

*Instruments
for Sustainable Transport
in Europe*

Potential, Contributions and Possible Effects

A report from the Swedish Euro-EST project

Ian Skinner and Malcolm Fergusson
Institute for European Environmental Policy, London

4977

REPORT

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The Swedish Civil Aviation Administration
The Swedish National Maritime Administration
The Swedish National Road Administration
The Swedish National Rail Administration
The Swedish Institute For Transport And Communication Analysis
The Swedish Transport And Communication Research Board
The Swedish Environmental Protection Agency

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Preface

A sustainable transport system is one of the greatest challenges in the pursuit of sustainable development. A wide range of environmental problems have to be solved in ways that are compatible with social and economic goals.

The transport sector has already taken a lot of measures to lessen the burden on the environment. In order to achieve an environmentally sustainable transport system more action is needed. The integration of environmental concerns into policies and decision making has to be extended and deepened.

In a joint report in the year 1996 eleven Swedish stakeholders within the field of transport and environment defined an environmentally sustainable transport system (EST) in terms of a number of goals. The stakeholders assumed that the goals could be reached within 25-30 years. The Swedish EST-project, *inter alia*, stressed the importance of international co-operation.

Therefore, a network consisting of the Swedish National Road Administration, the Swedish National Rail Administration, the Swedish Civil Aviation Administration, the National Maritime Administration, the Swedish Institute for Transport and Communication Analysis, the Swedish Transport and Communication Research Board and the Swedish Environmental Protection Agency now have rejoined their forces and started the project 'Euro-EST'.

The objective of 'Euro-EST' is to promote a co-ordinated and integrated environmental work in the transport sector with a view of achieving an environmentally sustainable transport system in Europe.

A strategic framework, with clearly defined objectives and policy goals, would be helpful in this endeavour. Instruments that should be implemented to bring about needed change would be defined in relation to such a framework.

This report identifies a list of potential instruments which would help Europe to move towards a more environmentally sustainable transport system. It looks at interactions between instruments, and potential effects and costs to society, in relation to implementation.

The report was developed by Ian Skinner and Malcolm Fergusson at the Institute for European Environmental Policy, London. The authors are responsible for the content and the conclusions in the report.

Swedish Environmental Protection Agency

Stockholm, May 1999

Contents

1. Introduction	5
2. Sustainability Objectives and Policy Goals	6
Environmental Sustainability Objectives	6
Social Sustainability Objectives.....	6
Economic Sustainability Objectives.....	7
Interactions between Sustainability Objectives	8
Policy Goals	8
3. Instruments for Sustainable Transport	10
Strategic Instruments	11
Fiscal Instruments	12
Regulatory and Legislative Instruments	12
Other Instruments	13
Implementation	14
4. The Contribution of the Instruments to Making Transport Sustainable	16
Increasing Network Capacity and Sustainability	16
Taxation and Equity	17
Reconciling Economic and Social Objectives	17
Costs	18
5. Conclusion	20
References	21
Tables	22

1. Introduction

This report develops the work undertaken by the Swedish Environmental Protection Agency (SwEPA) on an Environmentally Sustainable Transport System for Europe (SwEPA, 1996). It identifies a list of potential instruments which could be used to move towards a more environmentally sustainable transport system. It then identifies potential interactions between these instruments, as well as the potential effects and costs to society associated with their implementation. This is an important step towards the development of a sustainable transport system in Europe and is fundamental to the development of packages of policies to improve the sustainability of the transport system which is the next stage of SwEPA's work programme.

The report is divided into 5 sections. Section 2 identifies a set of sustainability objectives, covering environmental, social and economic issues, and policy goals which could underlie moves towards a sustainable transport system. Section 3 identifies and categorises instruments which could contribute to achieving a sustainable transport system in Europe. They are categorised under four headings: strategic; fiscal; regulatory and legislative; and other including informational and educational instruments. In Section 4, the sustainability objectives and policy goals from Section 2 are used to assess the potential contribution of each of the instruments identified in Section 3 to promoting sustainable transport. Each instrument is assessed to identify which objective it could contribute to achieving and which it potentially undermines. In this way, its potential contribution to the promotion of sustainable transport can be identified. The analysis also identifies which instruments need to be implemented in combination with the first instrument to ensure that its implementation contributes to making the transport system more sustainable. Many of the issues addressed are highly complex and controversial, so the discussion inevitably involves a significant degree of simplification. Section 5 presents the conclusions of the assessment.

2. Sustainability Objectives and Policy Goals

In order to identify whether an instrument is contributing to making transport more sustainable it is necessary first to identify what we mean by making transport more sustainable. The most evident way of doing this is to identify a series of objectives against which individual instruments could be compared in order to assess them for their contribution to sustainability. Skinner (1998) identified such a list with reference to the literature (see the first column of Table 1). The environmental objectives given in Table 1 address the 13 environmental threats identified in the earlier stages of the SwEPA project (SwEPA, 1996). Table 1 also includes a set of social and economic objectives for sustainability. These are included because sustainability is not only concerned with environmental issues, but also with social and economic ones. If the set of objectives was limited to environmental ones alone, social and economic considerations would be neglected in the development of policy. This is not politically realistic, and in the context of sustainable development, would be undesirable.

Environmental Sustainability Objectives

The majority of environmental objectives (Env1 to Env5) address either pollution or resource use and are therefore uncontroversial and in no need of elaboration. However, identifying an appropriate form of words for an objective to address land use was more difficult as the amount of land that is appropriate to allocate to transport infrastructure is difficult to assess. From an environmental perspective, restricting the use of protected land or quality agricultural land would seem to be an appropriate objective. However, while being the most *environmentally sustainable* option, this may not be the most sustainable option overall as other social and economic objectives would need to be taken into consideration. Assessing the amount of land needed for the provision of transport infrastructure is linked to assessing the need for infrastructure at the international, national, regional and local levels, while taking into account environmental concerns. This would then need to be balanced with other demands on land, including that of conservation. In the light of these considerations minimising the impact of transport infrastructure, including land take, for a given level of travel demand was considered to be a suitable objective (Env6, see Table 1).

Social Sustainability Objectives

The social objectives of Table 1 (S1 to S5) are also relatively uncontroversial. Improving the health and safety associated with the operation of transport (S1), the aesthetic quality of the built environment (S2) and accessibility (S3) evidently contribute to social sustainability. Equity is also fundamental to sustainability and is covered by objectives S4 and S5. There are two objectives as the latter deals with inter-

generational equity as emphasised by the Bruntland Report (WCED, 1987), while the former focuses on equity within the existing generation.

There are plenty of examples of the need to reduce intra-generational equity within the current transport system. For example, retail and entertainment chains have responded to increased car ownership by locating stores and facilities out of urban areas. This is beneficial to those who have access to a car, but not to the many people who are unable to drive or who do not have access to a car. Thus accessibility to services and other facilities for those on lower incomes has been reduced by these trends relative to that of those on higher incomes. Also, pollution adversely affects those on lower incomes who live in urban areas as those on higher incomes are able to move out to the less polluted suburbs. It is issues such as these which S4 is meant to address. The policy implications of reducing inter-generational equity are notoriously difficult to identify as the transport system and environmental problems faced by future generations are difficult to forecast. However, moves towards attaining other objectives should generally reduce the impact on future generations, especially those such as infrastructure development and land use which have long-term implications.

Economic Sustainability Objectives

The economic objectives of Table 1 (Ec1 to Ec4) are not as clear-cut or as uncontroversial as the environmental and social objectives. The first, Ec1, addresses, for example, the problem of congestion, which is an inefficient use of infrastructure, as it imposes costs on industry and individuals and causes inefficient use of resources. Objective Ec2 aims to make operational the need to consider the transport and economic implications of policies at all levels. Some would argue that this would be in opposition to economic efficiency in that it would implicitly encourage local and regional economic activity, whereas an unfettered free market might remove the activity elsewhere. However, in the absence of a perfect market in which all environmental and social impacts are reflected, there are strong arguments for encouraging economic activity to take place at local and regional levels in the most transport-efficient fashion.

Attaining objective Ec3 would include the internalisation of the external costs resulting from the use of resources as the correct valuation of resources would result in a more economically efficient use of resources by the transport system (see Maddison *et al*, 1996). The final economic objective, Ec4, arises from the fact that transport, being a derived demand, supports economic activity and therefore contributes to economic development. It is worth noting at this point that stating that a sustainability objective supports *sustainable* economic activity and therefore contributes to *sustainable* economic development is not the same as saying that an objective contributes to economic growth as currently defined. Consequently, the argument that if a measure or instrument discussed below does not contribute to economic growth means that it would not contribute to sustainable economic development is not valid (see, for example, Table 8). This however remains perhaps the most controversial issue in current transport policy thinking.

Interactions between Sustainability Objectives

Table 1 also indicates which objectives would support, or potentially support, the others. For example, any instrument which reduces the amount of pollution emitted (Env1) in urban areas would be likely to reduce the adverse effects of pollution on human health (S1) and would improve the aesthetic quality of the urban environment (S2). Similarly, improving accessibility (S3) and environmental quality (S2) could contribute to increasing the transport efficiency of economic activity (Ec2), which would in turn support sustainable economic activity (Ec4). One notable pattern in Table 1 is that most objectives are supported by the consideration of future generations (S5) and the support of sustainable economic activity (Ec4). As the aim of all the objectives of Table 1 is to increase the sustainability of transport policy, they are implicitly addressing the interests of future generations and increasing the sustainability of economic activity, at least in theory. Similarly, policies which consider future generations and increase the sustainability of economic activity could often contribute to achieving a number of the other objectives.

Table 1 does not show negative interactions as, in theory, the attainment of all objectives would contribute to attaining sustainability so there would be no negative interactions. In practice, however, the use of an instrument or measure can have a positive contribution to the attainment of one or more objectives, but be detrimental to the attainment of others. However, such negative interactions are specific to the instrument or measure which is being used, and the context in which it is being applied. Such interactions are discussed in more detail in Section 4.

Policy Goals

To implement policy and identify policy instruments, it is useful to identify more concrete policy goals to which instruments could be targeted (see Table 2). These provide a link between overall sustainable development objectives and specific instruments. On the one hand they help 'operationalise' the objectives, and on the other, provide more concrete goals against which to assess each instrument. For example, if a greater proportion of existing journeys were undertaken on less environmentally damaging modes (PG4), then there would be fewer emissions of greenhouse (Env2) and toxic gases (Env1), a reduction in the consumption of fossil fuels (Env3), improvements in health and safety (S1) and improvements in the efficiency of use of resources (Ec3) and transport infrastructure (Ec1). The policy goals are effectively ways in which the environmental performance, and therefore sustainability, of the transport system could be improved, all other things being equal. They are more relevant to the implementation of transport policy and are often given as the stated aim of more sustainable transport policy.

The policy goals become potentially more controversial as one moves down Table 2. Policy goals 1 and 2 concern the environmental performance of the manufacture and operation of transport without addressing use in any way. In other words they relate to increasing the efficiency of resource use and reducing the environmental damage per vehicle manufactured and per kilometre travelled. These are unambiguous means of reducing the environmental effect of transport if other things remain equal. However, if,

for example, improving the environmental performance of the operation of vehicles (PG2) were the only policy goal, a net reduction in emissions would only be achieved as long as the reductions were not negated by increases in traffic growth.

The third policy goal (PG3), which is effectively improving the efficiency of the use of the transport network, is similarly not a controversial way of improving the environmental performance of transport. However, measures aimed at improving flow and reducing congestion on roads would effectively increase the capacity of the network. Consequently if PG3 were the only goal which was obtained, the result is likely to be an increase in the total amount of traffic and an increase in the adverse environmental effects of transport. With respect to the less environmentally-damaging modes, such as rail and water, increasing the capacity of the respective networks need not necessarily be as much of a concern in the context of sustainability. These two policy goals (PG2 and PG3) have traditionally been the focus of policy aimed at reducing the environmental effect of transport.

However, it is increasingly recognised that there is a need to move further down the list to focus on modal shift (PG4), reducing journey lengths (PG5) and the number of journeys undertaken (PG6). Whereas in planning circles these goals are now being recognised as important, in others, such as industry and the retailer sector, they are not as warmly received for fear that they will restrict economic activity. Consequently, whereas to achieve a sustainable transport sector, a reduction in the number of vehicles and infrastructure (PG7) may be important, it is a policy goal which is politically sensitive. However, in some countries, eg England, reallocation of road space away from private transport is increasingly becoming a more popular and politically acceptable measure.

Movement towards one policy goal could contribute to achieving a number of sustainability objectives. For example, for a given number of journeys, emissions would be reduced (Env1) if the environmental performance of individual vehicles were improved (PG2), journeys were transferred to less-polluting modes (PG4), if the average journey length was reduced for the same modal split (PG5), or if there was a reduction in the number of journeys by the polluting modes (PG6). These goals can be met through the implementation of a range of instruments.

3. Instruments for Sustainable Transport

For the purposes of this report, instruments for sustainable transport are categorised under four headings which it was felt encompass the spectrum of potential instruments (see Table 3). The instruments themselves are given in Tables 4 to 7, and are listed in accordance with the policy goals (of Table 2) which they primarily address.

As well as describing each instrument, Tables 4 to 7 also indicate the policy-making body and give examples of where the instrument has been used. The policy making body indicated in the third column of each of these tables is not necessarily the most appropriate level at which a decision should be made, rather it relates to where the competence lies which in turn tends to be based on political expediency. For example, for many of the strategic instruments the most appropriate policy making body would probably be the EU as it is the most strategic body. However, for political reasons, the EU may be excluded from a significant degree of involvement, or may only set out the framework within which Member States develop their own strategies and instruments. This is especially the case with fiscal instruments where, in the context of the single market, the EU would again be the most appropriate body to set certain taxes, in order to overcome concerns about taxes damaging competitiveness or distorting the market. However fiscal policy is an area over which Member States prefer to maintain competence.

There is also a division of powers between national and regional, or local, government, and the powers devolved to and resources provided for the latter vary considerably from state to state for historical reasons. Where more powers and resources are given to regional or local government, this is often reflected in the adoption of more sustainable approach to transport at the local or regional level, even where national policy lacks a clear orientation towards sustainability. Where local powers are limited, devolution of relevant powers and duties may be a particularly effective instrument to promote sustainability (eg see Table 6). Devolution of power over transport policy in particular is now being pursued in a number of countries, eg in Italy, Germany and the UK.

The examples relating to the implementation of instruments (see the fourth column of Tables 4 to 7) have been drawn from input by national experts in a number of EU Member States, supplemented by documentation from a literature search. Only minimal detail is included in the tables for reasons of space, but well-documented examples have been selected wherever possible. Examples are intentionally confined to western Europe.

The examples selected are inevitably neither complete nor definitive, but give some indication of the state of implementation of the various instruments. Examples have not been included in some cases either where implementation is already quite widespread, or where a clear example did not come readily to hand. The latter is particularly the case for some of the broader strategic instruments, for which a detailed analysis would be needed to assess the validity of the approach taken.

Strategic Instruments

The strategic instruments given in Table 4 range from strategies aimed specifically at reducing adverse environmental effects, such as waste minimisation and air quality strategies, to those which are focused on transport itself. Strategies aimed at addressing specific environmental concerns could all be seen to be part of a strategy for sustainable development. Many of these are in the early stages of development in response to the increasing prominence of sustainability concerns (eg waste minimisation strategy). These strategies will have implications for transport as, for example, emissions from the operation of transport adversely affect air quality.

Strategies aimed more specifically at transport include strategies for planning and development, such as the concentration of development in urban areas and locating development in the most travel-efficient fashion, many of which overlap. A surprising number of EU Member States do not have an explicit statement of overall transport policy, far less any clear assessment of how their various policies and policy instruments contribute to sustainable development (Fergusson and Wade, 1993). However, some states are increasingly attempting to integrate transport and land use policy. Further, many aspects of transport policy may in effect be determined by policy in other areas such as economic development or industrial or social policy. It can be argued that this in itself represents a barrier to effective integration of environmental considerations into transport policy, as it leads at best to a defensive rather than proactive form of integration. A move to the latter would clearly be required in order to pursue sustainable development effectively.

Table 4 lists three strategies for traffic and the appropriate one for sustainability will depend on the level of development of the infrastructure and corresponding traffic levels of a particular area. In many urban areas in the European Union, it is probably appropriate to adopt traffic reduction strategies as traffic levels and their environmental, social and economic impacts are likely to be unsustainable. On the other hand, in the countries of central and eastern Europe where traffic levels are lower, the development of traffic reduction strategies may not be appropriate. Consequently, traffic management strategies may be sufficient as long as policies are not followed elsewhere which lead to unsustainable traffic levels and effects.

The aim of the strategies given in Table 4 is to better integrate the environment into broader policy-making, including transport. However, the implementation of structures and procedures to integrate environmental considerations into transport policy is still extremely patchy, and varies from state to state. Even where such measures are in place (for example in the UK and Germany) there is often little evidence that they have been fully used or that they have been effective. Some requirements for the strategic environmental assessment of transport policies and programmes are now beginning to emerge, but not yet in a particularly coherent way. Numerous methodological issues remain, for example, and many governmental bodies are sceptical of the benefits of such an approach.

Fiscal Instruments

A major reason for concern over the integration of environment into transport policy is that in most countries, transport is seen as having an overriding role in economic activity and growth, and there is therefore a reluctance to tackle traffic growth through regulations or fiscal instruments. Investment in alternative infrastructure to promote modal shift to rail or water is politically acceptable, but cannot generally be shown to have had a positive effect overall in curbing road use. In other words, relatively rich countries are happy to provide the ‘carrots’ for more sustainable transport systems, but are more reluctant to apply the ‘sticks’. Radical reorganisation of public transport has been undertaken in some states (eg UK and Germany), but this has been driven primarily by financial or political pressures, and improving sustainability has not necessarily been a main objective. The results of these policies are hotly disputed, but they do not seem as yet to have secured significant modal shift away from private transport modes.

Consequently, while investment is a potential instrument for sustainable transport, other fiscal instruments need to be used as well ranging from introducing incentives to encourage the use of other modes to penalising the use of the more environmentally damaging modes (see Table 5). The timescale in which the potential effects of any of these instruments are realised is dependent on the response of travellers. For example, increases in public transport patronage resulting from increased car fuel prices (ie the elasticities) are known to be low in the short term at least. However, increases in car use resulting from an increase in public transport fares are relatively higher. The instruments listed in Table 5 are necessarily quite generic as they cover a broad range of actual instruments. For example, increasing the cost of car use is important for discouraging car use and encouraging the use of other modes. The principal instrument to raise the cost of car use could be to increase the tax on fuel. These taxes currently vary widely from state to state and are sometimes linked to the specific environmental characteristics of fuels, and with some revenues hypothecated for environmental purposes.

Differentiating tax rates is also widespread, eg diesel fuel is taxed significantly less heavily than petrol in most Member States other than the UK. Most states differentiate annual vehicle taxes according to engine size or power, and sometimes by emissions characteristics as well, and some have a differentiated car purchase tax system. Scrappage taxes have been used in several countries in order to modernise vehicle fleets. Road pricing to manage demand or implement external cost pricing, or increasing parking charges would have a more direct negative effect on use, although the scale of the effect and the range of people affected would vary depending on the instrument used and where and how it was applied. The latter measures are as yet less widely applied than fuel taxes.

Regulatory and Legislative Instruments

Regulatory and legislative instruments range from instruments aimed directly at improving environmental sustainability, eg emission standards, to those which require a more sustainable approach to be taken, eg requiring local authorities to integrate

transport and land use planning (see Table 6). There is a debate about the benefits of using regulatory instruments as opposed to enabling the efficient operation of the market through fiscal instruments. However, it is not the purpose of this report to address this debate in any detail.

It is certainly arguable that both regulatory and fiscal instruments can contribute to sustainability and both have their strengths and weaknesses in different areas. The extent to which one is used rather than the other will vary from case to case as well as being dependent on the political perspective of the government at the time. Legislation can certainly help drive other policies. For example, new air quality legislation appears to be developing as a driving force for broader urban transport policy developments in some countries - notably France and the UK.

Note that enforcement instruments have been excluded from this table as they were considered to be an implementation issue (see below).

Other Instruments

Voluntary agreements and educational and informational instruments can also contribute to making transport more sustainable (see Table 7). The latter arise from the need to break existing patterns of behaviour if a more sustainable approach to transport is to be attained. For example the provision of infrastructure for public transport on its own is often not sufficient to encourage its use due to the differing perceptions relating to the use of private and public transport. Simple information directed towards a change in behaviour can itself be helpful in some cases, but a more sophisticated approach may often be necessary. Also, the response of many sectors of society to instruments which appear to be detrimental to the unrestricted use of private transport may be based on a misunderstanding or a misrepresentation of the problem. On the other hand many people may accept that a problem exists, but cannot see any way in which they themselves can contribute to its solution. These issues need to be addressed with educational and informational instruments in order to redress the balance. In isolation, the effectiveness of such instruments is questionable, however their use is necessary to increase awareness and, when accompanied by other policy instruments, can be an important contribution.

Voluntary agreements with industrial groupings can be a cost-effective way of addressing environmental concerns (eg EU agreement with industry on reducing CO₂ emissions from cars). There is already significant experience of such agreements in some states - most notably the Netherlands - and it appears likely that they will be used increasingly as an alternative to regulation at EU level as well. There are concerns as to how effective they will be in practice, but the European Environment Agency has set out the potential problems and desirable characteristics for such agreements (European Environment Agency, 1997).

Implementation

Instruments are the levers which, if pulled appropriately, move the transport sector in the direction of the predefined policy goals. Some instruments, such as increasing fuel taxes, will generally move the transport system in a more sustainable direction in their own right because implementation is relatively straightforward in developed western democracies. However the effect other instruments will have on the sustainability of transport will depend on the way in which the instrument is implemented.

For example, the mere existence of air quality targets or even a management strategy will not be sufficient to improve air quality. The aim of this strategy is to provide a framework within which other instruments, such as emissions regulations, traffic controls and increasing taxation, can be introduced to improve air quality. Similarly, emission standards on their own need not result in a net improvement in air quality if the emission reductions are negated by a growth in traffic. Consequently, these regulations should ideally be combined with a strategy to manage demand or even reduce traffic levels if the full benefit of an improvement in air quality is to be attained.

Within each strategy, therefore, there would need to be a set of instruments and measures to implement the strategy to ensure that the sustainability of transport is increased. In a strategy to manage traffic demand or reduce traffic levels, measures such as bus lanes, pedestrianisation and cycle lanes may well be important. In a strategy to improve energy efficiency, measures to reduce the weight of vehicles and improve the operation of a vehicle's engine could be important. Such measures are not reviewed in this report as the aim is to focus on instruments. However, they are all likely to have an important role to play in increasing the sustainability of the transport sector.

A set of potential instruments have been omitted from Table 6: those aimed at enforcing legislation. It was considered that such instruments have more to do with implementation of instruments in that they aim to ensure that legislation to increase the sustainability of transport is complied with. Enforcement instruments are nonetheless important to improve the sustainability of the transport system. A good example of the need to enforce instruments is speed limits. On inter-urban routes in many European countries where a speed limit exists it is widely exceeded. Vehicles moving at high speeds are not operating at optimal fuel efficiency and, consequently, the enforcement of inter-urban speed limits would have a beneficial environmental effect.

Another example of the need to enforce instruments is emission standards. In this case, there needs to be a range of enforcement procedures ranging from ensuring that a new vehicle model meets the required emission standards, that all new vehicles of that model being sold also meet the emission standards and that the vehicle will continue to meet the emission standards once it is being used on the roads. In order to enforce emission standards, therefore, there needs to be tests undertaken on the model by the certification agency; trading standards officers would need to ensure that all cars of that model also meet the emission standards; and ideally there needs to be regular tests throughout a vehicle's operational life to ensure that the emission standards are continually being met. Many such instruments and measures are already in place, but additional ones may be needed in some cases. This report does not, however, consider the issue of

enforcement in any detail. Rather, it is taken for granted that a legislative or regulatory instrument will only contribute fully to increasing the sustainability of transport if it is enforced effectively.

4. The Contribution of the Instruments to Making Transport Sustainable

The majority of the instruments categorised in this report contribute in themselves to only a few of the policy goals given in Table 2. However, sustainability will not be achieved merely by moving to one or two of the policy goals of Table 2, so it is necessary to identify how instruments contribute to sustainability and which type of instruments needs to be implemented at the same time to ensure that the effect is in the direction of sustainability. This analysis is undertaken in Tables 8 to 11 which take the instruments categorised in Tables 4 to 7 and highlight how each could contribute to or undermine the attainment of the various sustainability objectives and policy goals given in Tables 1 and 2. In each of Tables 8 to 11 the instruments are ordered according to which of the principal policy goals they will contribute to attaining.

Many of the instruments in Tables 8 to 11 need to be accompanied by other measures to ensure they contribute to sustainability. For example, while concentrating development in urban areas (see Table 8) could potentially reduce the length of trips (PG5) and increase the use of other modes (PG4), there is a danger that increasing the population density of urban areas would reduce the quality of the urban environment and therefore discourage local economic activity (contrary to S2 and Ec2 of Table 1). Furthermore, placing origins and destinations of trips closer together facilitates shorter journeys, but does not guarantee that trip lengths will be reduced. If the quality of the urban environment declines, its attractiveness as a place in which to live and work also declines. As a result, people might choose to live in more remote locations which would result in longer journeys and thus defeat the object of concentrating development in urban areas in the first place. Planning policy must, therefore, aim to increase the density of urban development, while improving environmental quality. The corollary is that if people are to be attracted back to live in urban areas the existing urban environment needs to be improved.

Increasing Network Capacity and Sustainability

There are a number of instruments aimed at improving economic efficiency and the efficiency of resource use (eg improved infrastructure and in-car guidance systems), which could improve accessibility and equity (see Tables 9 and 11, respectively). However, such measures could have detrimental effects on other policy goals and environmental objectives by increasing the amount of travel as they effectively increase the capacity of the road network. There are three options with respect to such measures: no implementation of measures which could increase the capacity of the network; maintain or reduce total capacity by reducing capacity elsewhere to compensate for the increased capacity caused by the introduction of the measures; or accept an increase in the capacity of the public transport and/or road network, if that is the most sustainable option. Which option is appropriate would depend on local, regional and national circumstances.

For example, if an area was already relatively accessible, and the aim was to shift journeys from the car to other modes, then increasing the capacity of the public transport network could be accompanied by reducing capacity for cars. Alternatively, if it was decided that the area needed extra capacity, then this could be provided in the most sustainable way, which might well involve improving the capacity of existing networks. Similarly, if measures aimed specifically at restricting car use - which is effectively reducing capacity - were implemented in an area where there was no viable alternative, then accessibility would be reduced (contrary to S3). In this case, therefore, capacity for other modes must be provided at the same time in order to ensure that sustainability is not compromised.

Taxation and Equity

The use of pricing techniques to reduce the amount of travel is another evident source of potential conflict. If used in isolation, increasing the cost of travel is likely to have a detrimental effect on the social objectives of increasing accessibility and equity (S3 and S4). The possibility of hypothecating any revenue from increased transport prices to improve conditions and facilities for other modes could help address this issue, however. Indeed, there is an argument that a measure such as road pricing is only justifiable if such hypothecation were to take place. Beyond this, it is possible to identify combinations of taxation and other policy instruments which could contribute to both environmental and social sustainability objectives simultaneously (eg see Skinner and Fergusson, 1998).

In Table 9 there are a number of measures involving the use of incentives or subsidies to encourage or discourage certain behaviour. A distinction must be made between such incentives and subsidies and the need to remove environmentally-damaging subsidies, as the former are aimed at encouraging more environmentally beneficial behaviour. A subsidy or incentive to improve the environmental and social sustainability of transport could be seen as an attempt to include the environmental and social costs which are not yet included in the transport market. Furthermore, as the estimation of the costs of adverse environmental and social effects of transport is never likely to be more than a best guess, the use of incentives to encourage behaviour that is considered to be more sustainable can be considered an acceptable policy tool, even if not a 'first best' solution in economic terms.

The above discussion highlights two important points. First, in order to increase the sustainability of the transport sector, it is important to implement a package of policy measures with predefined objectives, as the implementation of policy measures in isolation could be neutral, or even detrimental to sustainability. Second, improving sustainability in the transport sector cannot be separated from improving the sustainability of other sectors.

Reconciling Economic and Social Objectives

A major problem in increasing the sustainability of transport, as in increasing the sustainability of other policy areas, is reconciling economic and social objectives. There

is often perceived to be a conflict between improving equity for existing and future generations (S4, S5 and implicitly the other objectives which reinforce these objectives) and supporting sustainable economic activity (Ec4, and implicitly the objectives which reinforce that objective). Measures to increase the environmental and social sustainability of transport are usually considered to be detrimental, economically, to individuals or companies.

In the broad sense, environmental, and even social, improvements are economic improvements, so they support sustainable economic activity, and therefore contribute to sustainable economic development, at the societal level. However, the increased costs involved to the individual or company are seen as restricting economic activity and therefore bad for economic development. This is the basis of the conflict underlying the implementation of more sustainable policies in many policy areas. Arguably, therefore, conflict exists where organisational or individual efficiency is opposed to improving societal efficiency, which includes improving the sustainability of social and environmental objectives, as well as economic ones. Addressing this issue is outside of the scope of this report, but many authors who have written about sustainable development address the need to change the approach taken by economics to the environment and social problems if more sustainable development patterns are to be achieved (e.g. Jacobs, 1991; Common, 1995; and Roodman, 1998).

Costs

Although some figures are available, it is not yet possible to present any detailed and coherent assessment of the costs or cost-effectiveness of instruments and measures towards sustainable transport. There are many reasons for this, including:

- Specific measures have thus far received more attention, and are more easily costed, than policy instruments.
- Costs can vary significantly from country to country and according to the method whereby measures are undertaken.
- Costs for 'hard' measures, such as infrastructure investment and technical improvements to vehicles, can be relatively well understood, but others are much more difficult to assess.
- Other costs (eg running costs for transport systems or costs of information campaigns) will vary considerably according to the system boundary of the analysis, the accounting conventions and institutional structures of the town or country in question. Costs of these instruments are generally less well studied than 'hard' measures.
- It is often difficult to quantify the benefits of an instrument or measure, and the value of external benefits (environmental, social or even economic) are often hotly contested.
- The basis of any cost-benefit analysis is likely to vary according to the type of instrument or measure under consideration. For example, road improvements are

often justified on the basis of safety improvements or the time savings for users and businesses, whereas public transport schemes more often consider the cash income to be gained through fares.

- Estimated costs and benefits of taxation and charging measures vary significantly according to the type of analysis undertaken (microeconomic or macroeconomic), on the assumptions as to the value of the benefits achieved and of the purposes to which revenues are allocated.

As an illustration of these difficulties, the EU's Auto Oil Programme initially attempted to evaluate the relative cost-effectiveness of technical and non-technical measures in meeting air quality targets. This attempt largely failed, so the Programme focused on evaluating the relative costs and benefits of a range of packages of improvements to fuel and vehicle technologies. Even then it proved difficult to cross-optimize the packages against a relatively narrow range of emissions parameters. To evaluate measures against a broad range of economic, social and environmental objectives, such as those of Table 1, is therefore currently out of reach.

The second Auto Oil Programme is currently attempting to remedy these deficiencies, but has still had rather limited success. Its findings may however go some way to providing a more coherent set of cost data. In the interim, there are some tentative conclusions which may be drawn on the cost side at least:

- Large scale infrastructure programmes tend to be very expensive relative to other measures. There are growing efforts to mobilise private as well as public money for new projects, but in many countries future spending is likely to decline relative to historic levels.
- Improving existing network utilisation either through minor improvements to bottlenecks or greater use of telematics is often cheaper and more cost-effective than large-scale building programmes.
- Minor works (eg cycle lanes and pedestrian schemes) are generally the cheapest of all 'hard' measures, being relatively labour-intensive but not capital-intensive.
- Costs of technical measures to vehicles can appear large in absolute terms, but are typically quite low compared to total costs. As an example, it has been suggested that the latest (unusually stringent) proposals for HGV emissions may add up to 4 per cent to the cost of a vehicle. This is an unusually high figure, but experience suggests that the actual costs may turn out to be lower than the industry initially estimates.
- 'Soft' measures and instruments are generally quite cheap in comparison to 'hard' measures, but their effectiveness can be the most difficult to evaluate.

5. Conclusion

All of the instruments listed in Tables 4 to 7 could contribute to making transport more sustainable in that they all contribute to achieving at least one of the sustainability objectives given in Table 1. However, if instruments are introduced in isolation, their effect will be limited and indeed, even though an instrument can be beneficial to achieving some objectives, many will be detrimental to attaining others.

Consequently, there is a need for instruments to be introduced as part of a package of complementary measures which aim to meet a set of predefined objectives. The implementation needs to be undertaken as part of broader strategy, so that instruments are implemented together in a strategic framework rather than in a piecemeal fashion. As the strategies listed in Table 4 implied, there also need to be moves in others sectors towards sustainability to compliment those being taken in the transport sector itself.

Some of the instruments listed in Tables 4 to 7 are already in common use. In general, these tend to be either the less controversial ones or those which were being used to attain other objectives, such as harmonisation of standards within Europe, eg emission standards. For other instruments, there remain significant political, and often technical, obstacles to their implementation.

Ultimately a sustainable transport system will only be achieved in Europe once patterns of passenger travel and freight distribution have changed significantly from those which most of Europe experience today. Many of the instruments discussed in this report will have a role to play in achieving such a system. However, they will need to be introduced as part of a broader strategy which would need to address wider issues such as trade and consumption patterns as well as the derived demand for transport itself. Ultimately it is likely that only through such a broad approach, alongside the policy instruments above, will transport be able to contribute to achieving sustainable development.

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Tables

Table 1:- Sustainability objectives relating to transport, and their interaction	23
Table 2:- Policy goals to improve the environmental performance of transport	24
Table 3:- Categorisation of instruments for sustainable transport.....	25
Table 4:- Strategic instruments for sustainable transport	26
Table 5:- Fiscal instruments for sustainable transport.....	28
Table 6:- Legislative and regulatory instruments for sustainable transport.....	30
Table 7:- Other instruments for sustainable transport (including voluntary agreements, information, dissemination of best practice).....	32
Table 8:- Assessment of strategic instruments	34
Table 9:- Assessment of fiscal instruments	37
Table 10:- Assessment of legislative and regulatory instruments.....	40
Table 11:- Assessment of other instruments	43

Table 1:- Sustainability objectives relating to transport, and their interaction

Interaction with other objectives:-		Env1	Env2	Env3	Env4	Env5	Env6	S1	S2	S3	S4	S5	Ec1	Ec2	Ec3	Ec4
Sustainability Objective (SOs):-																
Env1	Reduce toxic emissions and noise	-----	P	S		P	S					P	S	S	S	S
Env2	Reduce greenhouse gas emissions		-----	S		P	S					S	S	S	S	S
Env3	Reduce fossil fuel consumption			-----		P	S					S	S	S	S	S
Env4	Reduce consumption of other non-renewable resources				-----	P	S					S	S	S	S	S
Env5	Increase consumption of renewable resources			P	P	-----	S					S			S	S
Env6	Minimise the impact of transport infrastructure for given travel demand	S	S	S	S	S	-----					S	S	S		S
S1	Improve health and safety	S						-----	P		P					P
S2	Improve aesthetic quality of built and rural environment	S							-----		S	S	S	S		P
S3	Improve accessibility									-----	S		S	S		
S4	Reduce (intra-generational) inequity	S					S	S	S	S	-----			S		S
S5	Reduce the impacts on future generations	P	S	S	S	S	S	S	S	S	S	-----	S	S	S	S
Ec1	Improve efficiency of transport system			S			S					S	-----	S	S	S
Ec2	Improve transport-efficiency of economic activity	P	P	P			S		S	S	S	S		-----	S	S
Ec3	Improve efficiency of resource use	S	S	S	S	S	S					S	S	S	-----	S
Ec4	Support sustainable economic activity						S			P	S	S	S	S	S	-----

Key:- S - Supportive, as objective in row is supported by objective in column, eg improving health and safety, S1, is supported by reducing toxic emissions and noise, Env1;
P - Potentially supportive, eg improving efficiency of the transport system, Ec1, is potentially supported, but not necessarily, by reducing fossil fuel consumption, Env3.

Table 2:- Policy goals to improve the environmental performance of transport

Improving environmental performance (PGs)		SOs to which PGs could contribute
PG1	Improving environmental performance of manufacture of vehicles and construction and maintenance of infrastructure	Env4; Env5; Ec3; S5
PG2	Improving environmental performance of vehicle fleet (eg through cleaner vehicles or fuels)	Env1 to Env5; S1; S5
PG3	Improving environmental performance of existing traffic composition (reduce congestion and optimise speeds)	Env1 to Env3; Ec1; Ec3; Ec4
PG4	Improving environmental efficiency of travel by changing composition (eg increasing the modal share of public transport)	Env1 to Env3; S1 to S5; Ec1; Ec3; Ec4
PG5	Reducing amount of travel or transport of goods by reducing journey lengths	Env1 to Env3; Env6; S1; S2; S5; Ec1; Ec3; Ec4
PG6	Reducing amount of travel or transport of goods by reducing number of journeys	Env1 to Env3; S1; S2; S5; Ec1; Ec3; Ec4
PG7	Reducing amount of vehicles and infrastructure	Env4; S2; S5; Ec1; Ec3; Ec4

Table 3:- Categorisation of instruments for sustainable transport

Category of instrument (table)	Description
Strategic (4)	Strategic policies aimed at environmental concerns, eg air quality, or at transport policy, including planning
Fiscal (5)	Economic and financial instruments including investment, taxation and incentives.
Legislative and regulatory (6)	Legislation and regulations requiring standards to be met, eg emission standards, or plans or strategies to be drawn up by other organisations, eg green transport plans
Other, including information and best practice (7)	Other measures, which mainly involve information and soft measures aimed at changing behaviour

Table 4:- Strategic instruments for sustainable transport

Instrument	Description	Policy making body	Example
Waste minimisation strategy	A strategy aimed at minimising the amount of waste which effectively amounts to a more efficient use of resources. For transport this includes minimising the amount of waste which needs to be disposed of both during and at the end of a vehicles active life by more reuse and recycling, designing vehicles to enable more reuse and recycling and using more recycled resources in the construction of infrastructure.	National government, supported and facilitated by EU	Germany, EU (under development)
Air quality management strategy	A strategy aimed at improving air quality which requires the reduction of emissions to the air, where necessary. For transport, this relates principally to emissions released in the course of the operation of transport, but also to emissions released in the course of the manufacture of vehicles and the construction of infrastructure.	National government, supported and facilitated by EU	EU industrial policy and air quality framework; National Air Quality Strategy (UK)
Climate change strategy	A strategy aimed at reducing the impacts of climate change which requires the reduction of emissions of carbon dioxide and other greenhouse gases. For transport, this principally relates to carbon dioxide emissions released in the course of the operation of transport, the manufacture of vehicles and the construction of infrastructure.	National government, supported and facilitated by EU	Netherlands; UK; inter-ministerial working groups in Germany
Water and soil quality management strategies	A strategy aimed at improving water and soil quality which requires the reduction of emissions which pollute water courses and soil. For transport, this relates principally to run offs from spillages of oil and other hydrocarbons from roads and in the course of vehicle manufacture and road construction and salt from icy roads.	National government or agencies, supported by EU	
Energy efficiency programme	A strategy aimed at promoting the efficient use of energy. In transport, this would apply to the efficient use of vehicles, including energy-efficient driving behaviour, planning journeys to eliminate unnecessary trips, shifting journeys to more energy-efficient modes.	National government, supported and facilitated by EU	EU
Renewable energy strategy	A strategy aimed at promoting the efficient use of renewable energy. In transport, this would amount to increasing the use of renewable fuels, such as bio-fuels.	National government, supported and facilitated by EU	EU; France (bio-fuels)
Strategic integration of environment into transport policies and programmes	Range of instruments to ensure that environmental considerations are integrated in the decision-making process underlying transport policy, eg strategic environmental assessment	EU, national and regional government	EU (TENs); Italy; Castilla y León

Instrument	Description	Policy making body	Example
Traffic management strategy	A strategy aimed, not so much at reducing the environmental effects of traffic, but on making the most efficient use of infrastructure. The focus would be on reducing congestion and improving traffic flows, which would have a positive environmental effect in that unnecessary energy was not used and pollution emitted while vehicles were in congested conditions. However, it could result in more the same net environmental effects if traffic were simply to shift to another route or time.	National and local government depending on the type of road/area	Netherlands
Integration of modal networks	Integration includes improving public transport interchanges, improving cycle access on public transport, park and ride. For freight, greater use of intermodal transport and development of better interchange facilities.	National and local transport and planning ministries	Freiburg (passenger); Germany (freight)
Travel efficient development policy	Locate travel intensive development near public transport modes, in public transport corridors and near residential and employment centres. Similarly for freight.	National and local transport and planning ministries	Netherlands
Integration of transport and land use planning	This includes locating development to be accessible by public transport (including rail freight), concentrating development in urban areas, mixed use development	National and local transport and planning ministries	Netherlands
Urban concentration	Making the most efficient use of land in urban areas, rather than opting for suburban or rural development	National and local transport and planning ministries	
Urban renewal, revitalisation	Congestion, security concerns and neglect have meant that some urban areas are not a place where people would chose to live, which increases demand for suburban/rural development and journey lengths. Renewal and revitalisation of these areas would help reduce distances travelled.	National and local transport, planning and home affairs ministries	
Mixed use development	Aims to mix land uses at the local level, so that less distance needs to be travelled between home and work and other amenities and services. Similarly for freight movements.	National and local transport and planning ministries	
Demand management strategy	A strategy aimed at managing demand, rather than taking a laissez-faire approach to traffic and its growth. However, the strategy need not necessarily reduce traffic levels, but could simply reduce future growth. The strategy could involve restrictions on movement or wider measures to replace the need to travel, such as telecommuting, but would also likely to include the efficient use of infrastructure. It could be adopted for environmental reasons.	National and local government depending on the type of road/area	France (air quality laws)
Traffic reduction strategy	A strategy aimed at reducing the environmental effects of traffic by reducing traffic levels. This would need a more coordinated and concerted action to restrict movement, shift journeys from private to public transport and generally reduce the need to travel.	National and local government depending on the type of road/area	

Table 5:- Fiscal instruments for sustainable transport

Instrument	Description	Policy making body	Example
Incentives ¹ to encourage development of cleaner ² technology	As subsidies are not really allowed under EU law, support could be given to the research and development of cleaner technology by industry to help with the cost of developing cleaner technology.	National government, supported by EU	Various research and development programmes
Incentives to encourage more recycling and reuse	Tax incentives could be used or financial penalties imposed to encourage the vehicle manufacturers and construction industries to reuse and recycle.	National government, supported by EU	
Incentives to encourage purchase of cleaner vehicles	Support could be given to industry for the research and development of new technology. Incentives could be given to users in terms of lower tax rates to encourage the purchase and use of more fuel efficient and cleaner cars, buses etc.	National government, supported by EU	Italian bus purchase initiative
Incentives to encourage use of cleaner fuels	Tax advantages could be given to cleaner fuels and vehicles which are able to use cleaner fuels.	National government, supported by EU	Sweden; UK
Charging to manage use	Pricing mechanisms to manage demand could include road pricing, parking charges and public transport ticket pricing	National government, supported by EU or local government facilitated by national government	trunk road charging common in some countries, eg France
Charging for efficient use, eg external cost pricing	Pricing mechanisms to manage demand could include road pricing, parking charges and public transport ticket pricing, but prices are set to pay for external costs rather than manage demand.	National government, supported by EU or local government facilitated by national government	EU (under development); Switzerland (HGV charging scheme approved for 2001)
Invest in infrastructure for public transport and non-road freight	Infrastructure and facilities, ranging from local measures such as tramways, bus priority lanes and bus stops to intercity rail lines. Similarly for rail and water-borne freight.	Local and national government and sometimes the EU	Previously heavy investment programmes, eg Netherlands, Germany, France, Switzerland
Invest in infrastructure for softer modes	Infrastructure and facilities, including pedestrianisation, improved safety and security for pedestrians and cyclists and cycle racks	Local and national government	Netherlands; Denmark
Invest in transport infrastructure	Infrastructure and facilities for all modes. This could include some road building where appropriate to contribute to attaining sustainability (likely to be economic and social) objectives.	Local and national government and sometimes the EU	Netherlands, Germany

Instrument	Description	Policy making body	Example
Increase cost of car use	Increase fuel tax, parking charges or introduce charges for road use	National government/local government	UK (fuel tax)
Subsidise public transport use	Supporting or reducing public transport fares; providing free public transport	Public transport operators and local/national government	France; Sweden
Incentives to use other modes	Incentives could be given for people to use cycles to and in the course of work, for example.	Public transport operators/businesses	Amsterdam (free bikes)
Incentives to encourage certain types of land use	Tax incentives to encourage use of land for commercial/residential purposes, eg in urban areas.	Local government/national government	
Incentives to encourage development in appropriate areas and locations	Tax incentives to encourage companies to locate to certain localities and regions	Local government/national government/EU	Widespread
Increase price of car purchase	Introduce and increase vehicle purchase tax/differentiate for cleaner vehicles	National government	Denmark; Italy; Netherlands
Increase price of car ownership	Increase annual registration tax/differentiate for cleaner vehicles	National government	Germany; Italy
Introduce incentives not to travel or own a vehicle	Introduce incentives to work/shop remotely, reductions on cycle purchase or public transport fares or even computer purchase	Employers and public transport operators	
Incentives to scrap old or polluting vehicles	Payment or reduction in the cost of the purchase of a cleaner vehicle	National government	France, Italy, Ireland, Spain, Greece
Increase cost of travel	Increase cost of all forms of travel	National government	UK?

Note:- 1) Incentives include tax breaks, financial support, grants or differential taxation.

2)'Cleaner' includes less polluting, more energy efficient and renewable.

Table 6:- Legislative and regulatory instruments for sustainable transport

Instrument	Description	Policy making body	Example
Emission standards from manufacturing plants and machines used for construction of infrastructure	Set emissions (including CO ₂) for industrial plants	EU or national government	EU standards for regulated pollutants (not CO ₂)
Targets for use of renewable resources	Set sectoral/company targets for use of renewable resources	EU or national government	Rarely mandatory
Targets for energy efficiency	Set sectoral/company targets for energy efficiency	EU or national government	Rarely mandatory
Emission and noise standards for new vehicles	Set emissions (including CO ₂) and noise standards for new vehicles	EU primarily	EU (ongoing)
Emission and noise standards for existing vehicles	Set emissions (including CO ₂) and noise standards for existing vehicles	EU, national or local government	Mainly annual checks, which vary in stringency; roadside checks, eg London
Design standards for vehicles	Set design standards for new vehicles, including recycling targets and use of chemicals	EU	EU (proposed)
Design standards for infrastructure	Set design standards for infrastructure, including recycling targets and use of chemicals	EU	
Set speed limits	Speed limits can be set to achieve optimal flow, improve fuel efficiency or to achieve safety objectives, depending on location and circumstances	National government, or local government enabled by national government	Widely used, but enforcement variable; under review in UK
Encourage or require local/regional authorities/agencies, where necessary, to integrate infrastructure for different modes	Regulations or statutory requirements for local authorities to develop plans for sustainable transport. Plans to be assessed by national government.	National governments requiring local governments to develop plans	
Encourage or require public transport operators, where necessary, to improve service quality and integrate ticketing and information	Regulations or statutory requirements to encourage or require public transport operators to employ quality vehicles to provide a quality service	Local government in cooperation with public transport operators, either enabled or required by national government	Increasing in UK, eg London
Encourage or require large organisations, where necessary, to introduce Green Transport Plans (including telecommuting)	Regulations or statutory requirements to encourage or require large organisations to introduce Green Transport Plans	Local government/national government/other organisation in cooperation with local business	Austria; UK; Germany investing heavily in telematics

Instrument	Description	Policy making body	Example
Require local authorities, where necessary, to formulate integrated transport and land use strategies	Regulations or statutory requirements for local authorities to develop plans to integrate transport and land use planning	National governments requiring local governments to develop plans	
Planning and development control	Regulations or statutory requirements for local authorities to develop plans to plan and develop in line with sustainability	National governments requiring local governments to implement appropriate controls	UK
Encourage or require local authorities, where necessary, to reduce the need to travel (including the use of telecommunications)	Regulations or statutory requirements for local authorities to reduce the need to travel	National governments requiring local governments to reduce the need to travel	Under consideration in Netherlands and UK
Traffic restrictions or bans	Night bans on heavy goods vehicles; area restrictions; emergency powers under air quality legislation	Local government, enabled or required by national government	London, major EU routes (HGV bans); Bologna and cities in ALTER programme (area restrictions); Germany, Paris (emergency powers)

**Table 7- Other instruments for sustainable transport
(including voluntary agreements, information, dissemination of best practice)**

Instrument	Description	Policy making body	Example
Voluntary agreements to improve environmental performance of the manufacturing of vehicles and the construction of roads	Discussions with the relevant industries on improving the environmental performance of their industries in the most cost-effective way	At least national government, more likely the EU with the relevant industries	
Campaigns to educate to encourage more reuse, recycling and use of renewable resources by construction firms and vehicle manufacturers	Increase awareness about environmental effects and potential consumer benefit of being seen to be green	National government/EU	German end-of-life vehicles initiative
Voluntary agreements to improve environmental performance of vehicles and the maintenance of roads to improve efficiency of resource use and to reduce pollution	Discussions with the relevant industries on improving the environmental performance of their products in the most cost-effective way	At least national government, more likely the EU with the relevant industries	EU (CO ₂ from cars); Sweden (cleaner fuels)
Campaigns to educate consumers to encourage more environmentally-informed purchasing behaviour (eg more fuel-efficient/cleaner vehicles)	Increase awareness of environmental effects and the potential contribution of individuals to reducing these. Labelling of cars to indicate their environmental performance	National government/EU	Netherlands, EU
Campaigns to educate drivers to encourage more environmentally-aware driving behaviour	Increase awareness of environmental and economic benefits of improved driving behaviour.	National and local government/EU	UK (HGV initiatives)
Campaigns to encourage travellers to be flexible with journey times and employers, services etc to enable this flexibility	Increase awareness of potential benefits in economic terms to business of reducing congestion, in economic terms of employers of having less stressed employees	National and local government/EU	France (car free days)
In-car route guidance systems and improved logistics for freight	Electronic route guidance information to reduce congestion and better freight tracking using GIS. Often commercially-driven, but can be promoted by public authorities.	National government/EU/technological companies/highways authorities	Several systems now available in EU
Real-time information in public transport/at stops/stations	Real time information to make public transport services more user friendly	National government/EU/public transport operators and local authorities	Netherlands

Instrument	Description	Policy making body	Example
Campaigns to increase awareness regarding adverse effects of car use and benefits of public transport use (both to users and those potentially affected by policy changes, eg retailers)	Increase awareness of adverse benefits of car use and environmental, economic and health benefits of using other modes	National and local government	Widespread
Provide quality public transport information (timetables, routes, ticketing information)	Integrated, comprehensive and coordinated information	Public transport operators and local government supported/enabled by national government	
Integrate public transport information and ticketing	Integrate and coordinate ticketing	Public transport operators and local government supported/enabled by national government	EU benchmarking initiative
Green/school transport plans and travel awareness campaigns to encourage use of other modes in journeys to/within work/school	Plans to reduce the use of motorised private travel and increase the use of other modes for specific journeys and generally.	Businesses, encouraged and supported by other groups and government	Italy, UK
Media campaigns	Campaigns to raise general awareness and to encourage behavioural change among specific groups.	National and local government	
Provide information on cycle/pedestrian routes/networks and facilities	Information is often sparse or badly coordinated or inaccessible - all of which needs to be changed	Local government and cycling and pedestrian groups	Switzerland, UK
Campaigns/professional training/dissemination of best practice to educate officers and politicians with respect to best use of land	Dissemination of best practice with respect to efficient land use	National government with the help of planning professionals	
Campaigns to educate commuters/shoppers regarding potential for and benefits of teleworking/teleshopping	Dissemination of best practice and information regarding the benefits to customers/employees and retailers/employers of not having to travel and occupy space at the destination of the non-journey	National/local government	
Campaigns to educate to encourage responsible use of transport, particularly of the car (eg better personal organisation, car pooling, lifestyle changes)	Information regarding the advantage of changing behaviour and enabling that change through the setting up of schemes or information and contact numbers of other schemes	National/local government	Austria, Italy, Germany, Netherlands, Switzerland
Campaigns to educate to move culture away from car dependence to enable alternative more innovative approaches, eg more home deliveries	General education and information to move culture away for the existing obsession with the car	National/local government, other actors, eg retailers	Some retailers now experimenting with this

Table 8:- Assessment of strategic instruments

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Waste minimisation strategy	Env4 - Env6; S5; PG1; PG2	Env2; Env3; PG7;	Would minimise the amount of resources used and therefore the amount of waste which has to be disposed of, but would do nothing to address environmental damage caused by vehicle operations and traffic levels. Indeed minimising the amount of waste produced by manufacturing might encourage more vehicles to be made.	Would need to be accompanied by instruments to address environmental effects caused by vehicle operation and to reduce use. Would need to ensure that potential conflicts between recyclability and fuel efficiency are resolved.
Air quality management strategy	Env1 - Env3; Env6; S1; S2; S4; Ec1; Ec3; PG1; PG2	PG4 - PG6; Ec4 ¹	Would reduce the amount of pollution emitted in the course of the manufacture and operation of vehicles and the construction of infrastructure, but would do nothing to address traffic levels. Indeed reducing emissions might result in more travel being undertaken as people perceive there to be less environmental impact.	Would need to be accompanied by instruments to control demand.
Climate change strategy	Env1 - Env3; Env6; S5; Ec1; Ec3; PG1 - PG6	PG4 - PG6; Ec4 ¹	Would contribute to reducing the damage to the climate caused by emissions and would also require measures to reduce traffic levels.	Important strategy for sustainability as, with current technology, there is likely to be a need for a reduction in traffic levels in order that an effective climate strategy be successful.
Water and soil quality management strategies	Env1; Env3; Env6; S5; PG1; PG2		Would only have limited implications for the sustainability of transport as the sector is a relatively small contributor to overall water and soil pollution.	Reducing emissions to the air and better design of infrastructure, vehicles and fuel storage and transportation facilities would improve the sustainability of transport with respect to water and soil.
Energy efficiency programme	Env1 - Env3; Env6; S5; PG2	PG4 - PG6; Ec4 ¹	Would reduce fuel use and therefore emissions per kilometre travelled, but would reduce the cost of use, and therefore might encourage more use.	Would need to be accompanied by instruments to control demand.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Renewable energy strategy	Env1 - Env3; Env6; PG2	PG4 - PG6; Ec4 ¹	Would reduce emissions per kilometre travelled, but might encourage more use as people perceive there to be less environmental impact.	Would need to be accompanied by instruments to control demand.
Strategic integration of environment into transport policies and programmes	Env1 - Env6; PG1 - PG7	Ec4 ¹	Would help reduce the overall environmental impacts of transport policy.	Would need to be accompanied by measures to address the adverse social impacts of existing transport policy.
Traffic management strategy	S1; S2; Ec1 - Ec3; PG3	Env1 - Env3; Env6; Ec4 ²	Would improve the efficiency of resource use and traffic flow, but need not reduce the net environmental impacts of traffic as focus is on making efficient use of the road network, and is therefore effectively increasing capacity.	In some cases, this might be in line with sustainability, but in congested and developed areas, it would probably need to be combined with instruments to address use.
Integration of modal networks	Env3; S3; S4; Ec1 - Ec3; PG4; PG5	Ec4 ³	Would effectively be increasing the capacity of the network, but this could have net sustainable benefits if it included a reduction in car use.	Modal integration should be accompanied by other instruments (improved priority and facilities, information) to encourage use of other modes. Reallocation of road space would also help.
Travel efficient development policy	S3 - S5; Ec1 - Ec3; PG4; PG5	Ec4 ³	Aims to reduce the need to travel, increase accessibility and encourage travel that is undertaken to be by other modes.	Needs strong planning and development control to ensure that development contributes to sustainability and therefore that travel to and from the development is undertaken in most sustainable fashion.
Integration of transport planning and spatial development	Env1 - Env3; Env6; S3 - S5; PG4; PG5; PG7	Ec4 ³	Would contribute to sustainability by reducing the amount of travel necessary for a certain amount of development and maximising use of environmentally less damaging modes for this travel.	A strategic policy fundamental to improving sustainability and if implemented correctly will do so in the longer term.
Integration of transport and land use planning	Env1 - Env3; Env6; S3 - S5; PG4; PG5; PG7	Ec4 ³	Contributes to sustainability by reducing the need to travel and maximising the use of other modes for travel that does occur.	A strategic policy fundamental to improving sustainability and if implemented correctly will do so in the longer term.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Urban concentration	Env1 - Env3; S3; Ec1; PG4; PG5; PG7	S2; Ec2; Ec4 ³	Would contribute to reducing the need to travel and increasing the prospects for the use of other modes.	Attention must be given to ensuring that concentration does not detract from the aesthetic quality of the urban environment or unacceptably contribute to increasing congestion on any mode.
Urban renewal, revitalisation	S2; S3; S5; PG4; PG5	Ec4 ³	A strategic policy, which encompasses wider issues than transport and planning, but is important to sustainability.	Needs to be encompassed within a broader policy framework to ensure that social and development policy contributes to sustainable development
Mixed use development	Env1 - Env3; S3; PG4; PG5	Ec2; Ec4 ³	Aims to reduce journey lengths and therefore will contribute to environmental, accessibility and quality of urban environment objectives.	Must ensure that nature and scale of 'mixing' is sufficient for people not to feel confined and make services financially-viable, while small enough to reduce travel needs.
Demand management strategy	Env1 - Env3; Env6; S1; S2; Ec1 - Ec3; PG4 - PG6	Env1 - Env3; Env6; S3; Ec4 ²	Would improve the efficiency of resource use and traffic flow and could reduce the net environmental impacts of traffic. However, the focus of the policy is on making efficient use of the transport network, so environmental impacts need not necessarily be reduced.	In some cases, this might be in line with sustainability, but in congested and developed areas, it would probably need to be combined with instruments to address use and improve facilities for other modes.
Traffic reduction strategy	Env1- Env4; Env6; S1; S2; Ec1 - Ec3; PG4 - PG6	S3; Ec4 ²	Would improve the efficiency of resource use and traffic flow and reduce net environmental impacts of traffic.	Would need to be accompanied by strategic instruments to reduce journey lengths and improve facilities and infrastructure for other modes.

Note:-

- 1) These instruments would contribute to sustainable economic activity, however, they are often seen to be detrimental to traditional economic activity as they increase short- to medium-term internal costs and some may restrict movement, see text.
- 2) These instruments would contribute to sustainable economic activity, however, they are often seen to be detrimental to traditional economic activity as they limit traffic movement and therefore the flexibility of industry and individuals to vary travel patterns to suit their own needs.
- 3) These instruments would contribute to sustainable economic activity, however, they are often seen to be detrimental to traditional economic activity as a result of the belief held in some quarters that such regulation is detrimental to the operation of the market, see text.

Table 9:- Assessment of fiscal instruments

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Incentives to encourage development of cleaner technology	Env1 - Env6; S1; PG1	Ec3	While the development of cleaner technology would result in less environmental damage being caused for the same amount of travel, these instruments need not do anything to address the unsustainable increase in the use of private transport.	The development of cleaner technology, while important, needs to be combined with instruments to affect use.
Incentives to encourage more recycling and reuse	Env4; S5; PG1	Ec3	Increasing reuse and recycling would reduce resource use in the transport sector.	Increased reuse and recycling would increase the efficiency of resource use in the sector, so would increase its sustainability. However, to address other unsustainable aspects of transport, would need to be combined with instruments to affect use.
Incentives to encourage purchase of cleaner vehicles	Env1; Env2; Env3; S4; PG2	Ec3	While the use of cleaner technology would contribute to sustainability in that less environmental damage was being caused per journey, the instrument does nothing to address the unsustainable increase in the use of private transport.	The use of cleaner technology is important to increase sustainability, but needs to be accompanied by instruments addressing the use of private transport.
Incentives to encourage use of cleaner fuels	Env1; Env5; S1; PG1; PG2	Ec3	Increased use of renewables would reduce resource use in the transport sector.	Increased use of renewables would increase the efficiency of resource use in the sector, so would increase its sustainability. However, to address other unsustainable aspects of transport, would need to be combined with instruments to affect use.
Charging to manage use	Ec1; Env1 - Env3; PG3 - PG7	S3; S4	Could contribute to sustainability by reducing the use of private transport/increasing use of public transport at certain times, however could just as easily spread demand which would only reduce congestion rather than address other concerns.	If designed appropriately and accompanied by provision of facilities and infrastructure for alternative modes could result in a more sustainable transport system.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Charging for efficient use, eg external cost pricing	Ec3; Ec4; Env1 - Env3; PG3	S3; S4	Would contribute to sustainability as improves the efficiency of resource use by making users pay for the pollution they cause.	Requires that the revenue obtained from making users pay for the external costs be recycled to provide and improve facilities for other modes.
Invest in infrastructure for public transport	Env6; S3; S4; PG4 to PG6	Ec1; Ec3; Ec4 ¹	Enables use of public transport so could contribute to sustainability, but could merely increase capacity of network.	While likely to move towards sustainability would only do so if journeys were attracted from private transport. So, private transport journeys would need to be discouraged through pricing, reallocation of road space and restraint. Could be supported by improving quality of public transport service and publicity/awareness campaigns.
Invest in infrastructure for softer modes	S3; S4; Ec3; PG4 to PG6	Ec1; Ec4 ¹	Enables use of softer modes so could contribute to sustainability, but could merely increase capacity of network.	Would contribute to sustainability if journeys were attracted from private transport. So, private transport journeys would need to be discouraged through pricing, reallocation of road space and restraint. Could be supported by improving quality of public transport service and publicity and/or awareness campaigns.
Invest in transport infrastructure	S3; PG4 to PG6	Ec1; Ec3; Ec4 ¹	Enables integrated use of all modes so could contribute to sustainability, but could merely increase capacity of network.	While likely to move towards sustainability would only do so if journeys were attracted from private transport and private transport was used more responsibly. So, private transport journeys would need to be discouraged through pricing, reallocation of road space and restraint. Could be supported by improving quality of public transport service and publicity and/or awareness campaigns.
Increase cost of car use	S4; PG4 to PG6	S3; S4; Ec1; Ec3; Ec4 ¹	Would reduce environmental damage and should encourage use of other modes, but would not contribute to achieving social goals as accessibility and inequity would increase.	Would need to be accompanied by the provision of suitable alternatives.
Subsidise public transport use	PG4 to PG6; S3; S4	Ec1; Ec3; Ec4 ¹	Could simply encourage public transport use, without affecting use of other modes, so other than increasing accessibility and equity the contribution to sustainability would be limited.	To contribute to sustainability, the increased public transport use would need to include a shift from private transport. Consequently, private transport would need to be discouraged through restraint, reallocation of road space or increased costs.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Incentives to use other modes	PG4 to PG6	Ec1; Ec2; Ec4 ¹	Could increase the use of public transport which is a step in the right direction, but effectively only increases the use of infrastructure, so need not increase the sustainability of transport.	If the increase in public transport use was transferred from private modes then the instrument would contribute to sustainability. To achieve this, use of private transport would need to be discouraged through pricing, physical restraint or increased awareness.
Incentives to encourage certain types of land use	S3; Env6; Ec1; Ec2; PG5	Ec1; Ec3; Ec4 ¹	Could reduce the need to travel, thus increasing sustainability of development policy.	Would contribute to sustainability as long as transport infrastructure was also in line with sustainability principles.
Incentives to encourage development in appropriate areas and locations	S3; Ec2; PG5	Ec1; Ec4 ¹	If used appropriately could reduce the need to travel resulting in a more sustainable development policy.	Would contribute to sustainability as long as transport infrastructure was also in line with sustainability principles.
Increase price of car purchase	PG7; Env1 - Env3	S3; S4; Ec4 ¹	Would send out the right message, but would only affect one decision, that of the initial purchase.	Need other instruments to encourage less ownership and use, such as the existence of good quality alternatives and disincentives for use.
Increase price of car ownership	PG7; Env1 - Env3	S3; S4; Ec4 ¹	Would send out the right message, but the scale of the effect is not likely to be large, unless taxes are large.	Need other instruments to encourage less ownership and use, such as the existence of good quality alternatives and disincentives for use.
Introduce incentives not to travel or own a vehicle	S4; PG4 to PG7	S4; Ec1; Ec3; Ec4 ¹	Could increase sustainability if resulted in less travel, but time spent travelling to work/shops could be transferred to other journeys.	Would need to ensure that accompanying instruments would in fact result in a net traffic reduction.
Incentives to scrap old or polluting vehicles	Env1 - Env3; PG3	Ec1; Ec3; Ec4 ¹	Would reduce the environmental impact of existing traffic, however is often used to encourage new car purchases and does not affect traffic levels.	Would need to be accompanied by instruments aimed at reducing traffic levels.
Increase cost of travel	PG4 to PG6	S3; S4; Ec1; Ec3; Ec4 ¹	Would contribute to environmental objectives, but in the light of present inequities would not contribute to increasing social sustainability.	Would need to be accompanied by provision of facilities for other modes and changes in land use policy.

Note:- 1)Incentives and subsidies are often seen as inefficient instruments, in terms of their contribution to traditional economic activity. However, they could contribute to sustainable economic activity, as argued in the text, by eliminating unsustainable behaviour. Consequently, Ec4 has been widely included in the 'Could be detrimental to' column, although, by definition, moves towards sustainability contribute to sustainable economic activity and therefore to sustainable economic development.

Table 10:- Assessment of legislative and regulatory instruments

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Emission standards from manufacturing plants and machines used for construction of infrastructure	Env1; PG1	Ec1; Ec3; Ec4 ¹	Would contribute to reducing emissions, however would do nothing to address social problems or traffic levels.	Would need to be accompanied by instruments to address traffic levels.
Targets for use of renewable resources	Env3 - Env5; PG1	Ec1; Ec3; Ec4 ¹	Would contribute to increasing the use of renewable resources, but would not address other environmental and social problems.	Would need to be accompanied by instruments to address other sustainability concerns.
Targets for energy efficiency	Env3; PG1; PG2	Ec1; Ec3; Ec4 ¹	Would contribute to increasing energy efficiency, but need not have a significant impact on reducing the overall environmental impact of transport.	Would need to be accompanied by instruments to address other sustainable transport objectives.
Emission and noise standards for new vehicles	Env1; PG2	Ec1; Ec3; Ec4 ¹	Would contribute to reducing noise and emissions, although does not address use.	Needs to be accompanied by instruments to reduce use.
Emission and noise standards for existing vehicles	Env1; PG2	S4; Ec1; Ec3; Ec4 ¹	Will contribute to reducing emissions, but does not address use. Could adversely affect the least wealthy vehicles users.	Could be accompanied by information to ensure that vehicles are better maintained between tests. Should be accompanied by other instruments aimed at reducing use.
Design standards for vehicles	Env4; Env5; S1; PG2	Ec1; Ec3; Ec4 ¹	Would contribute to reducing noise and emissions and reducing resource use, although does not address use.	Needs to be accompanied by instruments to reduce use.
Design standards for infrastructure	Env4; Env5; PG1; PG3	Ec1; Ec3; Ec4 ¹	Would contribute to reducing noise and emissions and reducing resource use, although does not address use.	Needs to be accompanied by instruments to reduce use.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Set speed limits	Env1 - Env3; Env6; S1; Ec1; Ec3; PG3	Env1 - Env5; Ec1; Ec3; Ec4 ¹ ; PG4 - PG6	Could contribute to safety goals, improving the efficiency of resource and infrastructure use and to reducing emissions. Lower speed limits could suppress demand and encourage use of other modes. Optimal speed limits could increase demand as network would be used more efficiently.	Information would need to be provided to the public on the rationale behind the setting and enforcement of speed limits and might also need to be accompanied by instruments to reduce capacity.
Encourage or require local/regional authorities/agencies, where necessary, to integrate infrastructure for different modes	Env1 - Env3; Ec2; S3; PG4	Ec1; Ec3; Ec4 ¹	Could be a significant contribution to the range of sustainability objectives.	Would be an important tool in terms of planning, but could be complemented by technological, educational and economic instruments to increase sectoral sustainability.
Encourage or require public transport operators, where necessary, to improve service quality and integrate ticketing and information	S3; Ec2; PG4	Ec1; Ec3; Ec4 ¹	Would contribute to making public transport more attractive and therefore encouraging its use.	Would need to be accompanied by good quality and coordinated information and a promotional campaign as well as the provision of infrastructure.
Encourage or require large organisations, where necessary, to introduce Green Transport Plans (including telecommuting)	S3; Ec2; PG4 to PG6	Ec1; Ec3; Ec4 ¹	Would contribute to reducing the environmental damage and contribute to other sustainability objectives caused by journeys to and from these organisations.	Would need to be accompanied by improved facilities and infrastructure for other modes as well as educational and informational instruments.
Require local authorities, where necessary, to formulate integrated transport and land use strategies	S3; Ec2; PG4 to PG6	Ec1; Ec3; Ec4 ¹	Could be a significant contribution to the range of sustainability objectives.	Would be an important tool in terms of planning, but could be complemented by technological, educational and economic instruments to increase the sustainability of the sector.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Planning and development control	Env6; Ec2; PG4 - PG6	Ec1; Ec3; Ec4 ¹	Could be a significant contribution to the range of sustainability objectives.	Would be an important tool in terms of planning, but could be complemented by technological, educational and economic instruments to increase the sustainability of the sector.
Encourage or require local authorities, where necessary, to reduce the need to travel (including telecommunications)	Env1 - Env4; Ec2; PG6	Ec1; Ec3; Ec4 ¹	Could be a significant contribution to the range of sustainability objectives.	Would be an important tool in terms of planning, but could be complemented by technological, educational and economic instruments to increase the sustainability of the sector.
Traffic restrictions or bans	Env1; Env2; Env3; S2; PG2	S3; Ec1; Ec3; Ec4 ¹	Will improve air quality in those areas from which polluting vehicles are restricted. A secondary effect will be to stimulate demand among public transport operators and other vehicle owners for cleaner vehicles. Care needs to be taken to ensure that overall accessibility is maintained.	Information would need to be provided to the public on the rationale behind the decision and to retailers to advise them of potential benefits to them so to gain their support. Incentives (eg tax breaks) for development and purchase of cleaner vehicles would also help.

Note:- 1)These instruments would contribute to sustainable economic activity, however, they are often seen to be detrimental to traditional economic activity as they increase short- to medium-term internal costs or restrain movement.

Table 11:- Assessment of other instruments

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Voluntary agreements to improve environmental performance of the manufacturing of vehicles and the construction of roads	Env3 - Env5; S1; S2; PG1; PG2		Will contribute to environmental sustainability, but does nothing to address use.	Would need to be combined with instruments to reduce the use of private vehicles.
Campaigns to educate to encourage more reuse, recycling and use of renewable resources by construction firms and vehicle manufacturers	S5; Ec3; PG1; PG2		Will contribute to sustainability if it encourages more efficient resource use.	Will affect the efficiency of resource use in production, but would need to be used in conjunction with instruments targeting use.
Voluntary agreements to improve environmental performance of vehicles and the maintenance of roads to improve efficiency of resource use	Env3 - Env5; S5; Ec3; PG2		Will contribute to environmental sustainability, but does nothing to address use.	Would need to be combined with instruments to reduce the use of private vehicles.
Campaigns to educate consumers to encourage more environmentally-informed purchasing behaviour (eg more fuel-efficient/cleaner vehicles)	Env1 to Env4; S5; Ec3; PG3		Will contribute to sustainability if it encourages more environmentally-informed purchasing behaviour.	Will reduce emissions from and fuel use by the car, but will not address unsustainable usage, so needs to be used in conjunction with instruments that do.
Campaigns to educate drivers to encourage more environmentally-aware driving behaviour	Env1 to Env4; Ec3; S1; PG3		Will contribute to sustainability if it encourages more environmentally-aware driving behaviour.	Will reduce emissions and fuel used on journeys by the car, but will not address unsustainable usage, so needs to be used in conjunction with instruments that do.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Campaigns to encourage travellers to be flexible with journey times and employers, services etc to enable this flexibility	Env6; Ec1; Ec3; PG3	Env1 - Env4	Will contribute to reducing congestion, however could be merely increasing capacity of network, so need not have a positive effect on overall sustainability.	Effectively targeted at improving the efficiency of the use of the network. While this will avoid the need to expand physical capacity, emissions would increase. Could only contribute to sustainability if undertaken within a system which was already moving towards sustainability.
In-car route guidance systems	S3; Ec1; Ec3; Ec4; PG3	Env1 - Env6; S2; PG4 to PG6	Will contribute to reducing congestion, however could be merely increasing capacity of network, so need not have a positive effect on sustainability.	Again this instrument is aimed at improving the efficiency of the network. No doubt that it could save time, but could also encourage use. Needs to be accompanied by reallocation of road space and instruments to discourage car use.
Real-time information in public transport/at stops/stations	S3; Ec1; Ec3; Ec4; PG3; PG4	PG5; PG6	Will contribute to increasing the use of public transport modes, which could have a positive effect on sustainability.	Instrument is aimed at encouraging use of public transport, but also at improving the efficiency of its use. In order to contribute to sustainability would need to be used for journeys which would have been done by car. It should also be accompanied by improved public transport infrastructure and services.
Campaigns to increase awareness regarding adverse effects of car use and benefits of public transport use (both to users and those potentially affected by policy changes, eg retailers)	S3; PG4 - PG6		Will contribute to sustainability if it encourages less car use in favour of the use of other modes.	To encourage people to use public transport for journeys which would have been done by car, quality public transport alternatives would need to be provided.
Provide quality public transport information (timetables, routes, ticketing information)	S3; PG4		Will contribute to increasing the use of public transport, which could be positive in terms of sustainability.	Needs to be accompanied by improved awareness of the alternatives and improved public transport services.

Instrument	Could contribute to:	Could be detrimental to:	Sustainability potential	Making the instrument sustainable
Integrate public transport information and ticketing	S3; PG4		Will contribute to increasing the use of public transport modes, which could have a positive effect on sustainability.	Needs to be accompanied by improved awareness of the alternatives and improved public transport services.
Green/school transport plans and travel awareness campaigns to encourage use of other modes in journeys to/within work/school	S4; PG4 to PG6		Will contribute to sustainability if it encourages increased use of other modes in preference to the car, or less travel.	Needs to be accompanied by the provision of infrastructure and facilities for other modes and improved public transport services.
Media campaigns	Env1- Env3; S1; PG4 to PG6		Will contribute to if it encourages increased use of other modes in preference to the car or less travel.	Needs to be accompanied by the provision of infrastructure and facilities for other modes and improved public transport services.
Provide information on cycle/pedestrian routes/networks and facilities	S3; Ec3; PG4 to PG6		Will contribute to increasing the use of other modes, which could have a positive effect on sustainability.	Needs to be accompanied by instruments to make routes safer and more secure.
Campaigns/professional training/dissemination of best practice to educate officers and politicians with respect to best use of land	Env6; Ec2; Ec4; PG5		Will contribute to sustainability if it reduces the need to travel, especially by motorised modes.	Needs to be accompanied by the appropriate powers and financial resources to enable best practice to be implemented.
Campaigns to educate commuters/shoppers regarding potential for and benefits of teleworking/teleshopping	S3; Ec3; PG6		Will contribute to sustainability if it reduces the total number of journeys.	Needs to be accompanied by an increased awareness of transport and environmental problems.
Campaigns to educate to encourage responsible use of transport, particularly of the car (eg better personal organisation, car pooling, lifestyle changes)	Env1 - Env3; Ec1; Ec3; PG4 to PG6		Will contribute to sustainability if it reduces the total number, or length, of journeys or changes modal use.	Needs to be accompanied by an increased awareness of transport and environmental problems and to encourage people to take responsibility for their actions
Campaigns to educate to move culture away from car dependence to enable alternative more innovative approaches, eg more home deliveries	Env1 - Env3; S3; Ec2; PG4 to PG7		Will contribute to sustainability if it reduces dependence on the car.	Needs to be accompanied by a wider shift in the attitude of society to a less individual and more inclusive one.

REPORT 4977

Instruments for Sustainable Transport in Europe

Potential, Contributions and Possible Effects

SUSTAINABLE DEVELOPMENT MAY REQUIRE a thorough transformation of the transport system and alternative in addition to the social and economic ones - a strategic framework for environmental adaptation would be helpful in providing clearly defined objectives and policy goals. The implements necessary for change must be outlined jointly. Further effective measures are still required in addition to those, which have already taken.

This report identifies a list of potential instruments, which could be helpful in carrying Europe towards a more environmentally sustainable transport system. It examines the interactions between instruments and their potential impact on and cost to society.

The work was carried out by the Institute for European Environmental Policy, London.

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