TRANSPORT AND ENVIRONMENT

BACKGROUND REPORT AND SURVEY OF OECD, IEA AND ECMT WORK

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris

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FOREWORD

This working document includes two parts:

**Part I : The Background and Synthesis Report**, prepared by the OECD Secretariat’s Environment Directorate, presents an overview of key conclusions and findings that can be derived from recent work by the OECD, IEA and ECMT on road transport and the environment. It is intended to survey the current state of our knowledge and to help to assess the degree to which understanding of the potential effects of a wide range of possible policy responses could now offer the prospect of a comprehensive, integrated strategy for sustainable transport in OECD countries.

Section 2 of this paper describes the recent and projected evolution of road transport in OECD countries. Section 3 sets out the related environmental consequences. Section 4 summarises the wide range of individual policy measures (and to the extent possible, their known or anticipated effects) that the OECD has been able to identify so far which appear to have the potential to effectively mitigate the environmental impacts of road transport and eventually lead to sustainable transport. Section 5 describes recent attempts to estimate the overall effects of a comprehensive, integrated strategy for sustainable transport.

**Part II: The Survey of OECD, IEA and ECMT Work** presents an overview of recent, ongoing and planned work carried out by the OECD (STI, DCD, TDS, ENV), the IEA, and the ECMT on “Transport and Environment”. This survey was done to provide information to the corresponding bodies, highlight joint projects and interrelations between these activities and facilitate future co-operative efforts. An earlier survey was carried out, and distributed in May 1996. The current document is an update (as of mid-1997) which includes more recent developments and provides an outlook for future projects. It was prepared by the Pollution Prevention and Control Division of the Environment Directorate with the help and support of other OECD Directorates, the IEA Secretariat and the ECMT Secretariat, and is subject to revision as plans and activities in 1997-98 develop.

The OECD, the International Energy Agency, and the European Conference of Ministers of Transport have collaborated extensively and closely, within the frameworks of their respective work programmes, in carrying out the research and analysis on which this document is based. Given their respective mandates, each of these bodies has its own priorities and perspectives on the issues raised at the interface of environment, energy and transport policies. This stocktaking of recent work was undertaken by the OECD Environment Directorate as a contribution to the collective efforts of all three organisations. Its focus, however, is on findings and conclusions of particular relevance to the formulation of environmental policy. As such, it does not necessarily represent the views of the IEA, the ECMT or other bodies of the OECD.
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INTRODUCTION

The relationship between transport and the environment in OECD countries has been studied at the OECD, with varying degrees of intensity, for over 30 years. Air pollution, and to a lesser extent, noise, arising from road transport were the chief preoccupations of the OECD’s early work. From the late 1980s onwards, however, the overall level and scope of effort directed at work on transport and environment increased sharply, for two reasons. First, concern over the extent and magnitude of the environmental impacts of transport (air pollution, noise, accidents, congestion) had reached a level where not only environment ministers but transport ministers as well were forced to acknowledge the need to integrate transport and environment policies (e.g. the 1989 landmark resolution adopted by European Conference of Ministers of Transport). Second, growing concern about the global problem of climate change, and the significant contribution of transport thereto, led to major new work programmes by the OECD, the International Energy Agency (IEA) and the European Conference of Ministers of Transport (ECMT) in this field.

Thus, in the 1990s, an extensive body of work has been published by these three organisations, providing a broad and strong knowledge base about the development of the transport sector, the environmental implications of that development, and the wide variety of possible policy approaches that could mitigate the environmental impacts of transport in the short and medium term and lead ultimately to the design of sustainable transport policies in OECD countries. Road transport has been identified as having the largest repercussions by far for the environment and has therefore been the focus of most of the OECD’s work. In future, air transport is likely to receive greater scrutiny, given the increasingly significant impacts of this transport mode.

Two recent reports published in 1995 provide valuable syntheses of the results to date. Both drew heavily on the published work of the OECD, the IEA and the ECMT and take the form of proposals for comprehensive strategies for environmentally sustainable transport. These are "Motor Vehicle Pollution: Reduction Strategies Beyond 2010" (OECD 1995) and "Urban Travel and Sustainable Development" (OECD/ECMT 1995), see bibliography at the end of the document. The proceedings of the 1996 “Towards Sustainable Transportation Conference”, held in Vancouver, as well as those of several other major international conferences sponsored by the OECD, in co-operation with IEA and ECMT (Berlin, Stockholm, Düsseldorf, Mexico, Budapest), also provide valuable insights into what might constitute sustainable transport policy.
Access to people, goods and services has been, and remains, vital to economic development, in OECD countries as elsewhere. Transportation -- the movement of people and goods -- has been one of the principle means through which governments ensured access. In economic terms, transportation is an important activity in its own right: the production, maintenance and use of transport infrastructure and mobile equipment represent 4-8 per cent of GDP and 2-4 per cent of the labour force. However, some have questioned whether transportation’s share of GDP necessarily translates into improved societal welfare, especially given the many uncovered externalities such as air and noise pollution, accidents, land-take, and loss of productivity through congestion.

Historically, there has been a strong correlation between overall GDP growth and the expansion of the transport sector -- growth of GDP has been accompanied by a roughly similar growth in transport for both passengers and goods, and by much faster growth in transport by road. More recently, growth of the transport sector, and of road transport in particular, has exceeded that of GDP in many countries. Whether ongoing structural adjustment, improved logistics and the changing nature of economic activity can ultimately reduce the 'transport intensity' of OECD economies remains to be seen.

Road transport accounts for over four fifths of all transport related energy consumption, and is responsible for much of the transport sector's impact on the environment. The defining features of growth in road transport in OECD countries over the past 30 years are the steadiness and rapidity of that growth and the fact that it appears likely to continue, relatively unabated, well into the next century.

2.1 Passenger Traffic

More vehicles, carrying fewer passengers per vehicle, are making more and longer trips. On average for the OECD countries, and that for the past 20 years, the numbers of passenger cars has increased by around 3 % a year, while road passenger kilometres travelled have increased even faster at around 5%. Over the next two decades, in the absence of efforts to reduce demand, some scenarios suggest that both vehicles numbers and vehicle kilometres travelled will grow on average by 2 per cent per annum. Put another way, travel by car doubled between 1970 and 1990 and, on present trends, could double again within the next 30 to 40 years.

2.2 Freight Transport

A particularly striking feature has been the growth of goods transport by road: nearly 5 per cent p.a. over the last 20 years, faster than GDP growth and even faster than car traffic. Freight transport by road has won an increasing share of
goods transport, at the expense of rail and inland waterways. Structural changes in the economy and the expansion and improvement of road infrastructure have been accompanied by changes in the nature of goods transport: more powerful trucks can carry manufactured goods efficiently, while lighter trucks can ensure expeditious, timely and door-to-door delivery of high value-added goods. Improved reliability and availability of relatively cheap road freight is both a cause and effect in the trend towards 'just-in-time' production and enables manufacturers to reduce warehousing facilities.

Shifts in economic activity to suburban areas have led many firms to move to edge-of-town and out-of-town sites where they are no longer connected to existing rail and port terminals.

2.3 Factors Underlying the Growth in Road Transport

Many of the underlying factors responsible for the growth in demand for road transport in recent decades have been explored in the OECD literature, in particular by the ECMT and, from an urban environment perspective, by the OECD Urban Affairs Division. These factors include expanding economies and increasing consumer spending power, increasing urbanisation and sprawl -- the geographical spread of cities. As urban populations expand, land at the edges of urban areas becomes developed and new residential and employment subcentres emerge. These new subcentres’ dispersal and distance from older urban centres contribute to an increase in car travel that often supplants other modes like walking, cycling and public transport. Car dependency is further reinforced as new lifestyle patterns take hold and people spread their daily activities over a wider and wider geographical area.

OECD work has gone in somewhat less depth into the social, cultural and demographic dimensions of motor vehicle use in OECD societies. It is apparent that improved economic welfare and greater leisure time are shifting car travel away from commuter trips and increasingly towards social, leisure and shopping activities. ECMT work points to a number of social factors tending to increase demand for car travel: the growing proportion of the elderly in the population (now motorised to a high degree and with a strong propensity to continue driving as long as possible); greater access of women to cars as new drivers; growth in numbers of two-worker households; expectations of young people to drive earlier and more; and declines in household size leading to increases in car ownership.

Moreover, in most OECD countries, the car has come to symbolise both affluence and freedom. Personal mobility is highly valued and the automobile is often perceived to be the most convenient, flexible and comfortable travel mode. The car is seen not only as a highly personal and versatile means of transport, it may also serve as temporary shelter, office space, telephone booth, power tool, plaything and status object. Like a home, a car is often a highly valued part of an individual’s personal space.

A recent OECD overview of research pertaining to people’s travel behaviour has also highlighted other important factors that lead to and/or sustain high levels of car use. These include growing childhood dependence on car travel and its role in forming adult perceptions and behaviour, the emergence and persistence of car-centred travel habits, the impact of media and advertising messages and lack of experience with alternative transport modes.
2.4 Transport and Fuel Consumption

Data on transport activity across OECD countries continue to present difficulties of completeness, reliability and comparability. Data collected by the IEA on energy consumption by the transport sector are a valuable additional source of information. IEA statistics indicate that while other sectors of energy use in OECD countries rely on a variety of energy sources (indeed, important shifts away from fossil fuels have been noted in these sectors), transport remains almost completely dependent on oil. Road transport is 99 per cent oil dependent. Moreover, transport's share of total final oil consumption continues to grow significantly (e.g. from 43 per cent to 60 per cent between 1973 and 1988) while other sectors' dependence on oil has decreased, shifting to other sources. The IEA, in its 1994 World Energy Outlook, estimates that oil demand in the OECD transport sector will increase 1.5 per cent per annum through the year 2010, representing virtually all of the incremental demand for oil in OECD countries.

During the 1970s and early 1980s, fuel-efficiency targets were adopted in a few OECD countries, mostly voluntary in nature with the exception of the United States CAFE standards, and fuel efficiency of new vehicles (in test conditions) began to show significant improvement. However, this was only partially reflected in actual on-road fuel economy because of differences between official test results and on-road fuel use. In the mid-1980s, however, improvement in fuel efficiency of the vehicle fleet dropped off sharply in many OECD countries, reflecting low oil prices and increases in vehicle size, engine power and weight. The average fuel consumption of the car fleets in many OECD countries has actually increased since the mid-1980s.
The four main forms of negative environmental and social externalities arising from road transport -- are considered to be air pollution (including greenhouse gases and ozone depleting substances), noise, congestion and accidents. Taken together, these environmental and social externalities impose large costs on society, which are estimated to amount, at a minimum, to the equivalent of approximately 5 per cent of GDP in OECD countries. Urban populations are especially exposed to the negative impacts of motor vehicle traffic.

3.1 Air Pollution and Global Climate Change

Motor vehicle use in OECD countries is now generally recognised as the source of more air pollution than any other single human activity. In urban areas, where more than 70 per cent of the population of OECD countries live, levels of motor-vehicle-related pollutants frequently exceed internationally agreed air quality guidelines. High levels of air pollution, apart from generally lowering the quality of life in cities, are also directly responsible for a large number of adverse health effects, ranging in seriousness from respiratory problems to carcinogenesis. A great deal of attention has been devoted to health effects of transport-related air pollution, and more research is needed to improve and consolidate knowledge of health environmental impacts and risks.

Motor vehicle emissions are complex and include hundreds of compounds that are released into the atmosphere as gases, aerosols and particulates. Many of these compounds are transformed in the atmosphere, producing secondary pollutants such as tropospheric ozone (a component of summer smog), acid aerosols and carcinogenic hydrocarbons, that are sometimes more harmful than their directly-emitted precursors. Major air pollutants emitted by motor vehicles include carbon dioxide (CO$_2$), carbon monoxide (CO), particulate matter (PM), nitrogen oxides (NO$_x$), sulphur dioxide (SO$_2$) and volatile organic compounds (VOC). Highly reactive VOC species in vehicle emissions are, along with NO$_x$, emissions, the major motor-vehicle related precursors of tropospheric ozone (O$_3$). For a number of these pollutants, motor vehicles are the single largest source of total emissions in OECD countries, e.g. 89 per cent of CO, 52 per cent of NO$_x$, and 44 percent of VOCs.

Motor vehicles are also a major source of a number of toxic and carcinogenic air pollutants, including VOC species (e.g. benzene, 1,3-butadiene, formaldehyde, acetaldehyde and polynuclear aromatic hydrocarbons), lead, fine particulate matter, etc. Emissions of these substances are largely related to fuel composition or fuel additives, as well as engine technology, and are often results of incomplete combustion. An important fraction of overall motor-vehicle related VOC emissions is contributed through evaporative losses during fuel distribution, storage, transfer and vehicle refuelling, as well as from losses during vehicle use.

Among the different vehicles classes, automobiles are currently responsible for the greatest amount of polluting emissions,
particularly CO, VOC and CO₂. On the other hand, heavy-duty trucks and buses are responsible for half the world’s emissions of motor-related NOₓ in spite of a comparatively small share (around 5 per cent) of the vehicle population. They are also the source of a large share of fine particulate matter emitted by diesel engines. The high output of NOₓ and PM reflects not only the high fuel consumption and large amount of travel logged by heavy duty-vehicles, but is also indicative of comparatively poor standards and emission controls on this vehicle class.

Policies adopted by many OECD countries in the 1970s and 1980s proved effective in reducing emissions of some conventional air pollutants. For example, mean values of CO have been decreasing in most urban areas in OECD countries due to improvement in emission controls. After a period of steady increase during the 1980s, average concentrations of NOₓ have levelled off in many OECD countries. However, projections for the growth in motor vehicle traffic suggest that in the absence of new control measures, emissions of CO, hydrocarbons and NOₓ will rise again. And despite progress to date, pollution episodes due to motor vehicle emissions (e.g. smog) continue to occur frequently throughout the OECD area and are a subject of growing public concern. Moreover, smog and the ingredients of acid rain spread from urban areas, causing damage to surrounding regions.

In recent years, concern about the nature and scale of the climate change problem has led to numerous studies on the impact of the transport sector. CO₂ emissions from transport are directly proportional to gasoline and diesel fuel consumption. During a period when other sectors of energy consumption have begun to rely to a greater degree on other fuels, oil consumption by transport has been rising continuously. In OECD countries, transport accounts for more than 60 per cent of total oil consumption and about 20 per cent of total fossil fuel use. It is thus a major source of CO₂. Road transport generates other greenhouse gases, such as the CFCs (which are also ozone depleting) used in automobile air conditioning systems, NOₓ, etc...

3.2 Noise

Noise is generally perceived by urban residents as the first and foremost problem associated with road traffic. However, the effects of transport noise are not yet well understood, nor are there fully satisfactory measurements of noise and the nuisance it causes. Similarly, the monetary evaluation of the effects of noise is not very far advanced. Although the OECD carried out a major study in the late 1980s on noise pollution, this problem has been largely ignored in more recent work, and thus perhaps merits further attention (particularly as regards heavy-duty and two-wheeled vehicles).

Stricter standards for noise in vehicle and engine design, coupled with traffic calming measures (reduced speed limits, time and space restrictions on noisy vehicles), sound barriers and the development of quieter road surfaces can bring some attenuation of traffic noise pollution, at least by automobiles. However, these improvements are likely to be eroded by overall traffic growth. The problem is particularly severe in Europe and Japan. Roughly half of urban residents in European countries are adversely affected by noise and 17 per cent of Europeans are exposed to noise levels greater than 65 dB(A). In Japan, the figure is 30 per cent, while in the United States it is only 7 per cent.
3.3 Congestion

Traffic congestion is now a common feature in almost all large urban centres, not just in central and inner areas, but increasingly in the suburbs. Stalled and slow-moving “stop and go” traffic multiplies fuel consumption, pollution and noise. The cost of road congestion in OECD countries is estimated at about 2 per cent of GDP and constitutes a major nuisance for urban populations in particular. OECD studies have shown that building more roads in major urban centres has generally failed to ease congestion, and serves only to generate additional traffic. On the positive side, traffic congestion itself is becoming a significant constraint on urban traffic growth, albeit a costly one for those affected.

3.4 Accidents

In the transport and environment context, recent OECD work has not focused specifically on accidents although some projects have investigated the links between environment and integrated safety strategies. The ECMT does, however, maintain road accident statistics and has done some work on road safety. Rough estimates of the order of magnitude of the costs of accidents (medical care, lost production) have been made. Overall costs of road casualties and collisions in OECD countries are estimated to be equivalent to roughly 2 per cent of GDP.

Improved road infrastructure and safety features in vehicles, and increasingly stringent law enforcement have tended to reduce fatalities and injuries in some OECD countries. ECMT statistics show a slight although irregular decline in accident rates in recent years. Overall growth in road traffic (with a trend to more powerful, faster cars and heavier trucks) tends however to increase the risk of accidents. Excessive speed in built-up areas is considered to be the prime cause of accidents.

3.5 Internalising Social and Environmental Costs

The transport sector is characterised consistently in the literature as an important example of market failure to internalise the high social and environmental externalities. Transport markets in many OECD countries fail to make users pay the full cost of transport services. While some safety, health and environmental costs may partly be internalised through regulation, transport prices generally do not reflect the full social costs of noise and air pollution, increased risk of accidents or traffic congestion. ECMT has recently estimated these to be the equivalent of 5 % of GDP in ECMT countries (although this figure underestimates certain substantial costs, such as climate change, and ignores others, such as separation effects on ecosystems and human communities and damage to landscapes).

Knowledge of transport sector social costs is gradually improving as more and better research is done. The uncertainties that remain have many causes, most of these being related to the difficulty of calculating monetary values in the absence of markets, and to imperfect understanding of the harmful effects of transport in certain fields, such as noise or pollution. Internalisation need not only seek to account for currently uncovered costs but should also attempt to structure prices more efficiently so as to create incentives for adopting less environmentally harmful behaviour (e.g. shifting the balance from fixed to variable costs, eliminating distortion-causing subsidies, etc.) Internalising the social costs of transport has been and remains a major theme of work by the ECMT and OECD.
4 POLICY MEASURES AND THEIR EFFECTS

The published OECD, IEA and ECMT literature considered in this review has identified and analysed a broad range of policy measures which have the potential to mitigate the adverse environmental effects of transport. The reports of a series of major international OECD conferences focused on specific subjects like public transport (Budapest 1994), clean and fuel efficient automobiles (Mexico 1994, Berlin 1991, Rome 1990), urban transport (Düsseldorf 1993), urban electric vehicles (Stockholm 1992) and sustainable transportation (Vancouver, 1996).

As mentioned in the introduction, two OECD publications produced in 1995 have attempted to present comprehensive and integrated strategies for developing environmentally sustainable transport. "Motor Vehicle Pollution: Reduction Strategies beyond 2010" focuses primarily on technological approaches to emissions reductions and fuel efficiency improvements. "Urban Travel and Sustainable Development" elaborates a three-tiered strategy emphasising land-use and transport policies and the use of progressively higher fuel prices as an economic instrument to reduce travel demand. These two reports provide the basis for the measures described below.

The complex interrelationships among most of the measures proposed are such that it is difficult to present them within any one simple framework or structure. The discussion that follows looks first at the scope that exists for technological solutions to reducing the environmental impact of transport. It then considers measures designed to modify and/or reduce transport demand. Finally, it looks at the potential of institutional reform for improved policy integration, as well as the role of international cooperation.

4.1 Technological Measures for Clean, Fuel-Efficient Motor Vehicles

Numerous recent OECD studies have pointed to the very considerable potential of technological measures to reduce the environmental impacts of motor vehicles. There appears to be a wide degree of consensus that the measures described below hold the greatest near-term promise, and as such, merit serious consideration by policy-makers. It should be noted however that in the absence of large scale, real-world experience of these measures, legitimate questions as to their actual cost-effectiveness remain unanswered. The fact that much of this technology exists already, yet has not been taken into wide-scale use, suggests that there are economic, political and social barriers to their uptake which require further exploration.

Emission controls

In most OECD countries, the approach taken to reducing air pollution from motor vehicles has been to incite technological improvements by introducing or tightening motor vehicle emission performance standards. This regulatory approach is a direct and effective way to address vehicular emissions. The related testing, enforcement and administrative mechanisms are already in place, are familiar to regulators, politicians, manufacturers and consumers, and have proven (where rigorously applied) an effective means to
encourage development and implementation of better technology to control emissions.

At present, combinations of advanced emission control technologies already exist that could allow cars and other light duty vehicles to meet tailpipe emission standards 50 to 80 per cent tighter than the most stringent values currently in effect in any OECD country. Similarly, available control techniques can reduce current evaporative emissions by 75-90 per cent.

Essential for the success of emission control standards, in particular so they have a continuing impact on the in-use fleet, are improved and vigorously applied inspection and maintenance (I/M) programmes. For maximum effectiveness, I/M systems include certification/type approval, factory testing of new models, regular inspection and random roadside checks. It is estimated that effective I/M programmes would significantly reduce the pollution burden from the existing vehicle fleet operating under current standards (on the order of 25 per cent for HC and CO and about 10 per cent for NOx).

Tighter standards and more effective I/M are especially necessary for heavy-duty vehicles (for which today's emission limits are generally considered inadequate) and for two-wheeled vehicles (which generally have escaped standard-setting altogether). The noise and visible pollution (particulates) produced by these two categories of vehicle are perceived by the public as two of the most intrusive forms of road traffic pollution.

Attention has been devoted recently to controls for evaporative emissions, which can contribute as much as 30-40 per cent of total motor vehicle emissions of VOCs. Regulating the volatility of fuels sold commercially is one means of reducing these emissions.

Other technologies that appear to offer considerable scope for additional emissions reductions include in-engine emission controls, exhaust gas recirculation, on board electronic controls, and improved exhaust gas treatment systems.

**Fuel efficiency improvements**

It is estimated that existing vehicle design and engine technologies are rapidly capable of securing significant improvements in vehicle fuel efficiency (of the order of 20 per cent). If lower performance were accepted (reduced engine power, reductions in weight), improvements of 50-60 per cent or more could be achieved with limited technological development implications. Indeed, in the early 1980s, European manufacturers had already developed full size gasoline-fuelled prototypes for 4-5 passengers which achieved 2-3 l/100 km (80-100 mpg) with top speeds of over 150 km/h.

Reductions of vehicle weight, improved aerodynamics, lower rolling friction for tires, down-sized engines (corresponding to maximum authorised speeds), turbo-charging, lean-burn combustion, engine and catalyst preheating, direct fuel injection and electronic ignition controls have all been demonstrated as capable of increasing fuel efficiency and reducing emissions.

Market forces, responding to low oil prices since the mid 1980s, have not created the incentives to optimise the use of the considerable technological potential -- much of it production ready for some time -- to improve fuel efficiency. Fuel efficient models have in general sunk to the bottom of the market, while manufacturer's publicity campaigns have tended to focus on large, high-performance and fuel-intensive models. Faced with tough international competition in the automobile industry and cyclical variations in the oil market, governments have been reticent, since the middle of the 1980s, to mandate greater fuel efficiency.

Action then appears to be needed by governments to provide incentives through measures such as mandatory fuel economy targets, combined with the development of economic instruments aimed at vehicle manufacturers and consumers, geared to fuel efficiency (fuel taxes, vehicle-related taxes designed to discourage the purchase of
fuel-intensive vehicles). As to the relative merits of regulatory approaches (standards, targets) and economic instruments, experience has been varied. There is evidence to suggest that mandatory fuel-efficiency targets were effective in stimulating improvements in fuel efficiency in North America in the late 1970s and early 1980s. High oil prices seem to have been responsible for fuel economy improvements in Europe. There are strong arguments for complementary use of both kinds of approaches in motivating manufacturers (and ultimately consumers) to pursue increased fuel efficiency. Voluntary agreements with industry, associated with targets, could also be an effective approach.

Alternative fuels

Although earlier interest in alternative fuels was inspired largely by energy supply and security considerations, their potential to alleviate environmental problems of fossil-fuel consumption generated considerable further attention in the 1990s. Work has focused on liquefied and compressed natural gas (LNG/CNG), liquefied petroleum gas (LPG), methanol/ethanol, hydrogen and electricity (from batteries or fuel cells). Direct subsidies, tax exemptions and other incentives are already being used by some OECD governments to promote alternative fuels and the associated technology and infrastructure. Regulatory mandate, an approach now being tested by the State of California, seems to have been effective in accelerating electric car research and development by vehicle manufacturers worldwide.

Although alternative fuels are used today in small, specialised niche markets, the low price of oil and limited availability of alternative fuels continues to mitigate against large-scale switching, which would also entail high initial costs for production facilities, distribution networks, and suitably designed vehicles. Alternative fuels thus are unlikely in the short term to contribute significantly to sustainable transport (with the possible exception of electricity-driven city cars). There is little doubt that sooner or later, the transition to alternative transportation fuels will be necessary, for a combination of energy security, oil scarcity and environmental reasons.

Overall effectiveness of "technological fixes"

The OECD literature suggests that widescale adoption of best available technology already in use would, of itself, bring significant reductions in fuel consumption and pollution, especially if strong enforcement, inspection and maintenance programmes were implemented in all OECD countries. Further significant gains, as mentioned above, could be attained if technologies that are already at the prototype/demonstration stage were adopted. Market forces have so far failed to generate widespread use of best available technologies, so that the case appears strong for government intervention to progressively tighten standards and develop economic instruments designed to accelerate the adoption of today's optimal technology.

The effective use in the past of such approaches (mandatory standards, differentiated taxes on fuels, vehicle purchase and road taxes favouring cleaner, more efficient vehicles) suggest that this is one way to go. The fact that the average time for technological improvements (once commercially available) to diffuse through the entire vehicle park is about 10-15 years argues for early adoption of these policies, with a tight calendar for their implementation, and on an internationally co-ordinated basis.

As noted above, many questions remain about the cost-effectiveness of "technological fixes". Not only manufacturers and consumers, but many policy-makers as well, argue that it remains to be proven that increasingly costly measures associated with further "greening" of the automobile will indeed be fully compensated by environmental and social benefits. To the extent that higher costs for transport translate into constraints on suppliers and users of transport goods and services, there is a perception that what might be gained in environmental terms may be lost in other respects, whether through decreased
individual mobility or more broadly in terms of economic losses to producers and consumers. The economic, political and social barriers to the rapid and wide scale introduction of new anti-pollution and fuel-efficient technologies are acknowledged in the OECD’s work, but have not themselves been the object of in-depth study. Closer examination of these barriers, and the need for better analytical tools to assess the real cost-effectiveness of anti-polluting technologies provide a rich and indeed essential agenda for further work.

Capital Stock Turnover in the Transport Sector

Ongoing IEA work in co-operation with OECD/ENV addresses the issue of how quickly the automotive, truck and aircraft park is replaced. New energy-producing or energy-using capital equipment consumes considerably less energy than the older equipment it replaces. Capital stock turnover (CST) results in lower energy use and lower CO2 emissions. While newer capital stock generally involves lower operating costs, the feedback response between these lower costs and output or activity is small. Economic growth leads to growth in capital stock. Capital stock turnover leads to continually lower energy use and emissions per unit of output.

Compared with the life-spans of other energy-producing and energy-consuming equipment, the mean life of stock in this sector is relatively short. The technical potential for reducing energy use remains very large, especially for automobiles and light-duty trucks.

The scale of future energy consumption and carbon dioxide emissions from this sector will be determined largely by: the level and nature of future travel demand; future growth and CST in road automobiles, light-duty and heavy-duty trucks and aircraft and their energy efficiency; and the type of fuel used and its carbon dioxide emissions attributes.

4.2 Examples of Policy Instruments for Promoting Clean and Fuel-efficient Automobiles

OECD work has examined various economic and regulatory instruments that could encourage and accelerate the uptake of better, if not best-available, technologies for clean, fuel-efficient vehicles.

Economic Instruments

Fuel pricing
Fuel prices reflecting the high social costs linked to fuel use could both restrain growing demand for fuel consumption and stimulate demand for more fuel efficient technologies. Higher fuel prices could also be one means of beginning to internalise some of the environmental and social costs of road traffic. A recent OECD analysis of “no regrets” fuel taxation options-- that is, options that are beneficial for reasons other than their environmental impact -- has determined that these measures could contribute substantially to reducing fuel use. Options include shifting the burden of taxation from vehicles to fuel, ensuring that governments recuperate the costs of providing transportation-related infrastructure through fuel taxes and indexing fuel costs to pay for uncovered costs associated with traffic congestion, accidents, air pollution, noise and land-use impacts. Fuel price increases justified on
these three grounds are likely to vary according to local, regional and national conditions. For instance, some countries’ may already recover all of the costs associated with infrastructure provision through their fuel taxes while others may not yet do so. Harmonisation of such “no regrets” taxes may therefore not make sense at the international level given the variation in different countries’ existing levels of costs and taxation. However, agreement to implement a minimum level of tax increase and/or the harmonisation of charges at the regional level might make good sense in order to ensure reductions in fuel use and the wider adoption of fuel efficient technologies.

“Feebates” (vehicle purchase taxes/rebates based on energy efficiency)
Several countries have investigated indexing a portion of vehicle purchase taxes according to fuel efficiency or emissions. Such mechanisms would tax vehicles with high fuel consumption or emissions while providing consumers with rebates for purchasing vehicles with lower few consumption or emissions. Other countries have indexed vehicle sales taxes according to the vehicle’s purchase price and/or engine size. These indirectly account for fuel economy since, in general, higher priced vehicles tend to have lower fuel economy (because of heavier weight, greater number of energy-consuming features such as air conditioning and more powerful engines). However, such sales taxes may not be the most effective vehicle taxation option since they do not provide a direct incentive to improve energy efficiency. Feebates, on the other hand, provide such an incentive -- even in those cases where gains in energy efficiency add a cost to the vehicle purchase price.

Regulatory Instruments
Fuel efficiency and emission standards
These measures, whether mandatory or voluntary, are considered to be effective by many in that they leave industry the flexibility to choose the best system and technology to meet a given standard (for fuel efficiency or pollution control) at least cost. Whether expressed as fuel economy or CO₂ emission standards, targets might become increasingly stringent over time according to a clear, long-term calendar based on the known potential for improvements, and be supported by economic incentives.

Speed limits
A convergence of speed limits across OECD countries on what are already widely accepted values (e.g. 50 km/h in built-up areas, 90 km/h on roads and 110-120 km/h on motorways) and effective enforcement could reduce accidents, pollution and fuel consumption.

Other areas where regulatory approaches would appear to still have considerable scope are inspection and maintenance programmes, eco-labelling and consumer information, and driver training and education programmes.

4.3 Influencing Demand for Transport

Even though "technical fixes" show strong potential to reduce pollution through stronger emission controls and improved fuel efficiency, it is foreseen that unconstrained growth of traffic will ultimately overwhelm these gains. Thus, a second important and complementary strategy goal is to simultaneously influence demand for motor vehicle travel. There is thought to be scope in the longer term for land-use planning to reduce demand for travel and/or shift it to other less harmful modes, and in the shorter term to use a wide variety of measures to control road traffic, promote public transport, etc. Reducing road traffic by these means presents the added advantage of meeting other objectives in addition to pollution reduction, e.g. noise and congestion reduction, traffic safety and improvement of the quality of life in general.
Land use and transport planning

Carefully conceived and integrated urban land use and transport planning is considered by many to be a potentially effective approach, in the longer term, to significantly modifying demand for travel, especially in favour of public transport. However, the OECD literature suggests that even today, transport planning and urban development tend in general to go their separate ways.

A key lesson that emerges from OECD work, around which there is wide consensus, is that the provision of additional road infrastructure is rarely a solution, but rather adds to the problem. More roads generate more traffic, have not in general reduced problems of congestion, and incite more people to switch from public transport to car driving.

Land-use planning that concentrates homes, jobs and other attractors like shops and recreational facilities, whether in city centres or in new suburbs and new towns, should theoretically reduce overall travel demand in the longer term. However, the evidence shows mixed results, not least of all due to a strong propensity on the part of individuals to accept longer travel times, usually in their cars, in order to retain access to a wider variety of job, housing, shopping and recreational opportunities.

Ways in which planning policies might influence travel demand to favour public transport include:

- concentrating high-density residential development and new residential areas, together with trip-attracting facilities, in areas well served by public transport;
- using developer contributions, or revenue from parking charges and tolls, to finance public transport infrastructure;
- restricting access to town centres by parking charges, tolls, or outright bans, while encouraging suburban residents to “park and ride”.

Public transport

In the OECD area, travel by public transport has barely changed in volume in recent decades, and has declined sharply as a proportion of all passenger travel. Many OECD countries continue to make significant investments in public transport, seeing the expansion and improvement of public transport as the preferred means of improving overall transport capacity while reducing reliance on road traffic. The evidence shows however that these investments are more likely to be effective and economical in areas of high population density than in relatively low density areas. However, public transport, when operated at only a portion of its full capacity, can have a greater environmental impact than car use. This suggests that efforts ought to be made (including, perhaps, restrictions on single occupant vehicle travel, pricing mechanisms and/or incentive programmes) to ensure that public transport is not impeded by car traffic and operates at or close to its full capacity.

Outside of city centres, the difficulty for land-use and transport planners lies in reversing decades of urban planning based on -- indeed impelled by -- motor vehicle transport. Existing suburban infrastructure presupposes heavy reliance on the personal automobile, while the widely dispersed, low density development typical of suburbs can pose serious obstacles to the economical operation of public transport networks. Also, once travellers have made the switch to the private car, for whatever type of journey, it is extremely difficult to persuade them to switch back to public transport.

The case is often made for using revenues from fuel taxes, road pricing and other economic instruments to support the further development of public transport in urban areas. There appears to be scope in most OECD countries to increase the attractiveness of public transport through:

- extension of network coverage, capacity and frequency;
• enhancement of speed and accessibility, e.g. by designated freeway or street lanes for public trams, buses and multi-occupant vehicles;
• reduced or simplified fare structures;
• improved comfort and security;
• expanded parking at main transit terminals and development of park and ride programmes in suburban areas.

Traffic management in urban areas

Parking controls are still the most common means of restraining traffic in urban areas of most OECD countries. They seem to be accepted by the public and are reasonably enforceable. Wider use of measures affecting the availability and price of parking include limiting the amount of parking provided with new commercial developments, and shifting the supply of parking from central to suburban districts (to favour park-and-ride). Significantly higher charges for parking, coupled with strict enforcement, can effectively discourage motorists from driving into city centres.

Restricted access, e.g. pedestrian zones and streets reserved for public transport, pedestrians and cyclists, seem to find public acceptance in spite of initial misgivings. Some additional road infrastructure may be warranted in this context if it serves to route traffic around closed areas. Experience in OECD countries with using tolls to regulate access to city centres remains limited, but has been shown to be feasible.

Traffic calming can be achieved by stricter enforcement of existing speed limits, reducing speed limits, re-routing of traffic, and by the use of telematics to adjust traffic flow to current conditions.

Employer-based programmes can reduce demand for low-occupancy commuter travel, e.g., teleworking, initiatives to support multi-occupant travel through parking restrictions or financial incentives, substitution of free public transport passes for free parking, etc.

Freight transport can be better managed by restricting times of movement in city centres to off-peak hours and by transferring goods at points outside city centres from heavy road vehicles to smaller, quieter inner city delivery vehicles.

Education, information and public consultation. These instruments have the potential to influence the choice of transport means, routing and driving behaviour and habits, although there is little evidence in the literature that they have been extensively used with the aim of reducing demand for transport.

Pricing mechanisms and transport demand

Research and discussion on "getting the prices right" for the transport sector have been at the heart of much of the recent work by OECD, ECMT and IEA. The magnitude of the external social and environmental costs of road transport is recognised to be very high. It is argued that the internalisation of these costs, using a variety of pricing mechanisms, would in itself have a major impact on the demand for transport and hence, on the social and environmental impacts of the sector.

Many studies have examined the feasibility of alternative policy options to internalise the environmental and social costs of transport. Despite this, the policy response has been comparatively slow, and there remains a marked divergence between the policies which are often advocated and their acceptance into transport policy. For example, road-pricing to help optimise urban traffic flows has been given serious consideration by several OECD countries, but none has moved beyond the exploratory stage.

Strict internalisation of all of the external costs and benefits associated with transport is unlikely to prove either realistic or attainable. More important in practice may be the quasi-internalisation of these external effects by the more widespread adoption of appropriate economic and command-and-control instruments.
Road pricing, i.e., tolls for the use of road infrastructure (express highways, bridges, tunnels) are a familiar feature in many OECD countries. While effective and reliable technical systems for charging for the use of roads have been demonstrated, OECD countries have yet to use this mechanism in any systematic way as a deliberate tool to manage traffic demand and/or internalise environmental costs.

In the joint OECD/ECMT report "Urban Transport and Sustainable Development", considerable attention was paid to the thesis that potentially the most efficient measure to reduce road transport demand would be a significant rise in the real price of fuel over the longer term. This measure, it is argued, could both reduce demand for, and improve the efficiency of, motor transport. Substantial and steadily increasing fuel prices could influence life-styles, vehicle design, locational decisions, driver behaviour, choice of travel mode and length of journeys. Car use, fuel consumption and emissions would be reduced. The announcement of long-term real price increase strategies would allow people to adjust their behaviour more easily and with greater certainty to a new relative price situation. Theoretically these are convincing arguments, however, such a policy has not yet been put into practice -- primarily due to low public acceptance. In order to gain acceptance, such a policy would need to be designed and implemented in co-ordination with other tax and price policies so that its effects are revenue neutral.

4.4 Institutional Arrangements for Improved Policy Integration

While governments are constrained in various ways and degrees in influencing the behaviour of producers and users of transport goods and services, they do have scope to improve how they themselves deal with transport and environment issues. Integrated policy-making for transport remains hampered to a large extent by fragmentation of policy responsibility both horizontally (across transport, environment, energy, finance and industry ministries/departments) and vertically (across central, regional and local governments). A more coherent approach would help to avoid the many instances of measures -- aimed at developing the transport sector, improving the environment or at conserving energy -- working at cross purposes with one another.

4.5 International Co-operation for Sustainable Transport

The role of international co-operation has also received attention in OECD work. In view of the strong international competition on automobile markets, and the pressures of national manufacturers on their governments, effective action needs to be taken at the international level to ensure simultaneous decisions, common goals and constraints, and fair competition. Governments should work together to develop economic and regulatory frameworks that are stable, equitable and internationally co-ordinated.

Internationally agreed standards for air quality, motor vehicle emissions and fuel economy and quality would greatly facilitate the necessary adjustment by vehicle and fuel manufacturers. The adoption of compatible testing and measurement procedures would be an important step in this direction.

Similarly, co-ordinated action at the international level may be the only way that fiscal and pricing mechanisms for restraining transport demand, notably fuel or energy taxes, could work effectively.
Actual demonstrated effects of many of the policy measures described in Chapter 4 remain largely anecdotal and highly dispersed in the OECD literature (much of which is based on case studies). No OECD country has implemented a comprehensive and effective sustainable transport policy in which the interrelationships, synergies and/or neutralising effects of the wide range of measures described above have been demonstrated. Moreover, it is accepted that given the wide disparity in transport situations and environmental conditions across OECD countries -- indeed sometimes within individual countries -- the relevance and efficacy of any given sustainable transport measure or combination of measures are likely to vary widely. At the 1996 OECD Conference Towards Sustainable Transportation delegates did suggest that some common framework for action was necessary. They suggested a series of Sustainable Transport Principles that might serve to guide transport and environmental policy-making (see box).

The Environmentally Sustainable Transport Project (EST) of the OECD has sought to give more meaning to the term “sustainable transport” by seeking to develop and test a qualitative and quantitative vision of sustainability in the transport sector. Qualitatively, environmentally sustainable transport is:

Transport that does not endanger public health or ecosystems and meets needs for access consistent with (a) sustainable use of renewable resources at below their rates of regeneration, and (b) use of non-renewable resources at below the rates of development of renewable substitutes.

The EST project chose six quantified criteria as being the minimum necessary to address the wide range of transportation impacts. The criteria were chosen in response to the following types of impact on the environment:

- Local and regional impacts of atmospheric emissions.
- Global impacts of atmospheric emissions.
- Local and regional impacts not resulting from atmospheric emissions.

The six criteria for EST developed during Phase 1 were these:

1. Transport-related emissions of nitrogen oxides (NO\textsubscript{x}) have been reduced to the extent that the objectives for ambient NO\textsubscript{2} and ozone, as well as nitrogen deposition, are achieved.
2. Emissions of volatile organic compounds (VOCs) have been reduced to the extent that excessive ozone levels are avoided, and emissions of carcinogenic VOCs from vehicle transportation have been reduced to meet acceptable risk levels.
3. Emissions of particulates have been reduced to the extent that harmful ambient air levels are avoided.
**Vancouver Principles for Sustainable Transport**

*Following the 1996 Vancouver Conference Towards Sustainable Transport, these principles were revised and accepted by the OECD Pollution Prevention and Control Group’s Task Force on Transport. They have since been incorporated into the CEI Environment Ministers’ Declaration “Towards Sustainable Transport in the CEI Countries” adopted on June 25 1997 in New York.*

<table>
<thead>
<tr>
<th>Principle</th>
<th>Text</th>
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<tbody>
<tr>
<td><strong>ACCESS</strong></td>
<td>People are entitled to reasonable access to other people, places, goods and services</td>
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<tr>
<td><strong>EQUITY</strong></td>
<td>In meeting the basic transport-related needs of people, including women, the poor, the rural, the disabled and children, nations, states and the transport community must strive to ensure social, interregional and intergenerational equity. Developed economies must work in partnership with developing economies in fostering practices of sustainable transport.</td>
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<tr>
<td><strong>INDIVIDUAL AND COMMUNITY RESPONSIBILITY</strong></td>
<td>All individuals and communities have a responsibility to act as stewards of the natural environment, undertaking to make sustainable choices with regard to personal movement and consumption.</td>
</tr>
<tr>
<td><strong>HEALTH AND SAFETY</strong></td>
<td>Transport systems should be designed and operated in a way that protects the health (physical, mental and social well-being) and safety of all people, and enhances the quality of life in communities.</td>
</tr>
<tr>
<td><strong>EDUCATION AND PUBLIC PARTICIPATION</strong></td>
<td>People and communities need to be fully engaged in the decision-making processes about sustainable transport, and empowered to participate.</td>
</tr>
<tr>
<td><strong>INTEGRATED PLANNING</strong></td>
<td>Transport decision-makers have a responsibility to pursue more integrated approaches to planning. They must involve partners from relevant sectors such as environmental, health, energy, financial, urban design, etc.</td>
</tr>
<tr>
<td><strong>LAND AND RESOURCE USE</strong></td>
<td>Transport systems must make efficient use of land and other natural resources while preserving vital habitats and maintaining biodiversity.</td>
</tr>
<tr>
<td><strong>POLUTION PREVENTION</strong></td>
<td>Transport needs must be met without generating emissions that threaten public health, global climate, biological diversity or the integrity of essential ecological processes.</td>
</tr>
<tr>
<td><strong>ECONOMIC WELL-BEING</strong></td>
<td>Taxation and economic policies should work for, and not against, sustainable transport. Market mechanisms must account for the full social, economic and environmental costs, both present and future, in order to ensure users pay an equitable share of costs.</td>
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</tbody>
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1. Climate change is being prevented by achieving per-capita carbon dioxide emissions from fossil fuel use from transportation consistent with the global protection goals for the atmosphere.

2. Land surface in urban areas is used for the movement, maintenance, and storage of motorised vehicles, including public transport vehicles, such that the objectives for ecosystem protection are met.

3. Noise caused by transportation should not result in outdoor noise levels that present a health concern or serious nuisance.

The EST project has developed a series of “business as usual” trend scenarios for the year 2030 in the French-Swiss-Austrian Alpine region, Germany, the Netherlands, Sweden, the Québec-Windsor corridor, and the Oslo Metropolitain area. These have been contrasted with “Environmentally Sustainable Transport” scenarios in which all six EST criteria have been met. The project is currently undertaking a “back-casting” exercise where participants work back from the EST scenario in order to determine what type of measures will be needed in order to achieve environmentally sustainable transport in their region and or country.

Previous to the EST project, a joint OECD/ECMT Working Group on Urban Travel and Sustainable Development sought to broadly estimate the effects of three tiers or "strands" of measures: the rapid implementation on an OECD-wide basis of best practices and best available technologies; the gradual introduction of innovative policies; and the introduction of a substantial and steadily increasing fuel tax.

The first strand, called "Best Practice", would involve widespread use of tried and tested measures in land-use planning, traffic management and the improvement of public transport, associated with wide acceptance of today's strictest standards and targets relating to environmental quality and road safety.

This could bring about some changes in travel patterns, chiefly in inner city areas, where traffic levels could be stabilised. Noise and congestion would be little affected outside city centres and overall travel by car would continue to grow, if perhaps at a slightly reduced rate. Pollution levels should diminish in response to tighter fuel economy and emission standards, but even with today's most stringent fuel economy targets, CO₂ emissions would continue to rise.

"Policy innovations", the second strand, would rely heavily on land-use planning and traffic management measures, some of which are still at the research and development stage. Land-use planning would be used to influence the location of jobs and homes so as to widen travel choices. Congestion pricing and telecommunications would be used to bring demand and supply for road space into balance.

Land-use planning measures would determine which types of settlements should expand, where major developments should locate (e.g. concentrating major attractors such as offices and shops in areas well served by public transport). Land uses would be integrated with public transport routes, roads, cycle and walkways. Strictly enforced speed limits would be applied more extensively on through roads and traffic calming would be extended to most residential and school areas. Traffic management measures would include an integrated package of congestion pricing, reductions in city-centre parking, bus priorities, park-and-ride services and investment in transit infrastructure.

Congestion and pollution would be reduced substantially. Noise would continue to be a problem, particularly in the absence of strong action aimed at motor bikes, motorcycles and heavy duty vehicles. Safety levels would improve and people without cars would be able to travel more easily. Car owners would have more attractive alternatives to travel by public transport, on foot or by bicycle. Dependence on
cars would be reduced and traffic growth in urban areas might cease altogether, though overall travel levels and CO₂ emissions would continue to rise.

The third strand, referred to as "Sustainable Development", adds, to the first two groups of measures, a progressively increasing fuel tax to significantly reduce vehicle travel. Taking into account IPCC targets, the example considered is that of a seven per cent annual rise in real terms in the price of fuel over the next twenty years. This is estimated to reduce the amount of fuel used to about a third of the forecast level of consumption 20 years from now, i.e. to about half of today's consumption, with a corresponding reduction in CO₂ emissions.

This saving would reflect a reduction in car trip lengths of approximately a third, and much slower growth in car ownership and car travel over the next twenty years (perhaps 10 to 15 percent instead of the forecast 50 percent). High fuel prices should lead to more economical driving styles, smaller and less powerful vehicles and further improvements in fuel economy (perhaps as much as a third) arising from improved engine design. High fuel costs would provide a strong incentive to improve the efficiency of road freight transport and to shift freight to other modes.
PART II

SURVEY ON OECD, IEA AND ECMT WORK ON TRANSPORT AND ENVIRONMENT
Joint Activities of the OECD, IEA and ECMT

There is extensive work underway in the OECD and associated institutions (IEA, ECMT) on transport and environment relationships -- involving, e.g., IEA’s Offices for Long Term Co-operation and Energy Technology, Research and Development; the ECMT; and OECD’s Environment Directorate, Directorate for Science, Technology and Industry (Road Transport Research Programme), Territorial Development Service (Urban Programme), Development Co-operation Directorate, Trade Directorate. Collectively, this represents a broad spectrum of sectoral issues and capabilities, enabling the OECD and its sister organisations to mobilise a capacity on transport and environment policy integration that is probably not matched elsewhere in the international community.

1.1 Intra-OECD Activities

THE ENVIRONMENT DIRECTORATE (ENV) WITH THE DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY (STI)

In 1995-96, ENV and STI’s Road Transport Research Programme co-operated on three topics: Recycling for Road Improvements, Integrated Safety/Environment Strategies, Transport of Dangerous Goods through Tunnels (see section 2.1).

THE ENVIRONMENT DIRECTORATE (ENV) WITH THE TRADE DIRECTORATE (ECH)

Case studies (Europe and North America) on trade liberalisation in the transport sector have recently been completed by the OECD Joint Sessions on Trade and the Environment. A paper summarising the environmental effects of freight transport has also been prepared (see section 2.5).

1.2 OECD and IEA

In the framework of OECD and IEA projects on clean and fuel-efficient motor vehicles, a series of international conferences have been organised in the 1990’s to foster development and market expansion of more environmentally-sound vehicles. In March 1994, the OECD and the IEA (with the co-operation of the government of Mexico) organised the Conference Towards Clean Transport: Fuel Efficient and Clean Motor Vehicles in Mexico City. Among the topics discussed were the compatibility of the current demand for mobility and sustainable development, the special problems caused by current trends of motor vehicle use in urban areas, technological developments, the barriers to development and market penetration of fuel efficient and clean motor vehicles, and opportunities for action. Progress towards more fuel efficient or cleaner motor vehicles and related government and industry policies were examined world-wide. The conference proceedings were published early in 1996.

An international conference entitled “Towards Sustainable Transportation” was held in Vancouver (24-27 March 1996) organised by OECD, in co-operation with the IEA and other
international organisations and hosted by the government of Canada (see also sections 2.6 and 3.2). Over 400 stakeholders in the transport sector (automobile and alternative vehicle manufacturers, fuel producers, government officials, regional and local planners, etc.) from 25 countries, met in order to develop a vision of - and chart a course towards -- sustainable transport. In particular, the conference highlighted a series of Sustainable Transportation Principles and Strategic Directions meant to help guide public policy-making in reducing the negative environmental and social impacts of transport activity. While international in scope, the conference also allowed for an in-depth focus on the North American transport sector. A follow-up seminar (in 1998) on better integration of transport modes may focus on inter-city transport in North America.

1.3 OECD and ECMT

A joint OECD/ECMT workshop on the Social Costs of Road Transport was held in September 1993 in order to review updated and expanded information on the social costs of road transport, and to examine the obstacles to wider efforts aimed at internalising these costs in transport decision-making. A series of other papers on topics such as equity and acceptability, fiscal harmonisation and options for future action were also discussed. An OECD/ECMT publication, Internalising the Social Costs of Transport, was released in 1994.

Urban Transport and Sustainable Development (see also section 2.4) was a joint project of Group on Urban Affairs (formerly in the Environment Directorate, now part of the Territorial Development Service -TDS) and the ECMT, focusing on transportation in the urban environment. The project builds on the conclusions and recommendations from previous work on urban transport and evaluates the potential of alternative policy instruments, such as road pricing, land use planning and promotion of public transport. An attempt was made to determine whether a reduction in travel demand in cities is feasible through relocation of activities and people closer to existing public transport modes. Reports were produced on traffic "calming", road pricing and planning measures aimed at reducing urban travel demand. A conference on "Travel in the City: Making it Sustainable" was held 7-9 June 1993 in Düsseldorf (Germany), in co-operation with the Land of North-Rhine Westphalia. Case studies of exemplary policies in Member and non-Member countries were presented. The report of the OECD and ECMT joint Working Group on the project was published at the beginning of 1995. As a follow-up to existing joint work on urban transport, the Non-Member Countries Branch of ENV, TDS and ECMT organised a Seminar on Transport and Environment in Central and Eastern Cities, in Bucharest in June 1995 (see also 2.4).

Joint work is also underway to develop indicators of net effective taxation in transport to underpin work on internalisation of external costs and eco-taxes.

1.4 OECD, IEA and ECMT

Work by the OECD, IEA and ECMT to assess and evaluate sustainable transport strategies included a jointly-organised Conference on Reconciling Environmental, Energy and Transport Issues (Budapest, 30 May - 1 June 1994). The conference focused on transportation trends and their environmental and energy implications in Central and Eastern Europe. Following a review of Member country and Central and Eastern European experiences and policies related to reconciling objectives for transport, energy and the environment, potential programmes to reverse the decline in public transport and to move towards sustainable transport of people and goods was discussed.
Proceedings have been published for all 3 conferences. Co-operative efforts will continue to be pursued given (a) the growing demands for ECMT-IEA-OECD contributions of analysis, data and insights to international programmes and events (e.g., UN Commission on Sustainable Development; UNECE Regional Conference); and (b) OECD/IEA/ECMT engagement of non-member countries. An informal Contact Group met in December 1995 to facilitate the sharing of information and in-house consultations.

Co-operative efforts between the OECD and the IEA relating to policy instruments to promote environmentally-sound transport activities will continue in the future. In the technology area, the IEA took the initiative to organise, together with the OECD, the ECMT and the European Commission (EC), a Transportation Technology Forum on Energy, Environment and Transportation Systems Perspectives (Valbonne, 14-16 December 1994) in order to help government administrations and industry examine together, and update, priorities for transportation technology programmes; also to obtain views on areas requiring more attention of the organising international institutions, as well as suggestions on how to improve international collaboration where it already exists. As a follow up to the Valbonne Forum, the IEA Energy Efficiency, Technology and Research & Development (formerly Energy Technology Office), with support from OECD, ECMT and EC, organised an Expert Meeting (Paris, 9-13 October 1995) on Road Vehicle Technology in order to induce Government and Industry discussions on the subject. A second and third round of discussions were held, respectfully, in March and October 1996. The IEA and the OECD have also co-operated in examining the issue of capital stock turnover rates in the transport sector.

In addition to the specific activities described above, various bodies of the OECD, and the IEA and ECMT have been pursuing a number of more general co-operative projects related to transport and the environment. These include the following:

- The OECD and the IEA are substantially contributing to the work of the Intergovernmental Panel on Climate Change, in particular on greenhouse gas emission inventory methods. Members of the IEA and OECD Secretariat were involved as Contributing Authors and Lead Authors for several chapters of the IPCC Second Assessment Report, and include the Convening Lead Author for the chapter on mitigation in the transport sector. The report was approved in December 1995, and provides an overview of greenhouse gas emissions from the transport sector, scenarios of their future evolution, the social, economic and technical factors that influence that evolution, and the mitigation options for the sector. The report reviews what is known about the effects of the options, identifies their limitations, as well as sources of variation and uncertainty.

- The project on Environmental Implications of Energy and Transport Subsidies (see Section 2.5), carried out under the auspices of the OECD Pollution Prevention and Control Group, includes a series of country case studies (United States, France, Japan) on the transport sector. This project involves several OECD Directorates as well as the IEA and ECMT. The case studies examine the environmental and economic consequences of internalising environmental and social costs. In 1996, the OECD Environment Directorate participated in the meetings of the ECMT Task Force on Internalising the Social Costs of Transport.

- The Secretary General’s Office co-ordinated the preparation of a report on Sustainable Development for publication and presentation to the General Assembly of the United Nations in June of 1997. ECMT had a lead role in drafting the chapter on transport activity, in collaboration with the Secretary General’s Office, the Directorate for Science Technology and Industry and the Environment Directorate.
2

Organisation for Economic Co-Operation and Development (OECD)

2.1 General Secretariat: Advisory Unit on Multi-disciplinary Issues

**RECENT ACTIVITIES**

Prompted by the need to deepen the understanding of the role of air transport in the global marketplace and to review the regulatory structure which governs civil aviation, the *Advisory Unit* has recently completed a study on *The Future of International Air Transport Policy: Responding to Global Change* (1997). The report deals with environmental issues at several levels. It discusses the implications of infrastructure capacity bottlenecks for congestion at and around airports, and the attendant consequences of atmospheric and noise pollution for adjacent residents. It also considers the risk that unilateral national environmental policies may affect international competitive conditions and discusses the issue of aviation-related CO₂ emissions.

The *Advisory Unit* published an article in 1997 on *Air Transport and the Environment* in the special Earth Summit edition of the OECD Observer. The Unit has also contributed a subsection on air transport in the 1997 *OECD Report on Sustainable Development* for the General Assembly of the United Nations (see section 1.5).

**CURRENT ACTIVITIES**

The *Advisory Unit* manages the *OECD Future Studies Information Base*. This documentation system offers succinct key findings and conclusions of published and unpublished literature selected from the world-wide output of futures analysis. It is intended to help decision-makers in all walks of life to better understand the long-term trends, potential trend breaks and new driving forces which will likely shape tomorrow’s policy and business environment. The base contains some 7000 references of which more than one fifth relate to environmental and transport issues. The base is available as a CD ROM.

2.2 Directorate for Science, Technology and Industry (STI)

In a context of growing international interdependence, international co-operation is considered as a key priority by the *Committee for Science and Technology*. In particular, activities in relation to road transport research have been carried out with a long-term goal to contribute to the development and broad acceptance of "rules of the game" to reduce international friction and increase co-operation.

**RECENT ACTIVITIES**

At the occasion of its 30th Anniversary, the *Road Transport Research Programme* issued a report *Outlook 2000* which presents a synthesis of the main activities and research projects undertaken by the Programme during the last 5 years. An entire Chapter is dedicated to environment/transport interaction. References to the following recent *RTR* environment related activities are made:
- Roadside Noise Abatement (report published in 1995 and Seminar held in 1995)
- Road Infrastructure Rehabilitation and Safety Strategies in Central and Eastern European Countries (report published in 1995)
- Recycling for Road Improvements (report published in 1997)
- Integrated Safety/Environment Strategies (report to be published in 1997 and Seminar to be held in 1998)
- Transport of Dangerous Goods through Road Tunnels (report to be published in 1998)

During the 30th Anniversary Workshop, held on 20-21 May 1997, Mr William Long, Director of the Environment Directorate, gave a comprehensive presentation on main challenges of transport and environment issues.

The study on “Recycling for road improvements” was published in 1997. The report urges road administrations to set priorities for recycling. The first priority is for road officials to find the ways and means to recycle road by-products so that the road construction industry sets an example for other industries and does not contribute to the adverse environmental impacts associated with the disposal of waste materials. The report provides information on several proven recycling techniques (“winners”) that are cost-effective and can help to mitigate environmental impacts of road by-products. In addition, the report suggests a road innovation charter which provides a model partnering agreement between transport agency and the industry to facilitate for the introduction of by-product innovations and usage.

The Scientific Expert Group on “Integrated Safety and Environment Strategies”, chaired by Finland and France, completed a report in 1997 that examined how evaluation methods and planning tools can be designed and used to give equal and co-ordinated consideration to the safety and environmental effects of road transport. The report based on case studies from OECD Member countries analyses the integration of these aspects into the design and implementation of transport policies. The Environment Directorate and its Task Force on Transport participated actively in this study.

An international Conference on “Intermodal Networks and Logistics” was held on 3-5 June 1997 in Mexico City. The main topics concerned the development of multimodal transport, strategies for multimodal transport development, innovative financing, integrated advanced logistics and international experiences. Environment was a recurrent theme for each of these topics. Environmental concerns calls for an intermodal transport in most cases.

**CURRENT AND PLANNED WORK**

The joint OECD/PIARC research project on the “Transport of dangerous goods through road tunnels” started in 1995 and is chaired jointly by France and the UK. This special Research Project is financed through voluntary contributions from participating countries amounting to 1 million US$. The aim is to identify the most suitable provisions for reducing risks through appropriate tunnel design, construction, maintenance, operating practices and procedures. The study will also examine new ITS technologies and the organisation of emergency response to improve tunnel safety. The project, managed by a research director from Austria, is divided into three tasks:

1. Review current national and international regulations (survey completed under the leadership of Norway); 2. Develop quantitative risk assessment and decision support models (a major research contract has been let to a French/English/Canadian consortium) and; 3. Propose risk reduction measures (including transport and tunnel operations) with the Netherlands as the co-ordinator. The results of
this research project will be available in early 1999.

A study on “Performance indicators for the road sector” was published in 1997. The report examines current practices for measuring the efficiency of road administrations and suggests a well-defined set of goals and objectives which road administrations can use to gauge themselves. Environment is a key issue. It also deals with the purposes and uses of performance indicators and data systems that support the development of measures. Of the indicators, 16 are commonly used and identified as the minimum required for effective performance measurement. In cooperation with the World Bank, an international OECD task force has been established to carry out an international field test in 15 countries using these 16 indicators, within a period of two years, in order to test their practicality and operation. The results of this field test should be available in 1999.

As a follow-up to the report on “Integrated Safety/Environment Strategies”, Finland will sponsor an OECD Seminar on “Integrated Safety and Environment Strategies” in Helsinki, on 11-12 May 1998. The Seminar is designed to present the findings of the Expert Group, especially in regard to integrated strategies and the benefits of their application. The Environment Directorate will be involved in this Seminar.

In the framework of the 1998/2000 Programme of Work of RTR, the following activities related to environmental issues are tentatively planned (final decision to be taken end 1997):

Ecobalance

The study by a Scientific Expert Group, to be led by France, will extend the traditional environmental impact assessments to the appraisal of engineering structures, construction methods and technologies. It is planned to inventory quantified impact indicators used in connection with the consumption of natural resources and concerned with physical, chemical and ecological impacts on soil, water, atmosphere, etc. The final report should provide a basic environmental methodology for investment choices. The project will begin in early 1998. Cooperation with the Environment Directorate will be ensured.

Environmental Impact Assessment of Trade Corridors and Transport Networks in the CEECs

As a follow-up to the 14 Workshops held for the CEECs and NIS over three years and as part of the outreach activities with non OECD countries, a Conference on Environmental Impact Assessment of Trade Corridors and Transport Networks in the CEECs is planned for early 1998 in Gdansk, Poland. The Conference being developed in co-operation with PHARE and the Polish government will share information with the CEECs on various approaches for assessing and mitigating the environmental impacts of road projects. The Conference will also be a forum for establishing links between CEECs environmental experts and their colleagues in OECD countries.

Environmental Issues in Transport for 2000 and Beyond

Due to their pervasive effects, environmental policies have become an overriding concern in many OECD Transport and Public Works Ministries. There is a real need to survey Member countries about their perceptions (and experiences) in relation to environmental issues in transport and the associated forms of mitigation. Global warming/greenhouse gas emissions, sustainable urban development, industrial locations, multimodal planning, logistics and freight transport effects, the future of the automobile, cultural heritage, wildlife impacts, road construction and maintenance works procedures, etc., are examples of basic policy questions confronting the transport sector and future development. It is not suggested to repeat initiatives or conferences taking place in other fora, but to try to chart a course for the future by thinking strategically and prioritising the problem areas. A seminar is proposed,
probably in Italy, to review the current orientation in OECD Member countries and anticipate future challenges. The ultimate goal will be the identification of an agenda that can assist Member countries in their domestic environmental programmes and serve as a guide for the Steering Committee and the OECD Secretariat in designing practical and necessary co-operative international research efforts.

Air Quality Modelling and Improvements

The air quality effects of increasing traffic and congestion have become a transport, health, and social priority in most OECD Countries. An OECD Scientific Expert Group will be formed to review the state-of-the-art and best practices in managing the air quality effects of transport. The report will review procedures for assessing and measuring air quality in various OECD countries and consider how air pollution modelling can be used to capture this information and use it to compare different management and technical mitigation approaches against their costs.

Road Traffic Noise Modelling and Improvements

The conclusions of the 1995 OECD/RTR report on “Roadside Noise Abatement” -- confirmed by recent legislation in Member countries -- highlighted that emphasis needed to be placed on noise modelling as a method to assess noise impacts on housing and quality of life. The calculation bases, data requirements, inputs and procedures of existing noise prediction models should be reviewed and compared internationally to conclude on their applicability in distinct contexts and situations and to suggest improvements. An authoritative report by the OECD that compares existing road traffic noise prediction models would be of direct use to national and local governments.

2.3 Development Co-operation Directorate (DCD)

CURRENT AND PLANNED WORK

Environmental sustainability is one of several objectives for development co-operation towards the 21st century adopted at the thirty-fourth High Level Meeting of the Development Assistance Committee (DAC) in May 1996. (“Shaping the 21st Century: The Role of Development Co-operation”). Through its Working Party on Development Assistance and Environment and with the support of DCD, the DAC has undertaken a substantial body of work aimed at assisting partner countries strengthen their environmental management capacities.

The main thrust of this work is geared towards enhancing policy coherence, developing and maintaining synergies between donors, monitoring global environmental issues, and contributing to the policy debate in OECD capitals. Activities in relation to transport and environment include work on capacity development in environment, planning for sustainable development, and technology co-operation in support of cleaner production in developing countries.

Capacity Development in Environment (CDE)

CDE involves improving practices relevant to the environment in all spheres, strengthening efficiency and coherence of public policies across a wide range of policy fields as well as of institutional structures at the national, regional and local levels. As part of the follow-up work to UNCED, the DAC has acknowledged CDE as a particular area of concern for development co-operation. Subsequently to a Workshop on CDE in Costa Rica in 1993, the DAC developed and adopted a new set of guidelines on "Donor Assistance to Capacity Development in Environment" (1995) and a conceptual guide "Developing Environmental Capacity: A Framework for Donors" (1995).
The **OECD Workshop on Capacity Development in Environment**, which took place in Rome on 4-6 December 1996, has marked the most recent step in an ongoing effort to bring CDE to the ground level. The workshop presented a unique opportunity to generate broad support among policy makers and development cooperation staff in OECD countries and in partner countries for the pro-active pursuit of CDE as a vital part of sustainable development strategies and programmes.

In follow-up to the recommendations which came out of the Rome Workshop and based on the analysis of more than 40 case studies, a reference document for both decision makers and practitioners, "Capacity Development in Environment: Principles and Practice", was issued in May 1997.

**Planning for Sustainable Development**

National Plans for Sustainable Development are seen as a powerful mechanism for countries to convert sustainable development principles into practice. DAC Ministers have recently endorsed their implementation as a major development goal. The integration of transport related activities in such strategies becomes increasingly important as transport is a major source of environmental degradation in a growing number of countries.

The **DAC Working Party on Development Assistance and Environment** has been engaged in a range of activities in support of developing countries efforts toward drafting and implementing such strategies. Main activities include: an OECD Workshop in Ottawa, Canada in October 1993 which was jointly organised by DCD and the Environment Directorate; the publication of "Planning for Sustainable Development: Country Experiences" (1995); a Workshop on "Donor Co-ordination and Harmonisation of National Planning for Development", jointly organised together with the United Nations Inter Agency Committee on Sustainable Development (IACSD) in October 1995; and the establishment of an informal contact group between the Working Party and IACSD Members.

The main focus of future work of the Working Party is to encourage local ownership of the planning process and to contribute to strengthened co-ordination capacities of partner countries.

**Technology Co-operation in Support of Cleaner Production in Developing Countries**

In aiming at the reduction of resources used in production and increased levels of in-house recycling, cleaner production methods can have direct implications on transport needs. Moreover, transport issues can be an integral element of cleaner technology approaches, as the concept calls for a comprehensive and integrated pollution prevention approach applied to both production, products and services.

Technology co-operation in support of cleaner technology has been a key element of the Work Programme of the Working Party on Development Assistance and Environment since 1993. Actions in this work include the adoption of the "Common Reference Paper on Effective Technology Transfer, Co-operation and Capacity Building for Sustainable Development" by the DAC; the joint organisation of an international workshop together with the Environment Directorate of the OECD, held in Germany in 1994; the publication of "Promoting Cleaner Production in Developing Countries: The Role of Development Co-operation" (1995).

At present, the **Working Party** is carrying out a survey of donor policies and programmes in support of a more rapid diffusion of cleaner production in developing countries with a view to develop good practices guidance for donors.
2.4 Territorial Development Service (TDS)

RECENT ACTIVITIES

Work of the Group on Urban Affairs focused on transportation in the urban environment. Conclusions and recommendations from previous work on urban transport (Environmental Policies for Cities in the 1990s, Cities and Transport, 1992 Conference on The Use of Economic Instruments in Urban Travel Management) stated that urban congestion, pollution and noise continue to increase in spite of numerous regulations and policies. Technologies, traffic management and public transport improvements are not sufficient: they are offset by rapid traffic increases, for the cost of urban transport does not include the environmental and congestion components.

A major report on Urban Transport and Sustainable Development (see also section 1.3) was published early in 1995. The report concludes an OECD/ECMT joint project and builds upon 18 national overviews and a questionnaire completed by more than 130 cities. Present land-use and transport policies in OECD countries are leading to excessive travel by car in cities and their immediate surroundings, causing growing congestion, air pollution, noise and acid rain. The main conclusion of the study is that car dependency in cities can only be reduced by integrated approaches which combine measures that reinforce each other. The study identifies a policy package composed of three distinct strands, all necessary to reduce car travel. The more progressive ones take cities further towards the goals of less congestion, reduced energy consumption, and better environment through the adoption of a mix of pricing restraints (road pricing and higher taxes on fuel) and land use planning.

Together with the ECMT and the Non-Member Countries Division of the Environment Directorate, a joint seminar on Transport and Environment in Central and Eastern Cities was organised in June 1995 in Bucharest (Romania). The objective of the seminar was to examine the problems and opportunities for urban transport in Central and Eastern Europe during the transition to a market economy. The seminar concentrated on three major themes: managing the growth in motor vehicle use through a wide range of instruments (such as planning policies, parking controls and pedestrianisation schemes, traffic calming, and economic instruments); assessing structures mechanisms for financing urban public transport systems; and developing approaches for building consensus and priorities for action.

An joint OECD/German Conference on Sustainable Urban Development took place in Berlin on 19-21 March 1996. The conference marked the culmination of the OECD project on "The Ecological City" and built on the results of the programme on urban development which addressed issues related to economic revitalisation, land use, energy use and transport and environment.

CURRENT AND PLANNED WORK

TDS and ECMT are tentatively planning in 1998 (or thereafter) to conduct a follow-up study to the report on Urban Travel and Sustainable Development. More generally, TDS will continue to undertake studies concerning transport infrastructure which will cover issues of sustainability (e.g. environmental criteria, social acceptability, impact on land use patterns, etc.).
2.5 Trade Directorate (ECH)

Case studies (Europe and North America) on trade liberalisation in the transport sector have recently been completed by the OECD Joint Sessions on Trade and the Environment (see also sections 1.1 and 2.6). A paper summarising the environmental effects of freight transport has also been prepared in cooperation with the Environment Directorate. This work suggests that the increased economic scale of global freight transport following trade liberalisation might not be very significant, but the environmental effects could be quite large. For example, “transit” countries may find that trade liberalisation concentrates freight traffic volume on their networks, thereby exacerbating already difficult environmental conditions. On the other hand, positive technological and/or structural changes in the freight sector might result from trade liberalisation. As an example, NAFTA is helping to reorient North American transport toward a more rational economic pattern (e.g. from an east-west axis, to a north-south one). More open borders should allow shippers to use the most efficient routes to reach their markets, leading to fewer emissions and/or reduced energy consumption.

2.6 Environment Directorate (ENV)

Recent activities

Work has been undertaken by various groups addressing pollution, noise, fuel efficiency, social costs, urban transport and the transport of dangerous goods:

Pollution prevention and control in the transport sector

Work on this topic was carried out under the auspices of the former Air Management Policy Group and the former Group on Energy and Environment. In 1990, the study on Control Strategies for Photochemical Oxidants concluded that motor vehicles are the largest single source of emissions of major air pollutants and, therefore, the principal source of photochemical smog in urban areas and of large-scale formation of photochemical oxidants. The MOVE Project continued this work by focusing on further controls for motor vehicle emissions. Because of the substantial attention already given to exhaust emissions from automobiles in the OECD and in other agencies, the project focused instead on complementary issues, producing the following studies: Control of Emissions From Heavy-Duty Vehicles, Evaporative Emissions from Vehicles and Refuelling Systems, Control of Emissions From Vehicles In Use, Choosing an Alternative Transportation Fuel: Air Pollution and Greenhouse Gas Impacts. The conclusions of these studies formed the basis for a final report published in 1995, Motor Vehicle Pollution: Reduction Strategies beyond 2010, which modelled and assessed the long-term air quality benefits possible with current policies and more stringent, comprehensive emissions control strategies. It was found that motor vehicles are substantial contributors to serious environmental problems on every geographic scale. The study found that currently-adopted policies addressing motor vehicle emissions in OECD countries are insufficient to meet environmental goals. While initial reductions in emissions realised through current policies would begin to be reversed by growth in the vehicle fleet within the next twenty years or earlier, a wide range of demonstrated technical solutions exists to justify the rapid implementation of much tighter regulations on vehicle emissions. In spite of the large potential for further reductions of motor vehicle emissions offered by combinations of emissions abatement, fuel-efficiency and alternative-fuel technologies, however, constraints in traffic growth would
probably also be necessary to meet environmental standards for tropospheric ozone and reduce greenhouse gas emissions.

A substantial activity on **Clean Fuel Efficient Vehicles** was developed across the last few years, in close co-operation with IEA, ECMT and EC (see Section 1.4).

**Economic evaluations in the transport sector**

In 1988, the former *Group of Economic Experts* began a project on **Overcoming Impediments to the Integration of Environmental Considerations into Economic Development**. The study on **Market and Intervention Failures in Transport Policies** examined policy failures in six OECD countries, and attempted to find commonalities among these problems. It concluded that more emphasis should be placed on internalising social costs of transportation (inappropriate taxing and pricing practices) and on the enforcement of environmental policies.

The 1994 study, **Social Costs of Land Transport**, considered costs due to air pollution, noise and accidents using a generalised model. The study attempted to quantify only the social costs of land transport, but it also concluded that land transport represents "almost all" the social costs within the transport sector as a whole. This work was updated for contribution to the joint ENV/ECMT project on the social costs of land transport (see Section 1.3).

The **Environment Directorate**, along with the **Fiscal Affairs Directorate (DAF)**, convened a small experts workshop in November 1995 on **Subsidies/Tax Incentives and the Environment**. A broad sectoral approach, including the transport sector, was adopted and an “issues” paper (with recommendations from the workshop concerning the scope of the project) was presented at the **Environment Policy Committee** meeting in December, 1995.

In 1991, the **Group on Economic and Environmental Policy Integration (GEEPI)** published a set of **Guidelines for the Application of Economic Instruments** in several areas of environmental policy -- including the transport sector. In a 1997 follow up project, a detailed survey of eco-taxes in OECD countries is being prepared. A significant portion of this survey will deal with environmentally-related taxation in the transport sector.

A project on **Environmental Implications of Energy and Transport Subsidies** investigated environmental and economic benefits from eliminating or reducing government interventions in energy and energy-related markets through case studies and modelling. In particular, three transport case studies have been carried out in France, Japan and the US to explore the effects of internalising the social costs associated with transport activities. The studies identify government expenditure associated with road transport in 1991, estimate the external costs associated with the sector, and compare these expenditures and costs with user fees and taxes related to the use of road transport. They develop reference scenarios of road traffic in 2010, and investigate the effects of internalising the social costs for users by using a variety of policy instruments. The project report will be published in 1997.

A joint report (1997) with the Trade Directorate has been prepared for the OECD Finance Ministers on Globalisation and the Environment (see also sections 1.1 and 2.5). This report contains a section on the way in which globalisation is affecting Sectoral Economic Activities, including activities in the transport sector. This paper concluded that globalisation is likely to lower transportation prices across most modes, in most countries. Even where transportation prices rise in the short term, the longer-term pressure on prices is likely to be downwards. Reduced prices, combined with the increased incomes that should result from more efficient transport systems, generally are likely to result in new demands for transport services. Increased demand for transport services, in turn, may lead to new environmental stresses in the form of noise, air pollution and congestion. This scale effect has been exacerbated in recent years by structural shifts from rail and shipping to road transport. In particular, much of the expansion in
freight traffic that is being induced by globalisation is occurring on the road.

Noise abatement policies

In 1987, the OECD Ad Hoc Advisory Group on Noise Abatement Policies completed the study Fighting Noise in the 1990s to examine noise abatement policies in selected Member countries. The study concluded that the prospect of reduced noise seemed unlikely, particularly in the light of the increases in the number of vehicles and mobility observed since 1985.

Indicators and statistics on transport and environment

Sectoral indicators on transport have been developed by the Group on the State of the Environment in consultation with ECMT and published in OECD reports on the state of the environment in OECD countries. An environment monograph on Indicators for the Integration of Environmental Concerns into Transport Policies (1993) drew up indicators around three major themes: i) sectoral trends of environmental significance; ii) environmental impacts of the sector activity; and iii) economic linkages between transport and environment. Data on transport are collected regularly, and a chapter on this subject was included in the reports The State of the Environment 1991 and 1991 Compendium of Environmental Data.

Environmental Performance Reviews: the OECD has been entrusted by its Member countries to launch a programme with the principal aim of helping countries improve their environmental management. Environmental performance review reports for individual countries will typically include chapters on the integration of environmental and transport policies. During 1995, reviews of Canada, Austria, New Zealand and the Netherlands have been published.

Chemical risk management

The Chemicals Group and Management Committee of the Environmental Health and Safety Division has been examining the issues associated with the use of leaded gasoline since 1990 as part of its Chemical Risk Management Programme activities on lead. In 1993, a risk reduction monograph on lead was published [OCDE/GD(93)67] which included, among other things, assessments by Member countries of the impact posed by the use of lead in gasoline and the strategies they have employed to minimise that risk. In February, 1996, OECD Environment Ministers endorsed a Declaration on Lead which called on governments to give highest priority to certain risk management actions such as progressively phasing down the use of lead in gasoline except where needed for essential or specialised uses. Later that year, OECD and UNEP jointly hosted a meeting of intentional industry (i.e., the automobile, oil and lead industries), international organisations and the ECMT to co-ordinate their activities with respect to lead in gasoline and to develop a list of activities to carry forward. These activities include such things as examining air pollution issues associated with changes in fuels or automobile engine types and the experiences of countries who have applied different policy approaches to reduce the release of lead to the environment due to the use of lead in gasoline.

Most of the past work in OECD’s Chemical Accidents Programme has been related to fixed installations. In 1996, however, as a result of joint work with the International Maritime Organisation, OECD published Guidance Concerning Chemical Safety in Port Areas.

Also in 1996, the Government of Norway hosted a workshop on pipelines (Prevention, Preparedness for, and Response to Releases of Hazardous Substances) in Oslo, Norway. The Workshop was attended by 110 experts from 20 countries, representing government, industry, environmental groups, academia and other international organisations. The main aim was to provide an opportunity for experts to exchange information and experience and to make recommendations concerning best safety practices. The report of the workshop will be published during 1997.
Intermodal carriage of hazardous substances

The Chemicals Group and Management Committee has carried out projects relating to chemical accidents (See Section 1.1).

Waste minimisation and life cycle management

The Waste Management Policy Group held in March 1995 a comprehensive workshop on waste minimisation activities and challenges. Two of the five specific waste streams selected as case studies which were presented were automobile related: End-of-Life Vehicles and Lead-Acid Batteries. The report of the Waste Minimisation Workshop will be published early in 1996.

Individual Travel Behaviour

Sustainable Consumption and Production is a programme led by the Environment Directorate. The programme includes a project on Individual Travel Behaviour (ITB) which was organised jointly with the Pollution Prevention and Control Group. The ITB project has sought to address the need for a more comprehensive understanding of the processes leading to individuals’ travel behaviour -- and in particular, to understand how this behaviour emerges from a complex interplay between individuals, businesses and institutions and governments -- in order to highlight key points for policy intervention. The project has sought to incorporate insights from a number of disciplines (e.g. anthropology, sociology, psychology and geography) that are not regularly drawn upon in transport-related policy-making, through a series of Expert Workshops on Values, Welfare and Quality of Life (18-19 March, 1996, Paris) and on Culture, Choice and Technology (hosted by the UK-based Global Environmental Change Programme of the Economic and Social Research Council at the University of Sussex, Brighton, from 17-19 July, 1996). The OECD Policy Meeting on Sustainable Consumption and Individual Travel Behaviour (January 9-10, 1997) communicated the findings of the previous workshops to transport and environmental policy-makers.

The ITB project, generally, has highlighted the complex interplay between factors both internal (e.g. psychological make-up, habit, etc.) and external (e.g. existing infrastructure, media messages, etc.) to the individual in setting the context for travel behaviour. Policy that fails to take into account this interplay (e.g. by focusing only on pricing mechanisms and not on the constraints placed on individual choice) seem less likely to succeed. One important finding was that important shifts in travel behaviour are possible without individuals’ feeling a sense of sacrifice or loss. Using expert judgement and or market mechanisms to define “value” in the transport sector may ultimately be less effective than relying on local and private sector innovation and experimentation in transport problem-solving. Combined with local participatory decision-making processes, these approaches seem better able to capture aggregate notions of “value” and “quality of life”, and may ultimately lead to voluntary shifts in travel behaviour. The project identified a number of other strategies to change the travel behaviour of individuals, including: focusing policy action on points where people are breaking with habitual behaviour; providing people -- and especially children and adolescents -- with first-hand experience of a wide range of travel modes and developing more finely targeted and better crafted messages about behaviour change.

Reports of the two Experts Workshops have been published and the report of the OECD Policy Meeting will be published in 1997, along with a Literature Review on Individual Travel Behaviour. The findings from the project also contributed to the 1997 report to Ministers on the Sustainable Consumption and Production Programme.

CURRENT AND PLANNED WORK

The Pollution Prevention and Control Group (PPCG) has set up a Task Force on Transport of its own to serve as a flexible mechanism to oversee projects and co-ordinate amongst many different activities:
The topic of Environmentally Sustainable Transport (EST) is being addressed through a survey of policies and approaches using environmental criteria in transportation action plans with a view to developing options for national sustainable transport strategies. The first phase of the project presents the state-of-the-art, discusses the concept, and analyses selected environmental criteria. The next phases will use appropriate modelling and forecasting techniques to assess, on a pilot country basis, the feasibility of implementing different approaches. A final synthesis report will provide conclusions and recommendations. The Vancouver Conference Towards Sustainable Transportation (see also sections 1.2 and 3.2) provided substantial input to the project as have ongoing EST Expert Workshops and Task Force on Transport Meetings.

In response to a 1996 mandate from OECD Environment Ministers to analyse the potential contribution of the concept of eco-efficiency to public policy-making, the PPCG and the Sustainable Consumption and Production Programme jointly undertook an investigation of eco-efficiency in the transport sector. A background document, Eco-efficiency in the Transport Sector, was produced in 1996. A follow-up Experts Workshop on Eco-efficiency in Transport was held on 7-8 July, 1997 in Berlin. The findings of these will be incorporated into a report to Ministers to be produced for the 1998 Environment Ministerial meeting in Paris.

As part of a follow-up project, the OECD Ad Hoc Meeting of Experts on Subsidies and Environment is collaborating with ECMT in a (1997) study of the ways in which tax/subsidy regimes in at least two European locations may be discriminating against more environmentally-friendly freight transport modes. The project will form part of a broader report to OECD Finance Ministers in May 1998.

The PPCG programme on Sustainable Product Policies and Life Cycle Management is examining government policies for encouraging production and use of environmentally preferable products. One aspect of the work is a study of the adoption by industry of life cycle approaches and their implications for competitiveness and trade. The automobile industry is one of the sectors being considered, especially the effects of material substitution and production of variable thickness steel laminates. The initiative on government purchasing is examining Member country experience with special efforts to encourage public purchasing of environmentally preferable goods and services (including transportation-related goods and services). During 1996, experiences in several countries were studied in depth, in preparation for the International Conference on Public Purchasing in Switzerland (24-26 February 1997). Following the conference, the PPCG expects to develop guidance for governments considering initiatives to “green” government purchasing.

At the end of 1996, OECD’s Expert Group on Chemical Accidents included a new project in its work programme for 1997-1999 entitled Transport of Dangerous Goods (Rail, Motorway and In-land Waterways). The main objective in the first instance will be to share information on the transport of dangerous goods especially that related to accident prevention, preparedness and response. However, the Expert Group recognised the need to involve industry and all public authorities with roles and responsibilities related to the transport of dangerous goods. It also recognised the importance of working in close co-operation with other international organisations which already have a role.

Before a formal project is undertaken, it is proposed that all members of the Expert Group on Chemical Accidents initiate consultations with other relevant ministries in their countries and with other international organisations, as well as within the OECD and the European Commission (DG 7), concerning OECD involvement in this topic. The Netherlands agreed to prepare a discussion
document during the first half of 1997 to facilitate these consultations, and based on the outcome, the Expert Group will consider in December 1997 what further work, if any, should be undertaken. Therefore, no substantial work will begin before 1998.

- In the context of its new programme of work on the combination of policy instruments in environmental policy, the Group on Economic and Environment Policy Integration (GEEPI) is considering to launch a series of case studies on Policy Mixes to Fight Smog in Cities. Parameters such as the importance of the smog phenomenon, institutional structures, existing policies, data availability and research teams will determine the cities to be studied. Work would focus on the operation and effectiveness of specific sets of measures. A final step would consist in providing recommendations on manners to maximise the positive effects of policy combinations.

- The Environment Directorate’s Economics Division is pursuing work with the ECMT on establishing a statistical framework for comparing transport taxation between OECD countries. The project will also examine the efficiency of transport taxation, particularly as a part of environmental policies, and will propose analytical issues that can be pursued during a possible second phase. The project is closely co-ordinated with ongoing work within the Environment Directorate to develop statistics on environmental taxes.
3 International Energy Agency (IEA)

Transport activities in the OECD are responsible for approximately 60% of oil products consumption; hence, since the IEA’s inception in 1974 it has carried out analysis of transport sector energy demand, and played a co-ordinating role for international co-operation on transport energy policy and technology development. Following the United Nations Conference on Environment and Development in Rio de Janeiro, 1992, the IEA’s transport-related work has focused increasingly on technology and policy to reduce the environmental impacts of transport energy use.

Work on the transport sector is carried out in all of the offices and several divisions of the IEA, including the Energy Efficiency, Technology and R&D Office, the Energy and Environment Division, the Oil Industry and Markets Division, the Energy Economic Analysis Division and Non-Member Countries Division.

Seven of the IEA’s Implementing Agreements - international agreements to co-operate on technology development and deployment - have some relevance for transport technology. These include the agreements on Alternative Motor Fuels, Bioenergy, Hybrid and Electric Vehicles, High Temperature Materials for Engines, Advanced Fuel Cells and Energy Conservation in Combustion. Implementing Agreements have been responsible for a number of publications on these relevant areas.

The Agency has also produced several publications based on in-house research and analysis on transport and environment issues. These cover: energy efficiency in road vehicle fleets; technical, economic and environmental analysis of alternative fuels; econometric analysis of transport energy demand; and the policies of IEA Member countries relating to transport energy use.

3.1 Publications

In 1990, the IEA published Substitute Fuels for Road Transport. This book provides an analysis, for a time horizon placed roughly in 2005, of fuels that appear to have some potential to contribute to energy security. As well as examining technical feasibility and cost, the book reviews environmental effects of alternative fuel use. It covers fuels from very heavy oils, natural gas, methanol, ethanol and synthetic diesel and gasoline from natural gas.

In 1991, a study on Fuel Efficiency of Passenger Cars was published. This was an update of an earlier publication, which reviewed IEA Member country policy on car fuel economy and also drew together information on the factors affecting energy use by cars. These factors include energy and vehicle pricing and taxation, exhaust emission standards and public information programmes. The study also provided detailed statistics, based on country submissions, on the energy efficiency and energy use characteristics of national car fleets.

The publication Cars and Climate Change was released in early 1993. The report examines the technical, economic and market potential for reducing greenhouse gas emissions from cars through energy efficiency improvements and alternative fuels. It draws on a detailed life-cycle analysis of greenhouse gas emissions from a range of vehicle types and alternative fuels, and provides a cost analysis for some of the near-term
options under a range of conditions. Market niches are identified where alternative fuels may be cost-effective in 2000. Several case studies are used to illustrate strategies that have been used by governments to promote fuel economy and alternative fuels. The study also explores some of the difficulties in analysing opportunities for the transport sector and identifies ways in which governments could improve their analysis. It finds that greenhouse gas emission reduction strategies are likely to be most effective where they incorporate a mix of measures.

The study Electric Vehicles: Technology, Performance and Potential was published in December 1993. The study presented an overview of the current status of electric car and truck developments in IEA Member countries. It examined prospects for technology advanced in areas such as battery and vehicle performance and electric recharging systems. Driven by environmental concerns, governments and car industries have launched new programmes to accelerate technology progress.

A monograph was produced in 1994 on the Refining and Environmental Implications of Increased Use of Diesel-Engined Passenger Cars. The paper reviews environmental advantages and disadvantages of gasoline and diesel from an environmental standpoint and investigates the implications for the refining industry of an increase in diesel fuel demand at the expense of gasoline. It reviews the economics from the point of view of the car purchaser and of the national government. The study emerges with no clear-cut preference for either gasoline or diesel fuel from an environmental perspective. Future changes in fuel specifications will not only significantly affect the relative environmental impacts of the two fuels but could also influence the capacity of refineries to respond to changes in fuel demand and price.

The first publication in the Energy and Environment Policy Analysis Series, Biofuels, was published in late 1994. This report presents a thorough analysis of the costs, energy use and greenhouse gas emissions involved in producing and using ethanol from maize, wheat and sugar beet, “biodiesel” from rapeseed oil and methanol from wood. It compares these options with gasoline and diesel fuel. An evaluation of the greenhouse gas abatement potential and cost of electricity generation from wood is also included for comparison. The study used full-fuel cycle analysis to show that while their cost is high, biofuels can help reduce the use of petroleum products and the emission of greenhouse gases. Among the options considered, electricity generation from wood can be a cheaper means of reducing CO₂ emissions. The report also helps explain why prior analyses have produced conflicting results.

The 1994 IEA/OECD Scoping Study: Energy and Environmental Technologies to Respond to Global Climate Change Concerns addresses the potential contribution of new and improved technologies in reducing emissions of greenhouse gases. This broad-based assessment of technology development status and future needs aims to assist governments and international organisations in their efforts to respond to human-induced global climate change. In particular, this study is intended to identify where international co-operation can enhance the development (and eventual deployment) of longer-term energy and environmental technology options.

The 1996 report Comparing Energy Technologies aims to provide policy-makers with critical guidance in balancing the environmental benefits and costs of greenhouse gas-reducing technologies. It discusses full life-cycle analysis covering each stage of the energy cycle -- production, transformation, distribution and consumption. The report considers the state of the art in methodologies for assessing and comparing energy technologies, plus the strengths and weaknesses of current practice. It presents experts’ reports on energy R&D approaches and assessment criteria strategies in Canada, France Italy, Japan, the Netherlands, the United Kingdom, the United States and the European Union.
IEA International Energy Technology Collaboration: Benefits and Achievements (1996) assesses the results of the Energy Technology Collaboration Programme. The report describes how the international programme works to promote information sharing among more than 30 countries in Europe, America, Asia, Australasia and Africa and, ultimately, accelerates the development and deployment of new technologies to meet energy security, environmental and economic development goals. Operating through Agreements among governments, the programme leads to the publication of hundreds of documents which disseminate information about the latest energy technology developments and their commercial applications. This report details the activities and achievements of all 41 Implementing Agreements, covering energy technology information centres and RD&D projects in fossil fuels, renewable energy, efficient end-use and nuclear fusion technologies.

Several other publications of the IEA have a substantial transport component. Energy in Developing Countries, published in 1994, includes a comparative analysis of transport sector trends in energy demand and energy efficiency in several countries. The 1995 edition of the World Energy Outlook includes a chapter on the transport sector, discussing the determinants of demand for transport fuels and the effects of policies to influence transport energy demand. In the recently published Voluntary Actions for Energy-Related CO₂ Abatement in IEA Member Countries, voluntary approaches within the transport sector are surveyed for selected countries. The following two ongoing projects also contain a substantial transport component: Government Interventions in the Energy Sector; and Climate Change Policy Initiatives (volume II, 1995 update).

In 1997, the IEA will publish the study Energy Technologies for the 21st Century which assesses the long-term technical and economic potential of new energy technologies. It discusses how future energy security can be ensured through the successful development and deployment of such new and improved energy technologies as: advanced technologies for clean coal conversion and use, improved natural gas transport, enhanced hydrocarbon production, extensive use of new renewable energy sources, advanced nuclear fission power systems, nuclear fusion feasibility, environmentally sound electricity production and demand-side management, clean car technologies and alternative transport fuels and technologies for more efficient and flexible energy end use. The study identifies R&D options and priorities that governments of IEA Member countries may wish to consider for their energy programmes, and recommends increased industry participation and enhanced international co-operation in new technology development.

A policy paper will be published by the Energy and Environment Division in the Energy and Environment Policy Analysis Series in 1997. The work will be the result of the IEA’s sectoral work of the Energy Dimension of Climate Change together with an ongoing project on energy policy aspects of sustainable transport.

3.2 Symposia

The IEA has worked jointly with the OECD and ECMT to organise a series of conferences and to publish the results. These include the 1990 Expert Panel in Rome on the Low Consumption/Low emission Automobile; the 1991 Berlin conference Toward Clean and Fuel Efficient Automobiles; the 1992 Stockholm conference on The Urban Electric Vehicle; the 1994 conference in Mexico on the Clean and Fuel Efficient Motor Vehicles and Sustainable Transport, in Budapest on Reconciling Environmental, Energy and Transport Issues: The Role of Public Transport (1994) and the 1996 Towards Sustainable Transportation conference in Vancouver (see also sections 1.2 and 2.5).
In 1994, the IEA's *Energy Technology and R&D Office* organised in co-operation with the OECD, the ECMT and the EC a *Transportation Technology Forum on Energy, Environment and Transportation Systems Perspectives*. This Forum, held in Valbonne (France) in December 1994, addressed a variety of transport technology issues, relating to new ideas for the road vehicles beyond 2010, and relating also to freight and urban transport technology. Recommendations were made by the representatives of environment, energy and transport ministries as well as by representatives of industry. A follow-up series of Expert Meetings was organised, the first in October 1995 in Paris, first of the topics concerning road vehicle technology. The discussion dealt with Hybrid Vehicles, Advanced Engines and Lightweight Materials. The result was that this initiative responded to a strong need and that technology co-operation under the aegis of the IEA would strongly help dialogue between Governments and Industry. The IEA ETO was asked to draft specific language for multilateral co-operation in hybrid road vehicles, advanced engines and lightweight materials, and to explore the possible creation of an IEA “Umbrella Agreement” on Advanced Vehicle Technologies. A new series of expert meeting was held in Paris in March 1996 to continue work on these activities.
European Conference of Ministers of Transport (ECMT)

The ECMT is an inter-governmental organisation established by a protocol signed in Brussels on 17 October 1953. The Council of the Conference comprises the Ministers of Transport of 34 European countries. The work of the Council of Ministers is prepared by a Committee of Deputies. ECMT is a forum for favouring transport policy dialogue at a political level. It is organised around an annual meeting.

In November 1989, the Council of Ministers adopted a wide-ranging resolution on Transport Policy and the Environment, which is the basis for ECMT follow-up work. In brief, while the Resolution (ECMT Resolution No. 66) recognised the major economic and social benefits provided by modern transport systems, it also acknowledged the large and growing environmental problems associated with them and identified three areas for further improvements:

- Control of vehicle emissions and fuel quality, and impacts on global pollution;
- Traffic management in urban areas and for inter-urban traffic; and
- Integrating transport infrastructure design and evaluation with environmental impact assessments.

4.1 Recent Activities

The issue of transport's contribution to global warming was examined at several events: at the Hearing of the ECMT Council of Ministers with representatives of the automobile and fuel industries in November 1990, at an International ECMT Seminar on Reducing Transport's Contribution to Global Warming in Paris in 1992, and inter alia at the 1993 meeting of the Council of Ministers of Transport in Noordwijk. Transport Policy and Global Warming, based on the conclusions of the seminar, was published in 1993.

A seminar on the External Costs of Transport was held (with OECD) in September 1993. A publication "Internalising the Social Costs of Transport" followed, and the ECMT Annecy Ministerial Session (May 1994) discussed a paper on this issue. Following these discussions, the Ministers set up a Task Force to further develop the issue. A work programme and terms of reference are being drawn up for this Task Force, whose first formal meeting was held in 1995.

A major part of ECMT work focuses on railways, combined transport and inland waterways including switching between modes. A report on Reducing Noise from Railway Wagons was prepared for the ministerial session in 1996.

4.3 Current and Planned Work

A dialogue is underway with the Vehicle Manufacturing Industry (represented by OICA and ACEA), and resulted in a joint declaration between government and industry on reducing CO2 emissions from cars, adopted by Ministers at the ECMT Ministerial Session in 1995 in Vienna. Follow up to the declaration includes monitoring of specific fuel efficiency and CO2 emissions from new cars.
A report on monitoring was submitted to Ministers in 1997 providing official data for the period 1980 to 1995 and analysing methodological issues for future monitoring activities. Also under the dialogue, a workshop on the influence of driver behaviour and on-board instrumentation on fuel efficiency was organised in Delft in 1996. Results of pilot projects presented at the workshop suggest a significant potential for fuel savings could be achieved through changes in driving style brought about by training and information programs backed up by feedback from on-board instrumentation.

Under mandate from its 1994 ministerial meeting, ECMT consulted Member and Associate Member countries in 1996 requesting information on CO₂ emissions from transport and on policies and measures in place or envisaged to limit these emissions. Twenty-nine countries responded and a report summarising and analysing the information provided was submitted to Ministers in 1997, with a view to publication in November. The report shows that only a small number of countries have developed focused strategies for CO₂ emissions reductions from the transport sector. *Inter alia* it concludes that transport sector emissions will continue to rise both in relative and absolute terms through 2010 in almost all ECMT countries and that, largely as a consequence, overall greenhouse gas stabilisation targets will not be met by a majority of Member countries. The report will be submitted to Council of Parties-3 (on Global Climate Change) in Kyoto (1997)

A *Task Force on the Social Costs of Transport* has been established to report to Ministers. It aims to clarify the concepts and terms involved in the policy debate, summarise the methodologies used for estimating externalities and the results of studies undertaken and suggest improvements to the policies adopted to address the social costs of transport. Policy conclusions from the work, outlining an approach to providing incentives for reducing externalities, were presented to Ministers in April 1997. A full report will be published in November 1997. A resolution on internalising transport externalities is expected to be prepared for Ministers in 1998. Work is underway on subsidies and taxation in transport. One of its outputs will be a quantification of distortion in transport markets in order to assess whether the kinds of changes to charges and taxation recommended by the are likely to be effective.
SELECTED LIST OF PUBLICATIONS
RELATED TO TRANSPORT AND THE ENVIRONMENT

Publications and Conference Proceedings

Forthcoming Publications (1997)


1997

Performance Indicators for the Road Sector, OECD, 1997.
Sustainable Consumption and Production, OECD, 1997.
1996

Changing Daily Urban Mobility: Less or Differently?, Economic Research Center Round Table 102, ECMT, 1996.


Intergovernmental Panel on Climate Change Second Assessment Report, IPCC, 1996.


Voluntary Actions for Energy-Related CO₂ Abatement in IEA Member Countries, IEA, 1996.

1995


1994


1993


Cars and Climate Change, IEA, 1993.


Road Transport Research Outlook, Road Transport Research Programme, OECD, 1993.
Travel in the City: Making it Sustainable, Proceedings of an International Conference (Düsseldorf, 7-9 June 1993), OECD/ECMT, 1993.

1992
International Road Research Scheme (IRRD) Thesaurus Update, LCPC/OECD, 1992.

1991

1990
Environmental Policies for Cities in the 1990s, OECD, 1990.

1988/89
Environment and Transport Infrastructures, Economic Research Center Round Table 79, ECMT, 1989
Technical Reports: Environment Monographs

Forthcoming Publications (1997)


1997


1996


1993

Control of Emissions From Heavy-Duty Vehicles, Environment Monograph No. 55, OECD, 1993.

Control of Emissions From Vehicles In Use, Environment Monograph No. 54, OECD, 1993.


Indicators for the Integration of Environmental Concerns into Transport Policies, Environment Monograph No. 80, OECD, 1993.


1992


1990
