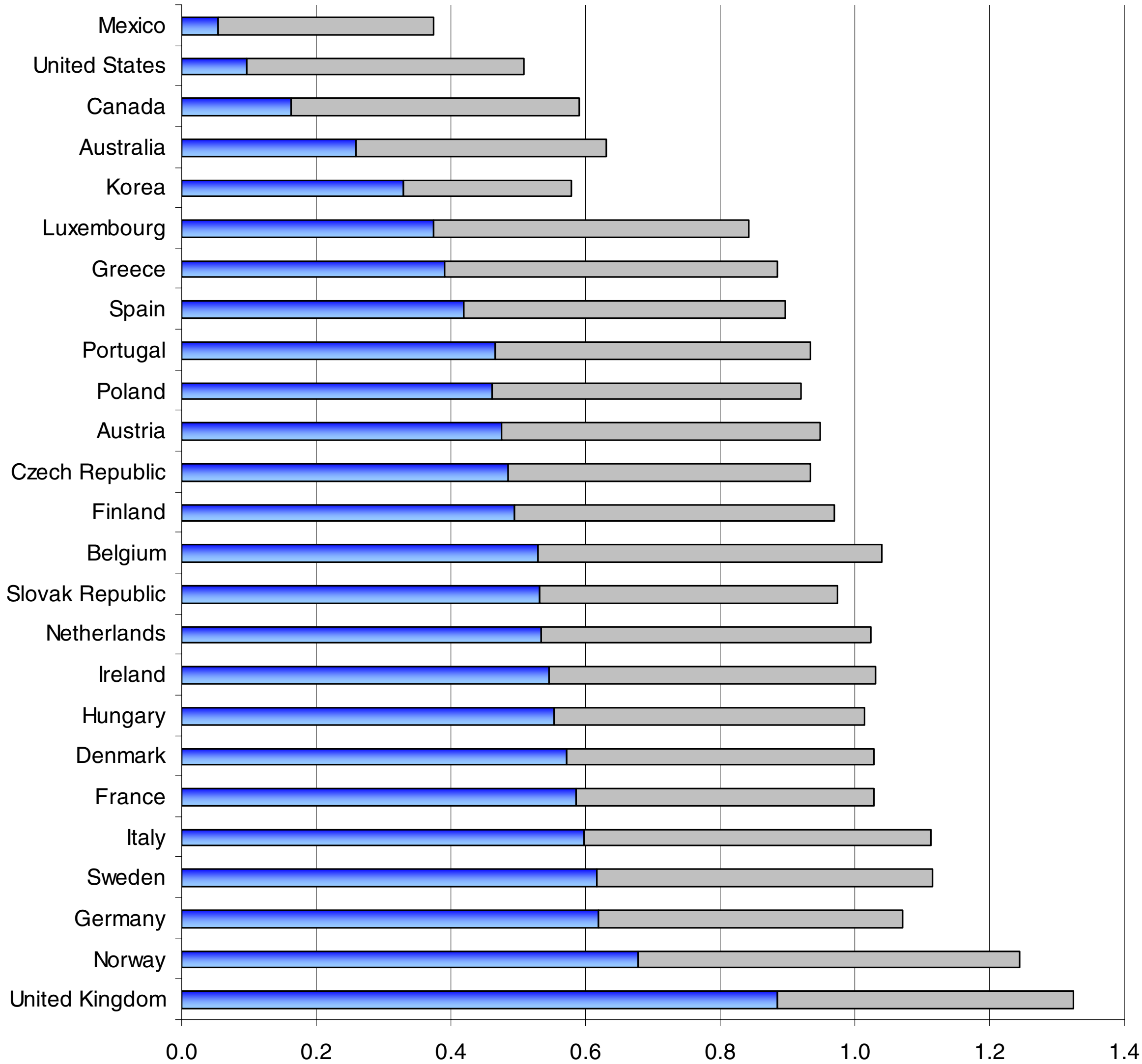


Average Prices and Taxes of Diesel….. (continued)
Figures in real 2000 Euros per litre



Average 2005 Prices and Taxes of Diesel

2005 Euros per litre



Average Prices and Taxes in Nominal and Real Currency for Diesel, Premium Unleaded Gasoline RON95 and Premium Unleaded Gasoline RON98

Data sources:

Fuel taxes and prices in nominal national currency: *IEA Energy Prices and Taxes database,* http://data.iea.org.

National Currency / Euro exchange rates: OANDA.com, The Currency Site http://www.oanda.com/.

National Consumer Price Indices: *OECD Economic Outlook database*

Completed with national data sources, where necessary (see notes with the graphs above).

Australia				Australia			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.184	0.165	0.348	1990	0.228	0.205	0.433
1995	0.240	0.152	0.393	1995	0.265	0.168	0.432
2000	0.286	0.277	0.563	2000	0.286	0.277	0.563
2002	0.264	0.232	0.496	2002	0.246	0.216	0.461
2003	0.267	0.257	0.524	2003	0.241	0.233	0.474
2004	0.279	0.313	0.592	2004	0.247	0.276	0.524
2005	0.300	0.434	0.734	2005	0.258	0.373	0.632
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.226	0.187	0.413	1995	0.248	0.206	0.454
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-

Austria			
Average Prices and Taxes in Euro **(nominal)**			
Diesel (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.343	0.286	0.629
1995	0.375	0.25	0.625
2000	0.419	0.359	0.778
2002	0.409	0.31	0.719
2003	0.411	0.316	0.727
2004	0.445	0.364	0.809
2005	0.475	0.473	0.948
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.381	0.338	0.719
1995	0.551	0.27	0.821
2000	0.571	0.371	0.942
2002	0.56	0.314	0.874
2003	0.562	0.319	0.881
2004	0.583	0.365	0.948
2005	0.597	0.437	1.034
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.557	0.301	0.858
2000	0.583	0.427	1.01
2002	0.574	0.386	0.96
2003	0.575	0.385	0.96
2004	0.597	0.434	1.031
2005	0.614	0.521	1.135

Austria			
Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.431	0.359	0.791
1995	0.402	0.268	0.670
2000	0.419	0.359	0.778
2002	0.391	0.297	0.688
2003	0.388	0.298	0.686
2004	0.412	0.337	0.748
2005	0.429	0.428	0.857
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.479	0.425	0.904
1995	0.591	0.289	0.880
2000	0.571	0.371	0.942
2002	0.536	0.300	0.836
2003	0.531	0.301	0.832
2004	0.539	0.338	0.877
2005	0.540	0.395	0.935
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.597	0.323	0.920
2000	0.583	0.427	1.010
2002	0.549	0.369	0.919
2003	0.543	0.363	0.906
2004	0.552	0.401	0.954
2005	0.555	0.471	1.026

Belgium

Average Prices and Taxes in Euro **(nominal)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.315	0.240	0.555
1995	0.393	0.214	0.607
2000	0.431	0.380	0.811
2002	0.431	0.295	0.726
2003	0.425	0.331	0.756
2004	0.483	0.398	0.881
2005	0.53	0.51	1.04

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.449	0.26	0.709
1995	0.548	0.21	0.758
2000	0.688	0.357	1.045
2002	0.677	0.302	0.979
2003	0.684	0.334	1.018
2004	0.753	0.388	1.141
2005	0.81	0.47	1.28

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.457	0.293	0.75
1995	0.551	0.227	0.778
2000	0.699	0.409	1.108
2002	0.69	0.363	1.053
2003	0.691	0.371	1.062
2004	0.756	0.408	1.164
2005	0.82	0.49	1.31

Belgium

Average Prices and Taxes in Euro **(real - 2000)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.386	0.295	0.681
1995	0.427	0.232	0.659
2000	0.431	0.380	0.811
2002	0.414	0.283	0.697
2003	0.402	0.313	0.714
2004	0.447	0.368	0.816
2005	0.477	0.459	0.936

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.550	0.319	0.869
1995	0.595	0.228	0.823
2000	0.688	0.357	1.045
2002	0.650	0.290	0.940
2003	0.646	0.316	0.962
2004	0.697	0.359	1.056
2005	0.729	0.423	1.152

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.560	0.359	0.919
1995	0.598	0.246	0.845
2000	0.699	0.409	1.108
2002	0.662	0.349	1.011
2003	0.653	0.351	1.004
2004	0.700	0.378	1.077
2005	0.738	0.441	1.179

Canada				Canada			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.122	0.153	0.275	1995	0.133	0.166	0.300
2000	0.168	0.319	0.487	2000	0.168	0.319	0.487
2002	0.152	0.258	0.410	2002	0.145	0.246	0.391
2003	0.145	0.274	0.419	2003	0.135	0.254	0.388
2004	0.145	0.310	0.455	2004	0.132	0.283	0.415
2005	0.163	0.428	0.591	2005	0.145	0.381	0.526
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.165	0.251	0.417	1990	0.201	0.306	0.507
1995	0.158	0.207	0.365	1995	0.172	0.226	0.398
2000	0.230	0.368	0.598	2000	0.230	0.368	0.598
2002	0.211	0.321	0.532	2002	0.201	0.307	0.508
2003	0.199	0.325	0.524	2003	0.185	0.302	0.486
2004	0.199	0.364	0.562	2004	0.181	0.332	0.513
2005	0.219	0.457	0.676	2005	0.195	0.407	0.601

Source of data: Ministry of Energy - Ontario
http://www.energy.gov.on.ca/index.cfm?fuseaction=oilandgas.fuelprices

Czech Republic				Czech Republic			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.224	0.183	0.407	1990	0.501	0.408	0.909
1995	0.290	0.170	0.460	1995	0.401	0.236	0.637
2000	0.354	0.340	0.693	2000	0.354	0.340	0.693
2002	0.392	0.313	0.705	2002	0.367	0.294	0.661
2003	0.380	0.308	0.687	2003	0.356	0.288	0.644
2004	0.440	0.339	0.780	2004	0.401	0.309	0.710
2005	0.485	0.450	0.935	2005	0.431	0.402	0.835
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.348	0.167	0.515	1990	0.777	0.373	1.150
1995	0.331	0.236	0.567	1995	0.458	0.327	0.785
2000	0.450	0.356	0.806	2000	0.450	0.356	0.806
2002	0.496	0.302	0.798	2002	0.465	0.284	0.749
2003	0.481	0.298	0.778	2003	0.450	0.279	0.729
2004	0.509	0.328	0.837	2004	0.464	0.298	0.762
2005	0.549	0.403	0.952	2005	0.491	0.360	0.851
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.348	0.166	0.514	1990	0.776	0.371	1.147
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	0.514	0.387	0.901	2002	0.482	0.363	0.845
2003	0.501	0.391	0.893	2003	0.469	0.366	0.836
2004	0.528	0.426	0.954	2004	0.481	0.388	0.869
2005	-	-	-	2005	-	-	-

Source: EU Oil Bulletin
http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm

Denmark				Denmark			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
				Diesel (litre)			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	0.535	0.416	0.951	2000	0.535	0.416	0.951
2002	0.553	0.361	0.914	2002	0.527	0.345	0.872
2003	0.553	0.360	0.913	2003	0.517	0.337	0.853
2004	0.553	0.364	0.917	2004	0.511	0.336	0.847
2005	0.572	0.456	1.028	2005	0.519	0.414	0.933
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	0.743	0.378	1.121	2000	0.743	0.378	1.121
2002	0.768	0.334	1.103	2002	0.733	0.319	1.052
2003	0.769	0.337	1.106	2003	0.719	0.315	1.033
2004	0.773	0.356	1.128	2004	0.714	0.328	1.042
2005	0.784	0.428	1.212	2005	0.711	0.388	1.100
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.464	0.280	0.744	1990	0.573	0.346	0.919
1995	0.577	0.260	0.836	1995	0.646	0.291	0.937
2000	0.747	0.393	1.140	2000	0.747	0.393	1.140
2002	0.773	0.355	1.128	2002	0.738	0.338	1.076
2003	0.775	0.361	1.136	2003	0.724	0.337	1.061
2004	0.779	0.379	1.157	2004	0.719	0.350	1.069
2005	0.790	0.459	1.249	2005	0.717	0.416	1.134

Finland

Average Prices and Taxes in Euro **(nominal)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.261	0.258	0.519
1995	0.385	0.206	0.591
2000	0.457	0.393	0.850
2002	0.445	0.338	0.783
2003	0.465	0.343	0.808
2004	0.472	0.376	0.848
2005	0.494	0.475	0.969

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.333	0.315	0.648
1995	0.606	0.211	0.817
2000	0.764	0.371	1.135
2002	0.753	0.322	1.075
2003	0.785	0.31	1.095
2004	0.794	0.347	1.141
2005	0.806	0.405	1.211

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.61	0.228	0.838
2000	0.768	0.39	1.158
2002	0.758	0.342	1.1
2003	0.789	0.329	1.118
2004	0.799	0.37	1.169
2005	0.811	0.427	1.238

Finland

Average Prices and Taxes in Euro **(real - 2000)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.314	0.310	0.624
1995	0.414	0.222	0.636
2000	0.457	0.393	0.850
2002	0.427	0.324	0.752
2003	0.442	0.326	0.769
2004	0.448	0.357	0.805
2005	0.465	0.447	0.911

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.401	0.379	0.780
1995	0.652	0.227	0.879
2000	0.764	0.371	1.135
2002	0.723	0.309	1.032
2003	0.747	0.295	1.042
2004	0.754	0.330	1.084
2005	0.758	0.381	1.139

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.657	0.245	0.902
2000	0.768	0.390	1.158
2002	0.728	0.328	1.056
2003	0.751	0.313	1.064
2004	0.759	0.351	1.110
2005	0.763	0.402	1.165

France				France			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.327	0.194	0.522	1990	0.388	0.230	0.619
1995	0.425	0.162	0.587	1995	0.451	0.172	0.623
2000	0.524	0.321	0.845	2000	0.524	0.321	0.845
2002	0.509	0.262	0.771	2002	0.491	0.253	0.744
2003	0.522	0.271	0.793	2003	0.494	0.256	0.750
2004	0.562	0.323	0.885	2004	0.520	0.299	0.819
2005	0.586	0.442	1.027	2005	0.533	0.402	0.934
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.579	0.216	0.795	1990	0.687	0.256	0.943
1995	0.688	0.169	0.857	1995	0.731	0.179	0.910
2000	0.761	0.329	1.090	2000	0.761	0.329	1.090
2002	0.747	0.267	1.014	2002	0.721	0.258	0.979
2003	0.756	0.261	1.017	2003	0.715	0.247	0.962
2004	0.763	0.298	1.061	2004	0.706	0.276	0.982
2005	0.78	0.385	1.165	2005	0.709	0.350	1.060
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.583	0.24	0.823	1990	0.691	0.285	0.976
1995	0.688	0.174	0.862	1995	0.731	0.185	0.915
2000	0.765	0.347	1.112	2000	0.765	0.347	1.112
2002	0.751	0.286	1.037	2002	0.725	0.276	1.001
2003	0.759	0.278	1.037	2003	0.718	0.263	0.980
2004	0.767	0.317	1.084	2004	0.710	0.293	1.004
2005	0.787	0.418	1.205	2005	0.715	0.380	1.096

Germany				Germany			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.29	0.222	0.512	1990	0.354	0.271	0.625
1995	0.392	0.181	0.573	1995	0.417	0.193	0.610
2000	0.489	0.312	0.801	2000	0.489	0.312	0.801
2002	0.556	0.284	0.84	2002	0.538	0.275	0.813
2003	0.592	0.294	0.886	2003	0.567	0.281	0.848
2004	0.599	0.338	0.937	2004	0.564	0.318	0.882
2005	0.62	0.450	1.07	2005	0.573	0.416	0.989
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.366	0.238	0.604	1990	0.447	0.291	0.738
1995	0.604	0.189	0.793	1995	0.643	0.201	0.844
2000	0.703	0.312	1.015	2000	0.703	0.312	1.015
2002	0.769	0.279	1.048	2002	0.744	0.270	1.014
2003	0.806	0.287	1.093	2003	0.772	0.275	1.046
2004	0.812	0.324	1.136	2004	0.765	0.305	1.070
2005	0.82	0.400	1.22	2005	0.758	0.370	1.128
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.61	0.226	0.836	1995	0.649	0.241	0.890
2000	0.706	0.335	1.041	2000	0.706	0.335	1.041
2002	0.774	0.314	1.088	2002	0.749	0.304	1.052
2003	0.811	0.321	1.132	2003	0.776	0.307	1.084
2004	0.817	0.358	1.175	2004	0.769	0.337	1.106
2005	0.82	0.440	1.26	2005	0.758	0.407	1.165

Greece			
Average Prices and Taxes in Euro **(nominal)**			
	Diesel (litre)		
	Tax Component	Ex-Tax Price	Total Price
1990	0.089	0.105	0.194
1995	0.274	0.136	0.41
2000	0.345	0.320	0.665
2002	0.34	0.282	0.622
2003	0.342	0.295	0.637
2004	0.358	0.382	0.74
2005	0.391	0.494	0.885
	Premium Unleaded Gasoline (95 RON) (litre)		
	Tax Component	Ex-Tax Price	Total Price
1990	0.176	0.142	0.318
1995	0.39	0.169	0.559
2000	0.406	0.363	0.769
2002	0.408	0.327	0.735
2003	0.409	0.331	0.740
2004	0.42	0.392	0.812
2005	0.443	0.448	0.891
	Premium Unleaded Gasoline (98 RON) (litre)		
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

Greece			
Average Prices and Taxes in Euro **(real - 2000)**			
	Diesel (litre)		
	Tax Component	Ex-Tax Price	Total Price
1990	0.217	0.254	0.470
1995	0.347	0.172	0.519
2000	0.345	0.320	0.665
2002	0.317	0.263	0.581
2003	0.308	0.266	0.574
2004	0.314	0.335	0.649
2005	0.331	0.418	0.749
	Premium Unleaded Gasoline (95 RON) (litre)		
	Tax Component	Ex-Tax Price	Total Price
1990	0.426	0.344	0.770
1995	0.494	0.214	0.708
2000	0.406	0.363	0.769
2002	0.381	0.305	0.686
2003	0.369	0.298	0.667
2004	0.368	0.344	0.712
2005	0.375	0.379	0.754
	Premium Unleaded Gasoline (98 RON) (litre)		
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

Source: EU Oil Bulletin
http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm

Hungary

Average Prices and Taxes in Euro **(nominal)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.331	0.182	0.513
2000	0.473	0.353	0.825
2002	0.506	0.323	0.829
2003	0.501	0.327	0.828
2004	0.511	0.357	0.868
2005	0.552	0.463	1.015

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.402	0.195	0.597
2000	0.535	0.357	0.892
2002	0.588	0.330	0.918
2003	0.592	0.326	0.918
2004	0.602	0.350	0.952
2005	0.630	0.420	1.050

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.402	0.195	0.597
2000	0.542	0.384	0.926
2002	0.595	0.359	0.954
2003	0.599	0.355	0.954
2004	0.611	0.387	0.997
2005	0.637	0.448	1.085

Hungary

Average Prices and Taxes in Euro **(real - 2000)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.667	0.366	1.033
2000	0.473	0.353	0.825
2002	0.440	0.281	0.722
2003	0.417	0.272	0.689
2004	0.398	0.278	0.677
2005	0.415	0.348	0.763

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.810	0.393	1.203
2000	0.535	0.357	0.892
2002	0.512	0.287	0.799
2003	0.492	0.271	0.764
2004	0.469	0.273	0.742
2005	0.474	0.316	0.789

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.810	0.393	1.203
2000	0.542	0.384	0.926
2002	0.518	0.313	0.831
2003	0.498	0.295	0.794
2004	0.476	0.301	0.777
2005	0.479	0.336	0.815

Ireland				Ireland			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.411	0.268	0.679	1990	0.529	0.344	0.873
1995	0.416	0.263	0.679	1995	0.472	0.299	0.771
2000	0.465	0.377	0.842	2000	0.465	0.377	0.842
2002	0.438	0.336	0.774	2002	0.399	0.306	0.706
2003	0.47	0.334	0.804	2003	0.414	0.294	0.708
2004	0.521	0.361	0.882	2004	0.449	0.311	0.760
2005	0.547	0.484	1.031	2005	0.460	0.407	0.867
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.5	0.272	0.772	1990	0.643	0.350	0.992
1995	0.474	0.241	0.715	1995	0.538	0.274	0.812
2000	0.527	0.367	0.894	2000	0.527	0.367	0.894
2002	0.549	0.306	0.855	2002	0.500	0.279	0.779
2003	0.556	0.315	0.871	2003	0.489	0.277	0.767
2004	0.608	0.345	0.953	2004	0.524	0.297	0.822
2005	0.625	0.423	1.048	2005	0.526	0.356	0.882
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.48	0.274	0.754	1995	0.545	0.311	0.856
2000	0.634	0.417	1.051	2000	0.634	0.417	1.051
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-

Source: EU Oil Bulletin
http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm

Italy				Italy			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.333	0.169	0.503	1990	0.481	0.245	0.726
1995	0.49	0.203	0.693	1995	0.552	0.229	0.781
2000	0.531	0.361	0.892	2000	0.531	0.361	0.892
2002	0.546	0.31	0.856	2002	0.519	0.294	0.813
2003	0.549	0.328	0.877	2003	0.508	0.303	0.811
2004	0.559	0.379	0.938	2004	0.506	0.343	0.849
2005	0.598	0.516	1.114	2005	0.530	0.457	0.987
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.558	0.193	0.751	1990	0.806	0.279	1.085
1995	0.651	0.238	0.889	1995	0.734	0.268	1.002
2000	0.701	0.380	1.081	2000	0.701	0.380	1.081
2002	0.717	0.331	1.048	2002	0.681	0.314	0.995
2003	0.719	0.341	1.06	2003	0.665	0.315	0.981
2004	0.747	0.379	1.126	2004	0.676	0.343	1.019
2005	0.768	0.458	1.226	2005	0.681	0.406	1.086
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-

Japan				Japan			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.274	0.322	0.596	1995	0.277	0.326	0.603
2000	0.346	0.470	0.816	2000	0.346	0.470	0.816
2002	0.292	0.408	0.701	2002	0.297	0.415	0.712
2003	0.264	0.381	0.645	2003	0.269	0.388	0.657
2004	0.259	0.396	0.655	2004	0.264	0.404	0.668
2005	-	-	-	2005	-	-	-
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.292	-	-	1990	0.316	-	-
1995	0.443	-	-	1995	0.448	-	-
2000	0.540	-	-	2000	0.540	-	-
2002	0.455	-	-	2002	0.463	-	-
2003	0.410	-	-	2003	0.418	-	-
2004	0.400	-	-	2004	0.408	-	-
2005	0.393	0.603	0.996	2005	0.402	0.617	1.019
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-

Source: The Oil Information Center
http://oil-info.ieej.or.jp/cgi-bin/topframemake.cgi?ParaSession=OWF7-1&ParaID=OWF7-1z

Korea				Korea			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	0.273	0.249	0.523	2004	0.238	0.217	0.456
2005	0.329	0.249	0.578	2005	0.279	0.211	0.490
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	0.530	0.217	0.747	2004	0.462	0.189	0.651
2005	0.547	0.224	0.771	2005	0.464	0.190	0.654
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-

Source: Korea Institute of Energy Research
http://unit.aist.go.jp/internat/biomassws/material/Jin%20Suk%20Lee.pdf

Luxembourg

Average Prices and Taxes in Euro **(nominal)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.126	0.221	0.347
1995	0.316	0.18	0.496
2000	0.343	0.346	0.689
2002	0.336	0.296	0.632
2003	0.336	0.302	0.638
2004	0.343	0.347	0.69
2005	0.375	0.468	0.843

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.28	0.26	0.54
1995	0.413	0.202	0.615
2000	0.461	0.367	0.828
2002	0.455	0.319	0.773
2003	0.456	0.323	0.778
2004	0.539	0.366	0.905
2005	0.575	0.447	1.022

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.414	0.213	0.627
2000	0.465	0.401	0.866
2002	0.46	0.36	0.82
2003	0.459	0.354	0.813
2004	0.542	0.389	0.931
2005	0.58	0.476	1.056

Luxembourg

Average Prices and Taxes in Euro **(real - 2000)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.156	0.274	0.430
1995	0.341	0.194	0.536
2000	0.343	0.346	0.689
2002	0.321	0.282	0.603
2003	0.314	0.283	0.597
2004	0.314	0.317	0.631
2005	0.335	0.418	0.753

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.347	0.322	0.669
1995	0.446	0.218	0.664
2000	0.461	0.367	0.828
2002	0.434	0.304	0.738
2003	0.426	0.302	0.728
2004	0.493	0.335	0.828
2005	0.513	0.399	0.912

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.447	0.230	0.677
2000	0.465	0.401	0.866
2002	0.439	0.344	0.782
2003	0.429	0.331	0.761
2004	0.496	0.356	0.852
2005	0.518	0.425	0.943

Mexico			
Average Prices and Taxes in Euro **(nominal)**			
Diesel (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	0.000	0.000	0.000
1995	0.054	0.125	0.180
2000	0.191	0.286	0.477
2002	0.282	0.236	0.518
2003	0.167	0.236	0.403
2004	0.095	0.266	0.361
2005	0.053	0.332	0.385
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.084	0.558	0.641
2002	0.092	0.612	0.704
2003	0.071	0.476	0.547
2004	0.169	0.339	0.508
2005	0.127	0.419	0.546
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.278	0.361	0.639
2002	0.391	0.309	0.701
2003	0.249	0.293	0.542
2004	0.169	0.339	0.508
2005	0.122	0.424	0.546

Mexico			
Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	0.000	0.001	0.001
1995	0.131	0.301	0.431
2000	0.191	0.286	0.477
2002	0.253	0.211	0.464
2003	0.143	0.202	0.345
2004	0.078	0.217	0.295
2005	0.042	0.261	0.302
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.084	0.558	0.641
2002	0.082	0.548	0.630
2003	0.061	0.407	0.468
2004	0.138	0.277	0.415
2005	0.100	0.329	0.430
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.278	0.361	0.639
2002	0.350	0.277	0.627
2003	0.213	0.250	0.464
2004	0.138	0.277	0.415
2005	0.096	0.333	0.429

Netherlands				Netherlands			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.260	0.239	0.499	1990	0.331	0.304	0.635
1995	0.411	0.291	0.702	1995	0.457	0.324	0.781
2000	0.477	0.368	0.845	2000	0.477	0.368	0.845
2002	0.47	0.320	0.79	2002	0.437	0.297	0.734
2003	0.471	0.324	0.795	2003	0.429	0.295	0.723
2004	0.509	0.380	0.889	2004	0.458	0.342	0.799
2005	0.535	0.488	1.023	2005	0.473	0.432	0.905
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.488	0.294	0.782	1990	0.621	0.374	0.995
1995	0.636	0.222	0.858	1995	0.707	0.247	0.954
2000	0.770	0.390	1.160	2000	0.770	0.390	1.160
2002	0.811	0.333	1.144	2002	0.754	0.309	1.063
2003	0.823	0.336	1.159	2003	0.749	0.306	1.055
2004	0.867	0.385	1.252	2004	0.780	0.346	1.126
2005	0.892	0.460	1.352	2005	0.789	0.407	1.196
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.491	0.309	0.8	1990	0.625	0.393	1.018
1995	0.64	0.245	0.885	1995	0.712	0.273	0.984
2000	0.779	0.429	1.208	2000	0.779	0.429	1.208
2002	0.825	0.385	1.21	2002	0.767	0.358	1.125
2003	0.831	0.380	1.211	2003	0.756	0.346	1.102
2004	0.874	0.424	1.298	2004	0.786	0.381	1.167
2005	0.901	0.506	1.406	2005	0.796	0.447	1.244

New Zealand

Average Prices and Taxes in Euro **(nominal)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.087	0.204	0.291
1995	0.030	0.227	0.258
2000	0.042	0.318	0.360
2002	0.037	0.281	0.318
2003	0.038	0.282	0.320
2004	0.045	0.344	0.390
2005	-	-	-

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.234	0.317	0.551
2002	0.251	0.279	0.530
2003	0.272	0.296	0.568
2004	0.297	0.355	0.652
2005	-	-	-

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

New Zealand

Average Prices and Taxes in Euro **(real - 2000)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	0.103	0.243	0.346
1995	0.033	0.244	0.277
2000	0.042	0.318	0.360
2002	0.035	0.266	0.301
2003	0.035	0.263	0.298
2004	0.041	0.314	0.355
2005	-	-	-

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.234	0.317	0.551
2002	0.239	0.265	0.503
2003	0.254	0.276	0.530
2004	0.271	0.324	0.595
2005	-	-	-

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

Norway			
Average Prices and Taxes in Euro **(nominal)**			
Diesel (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.778	0.442	1.220
2002	0.645	0.446	1.091
2003	0.619	0.429	1.048
2004	0.605	0.431	1.037
2005	0.678	0.567	1.246
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.455	0.292	0.746
1995	0.657	0.332	0.990
2000	0.894	0.408	1.302
2002	0.835	0.357	1.192
2003	0.806	0.365	1.171
2004	0.794	0.398	1.192
2005	0.871	0.482	1.352
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.460	0.321	0.781
1995	0.665	0.363	1.028
2000	0.901	0.439	1.340
2002	0.843	0.391	1.234
2003	0.814	0.396	1.210
2004	0.803	0.432	1.234
2005	0.879	0.517	1.396

Norway			
Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.778	0.442	1.220
2002	0.618	0.428	1.046
2003	0.579	0.401	0.980
2004	0.564	0.401	0.965
2005	0.621	0.519	1.141
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.573	0.367	0.940
1995	0.737	0.373	1.110
2000	0.894	0.408	1.302
2002	0.801	0.343	1.143
2003	0.754	0.341	1.095
2004	0.740	0.370	1.110
2005	0.797	0.441	1.238
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.580	0.404	0.984
1995	0.745	0.407	1.152
2000	0.901	0.439	1.340
2002	0.808	0.375	1.183
2003	0.761	0.370	1.131
2004	0.747	0.402	1.149
2005	0.805	0.473	1.278

Poland				Poland			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.139	0.174	0.313	1995	0.251	0.314	0.566
2000	0.337	0.299	0.637	2000	0.337	0.299	0.637
2002	0.376	0.295	0.671	2002	0.350	0.275	0.625
2003	0.344	0.300	0.645	2003	0.318	0.278	0.596
2004	0.370	0.330	0.699	2004	0.330	0.295	0.625
2005	0.461	0.460	0.921	2005	0.403	0.402	0.805
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.207	0.160	0.367	1995	0.375	0.289	0.664
2000	0.446	0.336	0.782	2000	0.446	0.336	0.782
2002	0.531	0.300	0.830	2002	0.494	0.279	0.773
2003	0.478	0.284	0.763	2003	0.442	0.263	0.705
2004	0.494	0.331	0.825	2004	0.441	0.296	0.738
2005	0.571	0.424	0.995	2005	0.500	0.371	0.871
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.215	0.194	0.409	1995	0.388	0.351	0.739
2000	0.455	0.379	0.835	2000	0.455	0.379	0.835
2002	0.541	0.348	0.889	2002	0.504	0.324	0.828
2003	0.488	0.331	0.819	2003	0.452	0.306	0.757
2004	0.501	0.366	0.868	2004	0.448	0.328	0.776
2005	-	-	-	2005	-	-	-

Source: EU Oil Bulletin
http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm

Portugal				Portugal			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.243	0.206	0.449	1990	0.392	0.334	0.726
1995	0.333	0.189	0.522	1995	0.380	0.216	0.596
2000	0.341	0.313	0.654	2000	0.341	0.313	0.654
2002	0.367	0.278	0.645	2002	0.340	0.257	0.597
2003	0.403	0.306	0.709	2003	0.361	0.274	0.635
2004	0.433	0.354	0.787	2004	0.379	0.310	0.689
2005	0.467	0.467	0.934	2005	0.400	0.400	0.800
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.417	0.236	0.653	1990	0.674	0.382	1.056
1995	0.544	0.223	0.767	1995	0.621	0.255	0.875
2000	0.428	0.439	0.867	2000	0.428	0.439	0.867
2002	0.604	0.273	0.877	2002	0.559	0.253	0.812
2003	0.657	0.308	0.965	2003	0.589	0.276	0.865
2004	0.687	0.346	1.033	2004	0.601	0.303	0.904
2005	0.719	0.425	1.144	2005	0.616	0.364	1.010
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.546	0.236	0.782	1995	0.623	0.269	0.892
2000	0.434	0.468	0.902	2000	0.434	0.468	0.902
2002	0.61	0.310	0.92	2002	0.564	0.287	0.851
2003	0.666	0.356	1.022	2003	0.597	0.319	0.916
2004	0.697	0.401	1.098	2004	0.610	0.351	0.961
2005	-	-	-	2005	-	-	-

Source: EU Oil Bulletin
http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm

Slovak Republic

Average Prices and Taxes in Euro **(nominal)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.302	0.161	0.463
2000	0.421	0.322	0.743
2002	0.386	0.273	0.659
2003	0.437	0.284	0.722
2004	0.497	0.348	0.845
2005	0.531	0.444	0.975

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.299	0.212	0.512
2000	0.422	0.362	0.784
2002	0.408	0.296	0.705
2003	0.463	0.295	0.758
2004	0.527	0.351	0.879
2005	0.556	0.410	0.966

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.299	0.212	0.512
2000	0.429	0.391	0.820
2002	0.419	0.344	0.764
2003	0.473	0.349	0.822
2004	0.538	0.406	0.943
2005	0.566	0.464	1.031

Slovak Republic

Average Prices and Taxes in Euro **(real - 2000)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.449	0.239	0.687
2000	0.421	0.322	0.743
2002	0.348	0.247	0.595
2003	0.364	0.236	0.600
2004	0.385	0.269	0.654
2005	0.400	0.334	0.734

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.444	0.315	0.759
2000	0.422	0.362	0.784
2002	0.369	0.268	0.637
2003	0.385	0.246	0.631
2004	0.408	0.272	0.680
2005	0.418	0.309	0.727

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.444	0.315	0.759
2000	0.429	0.391	0.820
2002	0.379	0.311	0.690
2003	0.394	0.290	0.684
2004	0.416	0.314	0.730
2005	0.426	0.349	0.775

Spain			
Average Prices and Taxes in Euro **(nominal)**			
Diesel (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	0.203	0.171	0.375
1995	0.319	0.174	0.493
2000	0.366	0.329	0.695
2002	0.389	0.300	0.689
2003	0.39	0.304	0.694
2004	0.398	0.357	0.755
2005	0.418	0.479	0.897
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.434	0.208	0.642
2000	0.485	0.334	0.819
2002	0.508	0.306	0.814
2003	0.509	0.308	0.817
2004	0.516	0.353	0.869
2005	0.528	0.431	0.959
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

Spain			
Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	0.298	0.251	0.548
1995	0.363	0.198	0.561
2000	0.366	0.329	0.695
2002	0.363	0.280	0.642
2003	0.353	0.275	0.628
2004	0.350	0.314	0.663
2005	0.355	0.407	0.762
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.494	0.237	0.731
2000	0.485	0.334	0.819
2002	0.474	0.285	0.759
2003	0.461	0.279	0.739
2004	0.453	0.310	0.763
2005	0.449	0.366	0.815
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

Sweden			
Average Prices and Taxes in Euro **(nominal)**			
Diesel (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.270	0.383	0.653
1995	0.407	0.281	0.688
2000	0.546	0.454	1.000
2002	0.524	0.392	0.916
2003	0.526	0.363	0.889
2004	0.552	0.384	0.937
2005	0.616	0.499	1.115
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.597	0.216	0.813
2000	0.754	0.372	1.126
2002	0.708	0.309	1.016
2003	0.722	0.308	1.031
2004	0.743	0.349	1.092
2005	0.770	0.410	1.180
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.604	0.244	0.848
2000	0.764	0.410	1.174
2002	0.716	0.341	1.057
2003	0.731	0.341	1.072
2004	0.751	0.378	1.129
2005	0.779	0.443	1.222

Sweden			
Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	0.340	0.481	0.821
1995	0.416	0.288	0.703
2000	0.546	0.454	1.000
2002	0.501	0.375	0.875
2003	0.493	0.340	0.834
2004	0.516	0.359	0.875
2005	0.573	0.465	1.038
Premium Unleaded Gasoline (95 RON) (litre)			
	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.611	0.221	0.832
2000	0.754	0.372	1.126
2002	0.676	0.295	0.971
2003	0.677	0.289	0.967
2004	0.694	0.326	1.020
2005	0.717	0.381	1.098
Premium Unleaded Gasoline (98 RON) (litre)			
	Tax Componant	Ex-Tax Price	Total Price
1990	-	-	-
1995	0.618	0.249	0.867
2000	0.764	0.410	1.174
2002	0.684	0.326	1.010
2003	0.685	0.320	1.005
2004	0.701	0.353	1.055
2005	0.725	0.412	1.137

Switzerland				Switzerland			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.399	0.249	0.648	1990	0.483	0.302	0.785
1995	0.550	0.232	0.782	1995	0.570	0.240	0.811
2000	0.559	0.363	0.922	2000	0.559	0.363	0.922
2002	0.586	0.325	0.910	2002	0.576	0.319	0.896
2003	0.566	0.328	0.894	2003	0.554	0.320	0.874
2004	0.562	0.375	0.937	2004	0.545	0.364	0.909
2005	-	-	-	2005	-	-	-
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.320	0.258	0.578	1990	0.387	0.313	0.700
1995	0.529	0.219	0.747	1995	0.549	0.227	0.776
2000	0.542	0.357	0.899	2000	0.542	0.357	0.899
2002	0.567	0.315	0.882	2002	0.558	0.310	0.868
2003	0.546	0.317	0.863	2003	0.534	0.310	0.844
2004	0.542	0.367	0.908	2004	0.525	0.356	0.881
2005	-	-	-	2005	-	-	-
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.530	0.244	0.774	1995	0.550	0.253	0.803
2000	0.544	0.386	0.929	2000	0.544	0.386	0.929
2002	0.571	0.353	0.924	2002	0.562	0.348	0.909
2003	0.548	0.347	0.894	2003	0.536	0.339	0.874
2004	0.544	0.391	0.934	2004	0.527	0.379	0.906
2005	-	-	-	2005	-	-	-

Turkey

Average Prices and Taxes in Euro **(nominal)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.443	0.313	0.756
2002	0.490	0.272	0.762
2003	0.538	0.283	0.820
2004	0.541	0.326	0.867
2005	-	-	-

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.627	0.387	1.014
2002	0.719	0.307	1.026
2003	0.756	0.306	1.062
2004	0.755	0.348	1.103
2005	-	-	-

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

Turkey

Average Prices and Taxes in Euro **(real - 2000)**

Diesel (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.443	0.313	0.756
2002	0.219	0.122	0.340
2003	0.192	0.101	0.293
2004	0.174	0.105	0.279
2005	-	-	-

Premium Unleaded Gasoline (95 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	0.627	0.387	1.014
2002	0.321	0.137	0.458
2003	0.270	0.109	0.379
2004	0.243	0.112	0.356
2005	-	-	-

Premium Unleaded Gasoline (98 RON) (litre)

	Tax Component	Ex-Tax Price	Total Price
1990	-	-	-
1995	-	-	-
2000	-	-	-
2002	-	-	-
2003	-	-	-
2004	-	-	-
2005	-	-	-

United Kingdom				United Kingdom			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.334	0.232	0.566	1990	0.434	0.302	0.736
1995	0.484	0.178	0.663	1995	0.507	0.187	0.694
2000	0.993	0.341	1.334	2000	0.993	0.341	1.334
2002	0.908	0.293	1.201	2002	0.885	0.285	1.170
2003	0.834	0.292	1.125	2003	0.802	0.281	1.082
2004	0.874	0.333	1.207	2004	0.829	0.316	1.145
2005	0.884	0.440	1.326	2005	0.822	0.409	1.223
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.342	0.245	0.587	1990	0.445	0.318	0.763
1995	0.483	0.173	0.656	1995	0.506	0.181	0.687
2000	0.989	0.322	1.311	2000	0.989	0.322	1.311
2002	0.902	0.264	1.166	2002	0.879	0.257	1.136
2003	0.829	0.269	1.098	2003	0.797	0.258	1.056
2004	0.871	0.312	1.183	2004	0.826	0.296	1.123
2005	0.884	0.390	1.267	2005	0.822	0.363	1.179
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	0.492	0.223	0.715	1995	0.515	0.234	0.749
2000	1.042	0.390	1.432	2000	1.042	0.390	1.432
2002	0.966	0.304	1.269	2002	0.941	0.296	1.237
2003	0.886	0.290	1.176	2003	0.852	0.279	1.131
2004	0.895	0.370	1.264	2004	0.849	0.351	1.200
2005	-	-	-	2005	-	-	-

Source: EU Oil Bulletin
http://europa.eu.int/comm/energy/oil/bulletin/time_series/index_en.htm

United States				United States			
Average Prices and Taxes in Euro **(nominal)**				Average Prices and Taxes in Euro **(real - 2000)**			
Diesel (litre)				**Diesel (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.068	0.176	0.245	1990	0.090	0.232	0.322
1995	0.090	0.136	0.226	1995	0.101	0.154	0.255
2000	0.128	0.300	0.427	2000	0.128	0.300	0.427
2002	0.125	0.243	0.368	2002	0.119	0.233	0.352
2003	0.105	0.246	0.351	2003	0.098	0.231	0.329
2004	0.097	0.288	0.385	2004	0.088	0.263	0.351
2005	0.097	0.412	0.509	2005	0.086	0.364	0.449
Premium Unleaded Gasoline (95 RON) (litre)				**Premium Unleaded Gasoline (95 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	0.074	0.205	0.279	1990	0.098	0.270	0.368
1995	0.078	0.195	0.273	1995	0.088	0.220	0.308
2000	0.109	0.375	0.485	2000	0.109	0.375	0.485
2002	0.107	0.330	0.437	2002	0.103	0.316	0.419
2003	0.090	0.325	0.415	2003	0.084	0.304	0.388
2004	0.083	0.356	0.439	2004	0.076	0.324	0.400
2005	0.083	0.447	0.530	2005	0.073	0.394	0.468
Premium Unleaded Gasoline (98 RON) (litre)				**Premium Unleaded Gasoline (98 RON) (litre)**			
	Tax Component	Ex-Tax Price	Total Price		Tax Component	Ex-Tax Price	Total Price
1990	-	-	-	1990	-	-	-
1995	-	-	-	1995	-	-	-
2000	-	-	-	2000	-	-	-
2002	-	-	-	2002	-	-	-
2003	-	-	-	2003	-	-	-
2004	-	-	-	2004	-	-	-
2005	-	-	-	2005	-	-	-

ANNEX 3. DECLARATION ON REDUCING CO_2 EMISSIONS FROM PASSENGER VEHICLES IN ECMT COUNTRIES

The Council of the ECMT and the Vehicle Manufacturing Industry (represented by OICA and ACEA), meeting in Vienna on 7-8 June, 1995, agreed as follows:

1. Background

In the 1992 Framework Convention on Climate Change (FCCC), the Governments of industrialised countries agreed to work towards the stabilisation of greenhouse gas emissions at 1990 levels by the year 2000, and to reduce them thereafter. Although the Framework Convention does not specify these targets at the sectoral level, it is clear that the stabilisation of transport-based greenhouse gases in Europe will be required over the medium term. However, it is also recognised that the constraints of market demands and cost-effectiveness will affect the time frame over which such a goal can actually be realised.

Many different measures will be needed to reduce greenhouse gas emissions from the transport sector. With direct responsibility for this sector, Transport Ministers will have a key role to play in the design and implementation of these measures. Because automobiles are a major source of the transport sector's carbon dioxide emissions (the most important greenhouse gas), automobile manufacturers will also be expected to contribute significantly to the reduction of these emissions.

ECMT Ministers and the vehicle manufacturing industry therefore agree on the need for a joint approach to reducing CO_2 emissions from automobiles. A voluntary accord between Government and Industry is an important opportunity for each to express their fundamental interest in improving the CO_2 performance of automobile construction and use.

This Declaration is one step toward that long-term goal. In moving along this path, it is recognised that, in the early stages at least, the process of working together to achieve tangible progress may be more important than any quantified environmental target. This Declaration is intended to accelerate that co-operative process.

2. Objectives

The objectives of this Declaration are:

- To substantially and continuously reduce the fuel consumption of new cars sold in ECMT countries.
- To manage vehicle use so as to achieve tangible and steady reductions in their total CO_2 emissions.

A number of governments have already introduced, or are considering introducing, CO_2 targets for the transport sector. Some are negotiating with Industry. This Declaration is not intended to limit the scope for such initiatives

It is also recognised that fuel economy is becoming a competitive issue within industry, though the starting points differ from country to country. Though this will influence fuel economy further action will be required on the part of both Government and Industry if these joint objectives are to be achieved.

In some instances, the primary initiative should be taken by Industry, with support from Government. In others, the reverse will be true. Although the degree of responsibility will vary according to the measure involved, each of these groups will have some role to play in the success of all measures.

3. Measures

3.1 Government measures

Policy framework

Governments will set the broad policy framework for the transport system. This policy should be economically-efficient and take full account of all environmental impacts.

Government will continue to use economic instruments, environmental regulations, information and other measures to influence the market for, and to encourage the use of, fuel-efficient vehicles in a safe, fuel-conserving, manner. Government will also strive to ensure that policy measures taken in related vehicle design areas (e.g. safety and noise) are consistent with the need to reduce greenhouse gas emissions.

In implementing the above commitments, Government will apply the following general principles:

a) Measures taken will be implemented in as cost-effective a manner as practical.

b) Government accepts that the demand for more fuel-efficient cars should come essentially from the consumer, operating in free markets. Government policies will therefore strive to encourage consumers to choose fuel-efficient vehicles, and to operate them in a fuel-efficient way.

c) Government will seek to avoid major disruptions in policy, aiming instead for gradual, steady, and consistent implementation, so as to decrease uncertainty in the marketplace.

d) Irrespective of the type of measure being employed, international co-ordination will be pursued, to help avoid discrimination among individual countries or firms, and to provide a coherent message to Industry about future policy directions in Europe as a whole.

e) Government will actively consult with Industry on all significant policy initiatives taken in the pursuit of the goals contained in this Declaration.

New technologies and road traffic informatics

Government will encourage the creation and introduction of new information technologies, where they can provide a cost-effective means to reduce congestion and related losses in fuel consumption. The potential of integrated traffic management systems will be given special attention (e.g. increased use of public transport, combined with controlled access to city centres; road information/guidance systems; appropriate infrastructural measures).

Fleet maintenance/replacement

Government undertakes to develop and introduce harmonised systems of regular vehicle inspection and maintenance, in order to make the existing automobile fleet as clean and fuel-efficient as possible. Government also undertakes to investigate cost-effective ways of encouraging the disposal/scrappage of the oldest, dirtiest and most fuel-inefficient vehicles, provided that this would improve total global emissions, calculated on a full-fuel-cycle basis.

3.2 Industry measures

Fuel-efficient new cars

Industry agrees to give a strong emphasis to developing, manufacturing and marketing vehicles with improved fuel efficiencies. As the owners and developers of car manufacturing technologies, Industry is well-placed to promote the incorporation of new, fuel-efficient, techniques into vehicle designs, so as to continuously and significantly improve the fuel consumption profile of the fleet.

Marketing

Industry undertakes to promote energy efficiency as a sales argument. Conversely, the concepts of power, acceleration, and maximum speed will *not* be used as major sales arguments.

Industry recognises that it occupies a special place in the transport marketplace, and therefore has a special duty to demonstrate to consumers how its vehicles can be used in an environmentally responsible manner. With regard to fuel efficiency, Industry will explicitly examine the idea of an advertising "code of practice".

3.3 Joint Government and Industry measures

Marketing

Based on existing EC criteria (Directive 93/116/EC) for measuring CO_2 emissions/fuel consumption, Industry and Government undertake to examine the possibilities of, and if appropriate, to define practical arrangements for, introducing a standardised labelling system for new cars.

Developing new technologies

Information technologies (telematics) often require new kinds of equipment for vehicles. Manufacturers and governments will co-operate closely to define the criteria such equipment should meet, as well as to introduce them in practice. For example, ERTICO, where some Governments and Industry are already both represented, provides one valuable mechanism for ensuring that this technology can be applied efficiently.

Research and Development

Government and Industry agree that more emphasis needs to be placed on improving R&D programmes related to CO_2 emissions from cars. Both therefore undertake to work toward better co-ordination of existing R&D efforts, especially at the European level. Because technology development is so crucial to future fuel efficiencies, all reasonable opportunities to encourage joint R&D programmes between Industry and Government should be fully explored. Existing R&D programmes of the European Union or of Industry (e.g. EUCAR), as well as the International Energy Agency's

Implementing Agreements related to research and development should all be exploited in this context. Both basic research and its uptake in the marketplace will be emphasized in these activities.

Information/education

Specialised information should be developed for vehicle users, vehicle dealers and importers, and driving instructors, in order to promote fuel efficiency with regard to car purchase, use and driver behaviour. Government and Industry agree to develop specialised education/information campaigns aimed at these individual publics.

Other initiatives

Government and Industry agree to study the environmental value and economic feasibility of further consumer-oriented initiatives that would help to improved driving style and fuel consumption as well as traffic management, including, for example, econometers or on-board computers to indicate fuel consumption, the relationship between power, speed capability and fuel economy, and fuel-conserving traffic management measures.

4. Monitoring

Governments and Industry agree to establish an appropriate system to monitor progress toward the goals contained in this ***Declaration***. This monitoring system should:

a) Analyse trends in the projected specific fuel consumption and/or CO_2 emissions of new cars sold in ECMTMember countries. Beginning in 1996, data will be provided annually for each ECMT Member country, and in a standardized form, on:

i) the number of new car registrations, making appropriate distinctions among vehicle characteristics; and

ii) specific fuel consumption (in litres/100 kilometres) and/or CO_2 emissions (in grammes per kilometre) of these cars.

b) Periodically assess the effectiveness and efficiency of measures taken by both Government and Industry towards achieving the objectives of this Declaration.

Beginning in 1997, and continuing biannually thereafter, Government and Industry (or the Industry Associations) will report on all measures taken in support of this Declaration, including a qualitative evaluation of the effectiveness of these measures.

c) Periodically review the objectives of this Declaration, in the light of future developments in the international debate concerning climate change.

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