EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

ECONOMIC RESEARCH CENTRE

TRANSPORT AND SPATIAL POLICIES: THE ROLE OF REGULATORY AND FISCAL INCENTIVES

ROUND TABLE

124

OECD

ECONOMIC RESEARCH CENTRE

REPORT OF THE
HUNDRED AND TWENTY FOURTH ROUND TABLE
ON TRANSPORT ECONOMICS

held in Paris on 7th-8th November 2002
on the following topic:

TRANSPORT AND SPATIAL POLICIES: THE ROLE OF REGULATORY AND FISCAL INCENTIVES

EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT (ECMT)

The European Conference of Ministers of Transport (ECMT) is an inter-governmental organisation established by a Protocol signed in Brussels on 17 October 1953. It comprises the Ministers of Transport of 43 full Member countries: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, FRY Macedonia, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom. There are seven Associate member countries (Australia, Canada, Japan, Korea, Mexico, New Zealand and the United States) and one Observer country (Morocco).

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

At present, ECMT has a dual role. On one hand it helps to create an integrated transport system throughout the enlarged Europe that is economically efficient and meets environmental and safety standards. In order to achieve this, it is important for ECMT to help build a bridge between the European Union and the rest of the European continent at a political level.

On the other hand, ECMT's mission is also to develop reflections on long-term trends in the transport sector and to study the implications for the sector of increased globalisation. The activities in this regard have recently been reinforced by the setting up of a New Joint OECD/ECMT Transport Research Centre.

*

* *

Publié en français sous le titre :
POLITIQUES SPATIALES ET TRANSPORTS : LE RÔLE DES INCITATIONS RÉGLEMENTAIRES ET FISCALES

Further information about the ECMT is available on Internet at the following address:
www.oecd.org/cem

TABLE OF CONTENTS

INTRODUCTORY REPORTS

Axel PRIEBS
Region Hannover

Andrea DITTRICH-WESBUER
Institut für Landes- und Stadtentwicklungsforschung (ILS)
Dortmund
Germany

SUMMARY

Hanover, July 2002

1. INTRODUCTION AND BACKGROUND

Underlying this paper, drawn up at the ECMT's request, are the following ideas and objectives:

- Because there is such a high degree of interplay and interdependency between town planning and transport policies, the two policy spheres are always taken together in the sense of a co-ordinated transport and regional development policy.

- Our approach is based on the need for strict application and implementation of the principle of sustainability and the "European city" model based on compact, dense and multi-functional settlement structures (cf., for example, Beckmann, 2001). We are well aware, however, that the aim of maximising mobility (opportunities) and fulfilling individual housing demands, while at the same time minimising the impact on the environment, leads to conflicts that are difficult to resolve. Nonetheless, we believe that through developing compact and multi-functional settlement structures it is possible to reduce at least the extent of forced mobility and interference with the natural balance and to retain or create the necessary opportunities for future action.

- This paper focuses on the problems encountered in urban regions, not only because it is here that settlement and transport trends continue to be the most problematic, but also because of the opportunities that exist in such regions for developing settlement structures that save on transport.

- For the sake of optimised regional development from an environmental, social and economic perspective, the share of environment-friendly means of transport, and in particular local public transport, must be significantly increased in relation to private motor transport. Given the unacceptably harmful effects of traffic in Germany's conurbations, the need to reduce private motor transport must also be discussed.

In spite of these clear premises, it is important not to underestimate the complexity of the theme of this paper or the different policy spheres where action is required. The only way of influencing regional development so that it conforms to the aforementioned model is to take action on several different levels.

2. PRESENT SITUATION AND NATURE OF THE PROBLEM (SETTLEMENT AND TRANSPORT TRENDS IN GERMANY)

2.1. Settlement trends in Germany

Despite stable and, in some cases, falling population figures, the demand for housing in urban regions is not expected to fall, nor are there any signs that the trend is slowing down[1]. There are many different reasons for this, but it seems that urban regions are set to remain dynamic economic and cultural centres that present a strong attraction for newcomers. The demand for land is no longer coupled to demographic growth, however, but largely determined in urban regions by factors relating to lifestyle:

- Although specialists all agree on the need to be economical with land and develop a coherent budgetary approach to it, and although a series of model projects promoting more compact settlement structures and consistent re-use of land have been successfully implemented, so far there has been no perceptible and significant change in the attitudes and behaviour of private households or municipalities. Detached, single-family dwellings with large gardens are still highly prized and are still targeted for promotion, whether in advertising by building societies and the construction industry or through government incentives (cf. also Chapter 6).

- Household structures will continue to evolve: the increase in the number of single-person households and one-parent families, coupled with the fact that young people are leaving home earlier, means a growing number of (smaller) households. At least among segments of the population with stable incomes, the demand for larger and larger dwellings will continue. It is predicted that by 2015, per capita living space will have risen from 42 m² now to 48 m². In the case of families, for the second half of their lives, parents dispose of even more space once their children have left the family home.

- Suburbanisation will also continue unchecked as inner cities do their best to provide families with the detached houses they crave; in the end, the new settlements also reach the point where either they run out of land or further development would be counterproductive, insofar as inner-city open spaces would have to be sacrificed and quality of life there would suffer as a result. Meanwhile, suburbanisation also has an impact on trade and commercial employment, so that ultimately it produces very different settlement structures and traffic flows.

Settlement structures will therefore continue to be under pressure either to break up or, at least, to change. In some areas, particularly residential suburbs, densities may decline dramatically, with dire consequences for the infrastructure and therefore also for the financial situation of the relevant municipalities (cf. for example, Winkel, 2001).

2.2. Traffic trends and their causes

The rapid growth in the transport sector in Germany and the other EU Member States is well-known and well-documented. It is characterised by the sharp increase in the number of privately-owned vehicles and the share of traffic volume taken up by cars, but above all by the massive growth in private motor transport. In spite of (partial) successes with making local public transport more attractive, this trend is expected to continue in future. Total passenger-kilometres can therefore be expected to rise by almost a quarter, to 915 billion km by 2015 (cf. Prognos, 2001).

This development is the result of a complex process taking place on many levels. Basically, it may be summed up as a result of the drastic reduction in spatial barriers (cf. Schmitz, 2001). Other contributing factors include higher transport speeds made possible by technical progress, rising prosperity among broad sections of the population, massive extension of infrastructure and charges and tax benefits that act as government incentives to travel by car (see Chapter 5). However, the willingness of individuals to devote more of their time and money to transport on a daily basis is also crucial for determining transport trends. Such willingness is reflected in the car-oriented attitudes and habits of much of the population.

Suburbanisation is both the result of transport trends and a major cause: "*As spatial barriers are overcome, the emerging settlement and transport structures generate a need for considerable transport expenditure (time and money), coupled with behavioural patterns that accept this need and take it increasingly for granted* (Holz-Rau/Hesse, 2000)."

In spite of the many different factors at stake, it is generally agreed that mobility and individuals' specific transport choices are closely linked to the nature of available spatial structures. Transport is faced with important challenges, particularly in urban regions, as urban sprawl continues to spread and densities continue to fall. Increasingly diffuse traffic flows that result, for example, from the disintegration of traditional one-dimensional patterns (place of work/home) and the increase in leisure travel, make it more difficult to provide the necessary transport services, particularly using local public transport and its rail system, which suffered, moreover, from decades of cutbacks and inadequate investment. In Germany, however, this period of neglect came to an end in the mid-90s with the start of the process to regionalise local public transport. This has led in many places to significant improvements in the quality and performance of suburban local transport[2].

To ensure that an extension of local public transport does not merely increase capacity and travel speeds on the transport system as a whole, and thereby ultimately further the suburbanisation process, line measures need to be part of a regional town planning policy that is geared towards local public transport. Such an integrated approach is also essential for ensuring that the process to extend rail services is successful, insofar as it is the only way of triggering and subsequently absorbing any potential demand for the rail mode.

2.3. Fields of action

Against this background, there are growing calls among regional planners for a policy in favour of sustainable regional development. At the same time, however, their scope of action is severely limited by the high degree of autonomy granted to the (fiercely competitive) municipalities, the inadequate range of available planning instruments and, above all, the absence of a strong level of regional government. In addition, the public sector's ability to influence the availability of land in places of strategic importance from a regional planning perspective is limited by various market economy mechanisms and, in particular, the substantial differences in the cost of land between urban

centres and their surrounding areas. Nonetheless, there are still ways in which regional planning and policies at regional level can influence settlement and transport trends. The following chapter looks at Germany's specific needs and requirements in this context, particularly the need for a better administrative framework.

It is difficult to see how sustainable development can be achieved if the volume of car traffic continues to grow in accordance with the forecasts. Because there are so many factors that influence transport trends, other solutions must be found, in addition to specific town planning measures. Pricing instruments are at the centre of the debate currently under way in Germany and may well prove to be an effective answer to the reduction in spatial barriers. Chapters 5 and 6 offer a description of the current situation and an assessment of the relevant measures taken in the pricing sphere.

3. FIELD OF ACTION: THE NEED TO REINFORCE MANDATORY PLANNING INSTRUMENTS

3.1. The need for an integrated town and transport planning approach

The precondition for a sustainable transport policy is a settlement structure that generates very little traffic and enables what traffic there is to be bundled together in a network. Consequently, a regional development policy or town planning policy that saves on transport will always help to promote a sustainable transport policy. This integrated approach to town planning and transport planning has already been adopted at regional level in respect of a number of conurbations, including Hanover and its surrounding area, where this principle was first promoted at regional level in the mid-60s and has been the basis for all regional planning schemes ever since (cf. Menke, 2001). Town planning can make a major contribution towards traffic avoidance, but only providing there is a real possibility to influence settlement trends in the urban region (via mandatory instruments for controlling settlement) and measures can be adopted at regional rather than local level, insofar as an individual's action span is regionally defined and insofar as the sum of different solutions adopted by the individual municipalities does not represent the best solution for the region as a whole (Steinacher, 1999). However, organisational arrangements at regional level are not discussed in detail until Chapter 4.

It follows from this that the different instruments and means of control available to regional planning at regional level are at the heart of the considerations set out below. It should be noted that "regional planning at regional level", which is mandatory under the German Regional Planning Act in *Länder* whose territory consists of spheres of influence of several central places of the highest level[3], is the planning level between regional planning at *Land* level which covers a whole *Land*, and urban land-use planning at the level of each individual municipality. Under German legislation, the main task of regional planning at *Land* and regional level is to lay down a binding planning framework for the development of the individual municipalities; accordingly, municipal urban land-use plans must be brought into line with the regional planning objectives at the level of the *Länder* and regions[4]. The requirement for municipal settlement trends to respect regional targets is therefore clearly defined in German law. There are differences between the individual *Länder*, however, in terms of the planning

instruments available at regional level and the political will of the relevant planning authorities to go ahead with measures which are necessary at *Land* or regional level but which conflict with local interests.

3.2. Regional concepts with regard to settlement structures

3.2.1. Aim of regional concepts with regard to settlement structures

Regional concepts with regard to settlement structures aim to achieve optimum land use from a regional perspective. Even though a regional approach always has distinct advantages over a municipal approach, when assessing regional concepts with regard to settlement structures, it is important to remember that they, too, are the spatial reflection of dominant social models and accordingly depend on prevailing town and regional planning trends. The 1950s, for example, were dominated by an approach centred on motorised traffic. One feature which regional settlement structure concepts have in common is that they identify development prospects for the inner city and its surrounding area, often in abstract form. The main factors of influence in the case of growing or prosperous urban regions are concerned with the basic direction and centres of urban sprawl, the regional transport network, regional open spaces and their delimitation.

3.2.2. Traditional settlement structure concepts

There is a long history of regional settlement concepts in the town and regional planning spheres, and a whole series of different models and concepts have been developed since the end of the 19th and beginning of the 20th century. They have not all been put into practice to the same extent, however, and some have had more impact than others:

- Examples of a regional settlement structure concept, tending strongly towards an integrated approach to town and transport planning, include Hamburg's system of radiating axes developed in the 1930s and Copenhagen's Finger Plan, dating back to the 1940s.

- The 1944 Greater London Plan marked a milestone in planning history, insofar as it established a green belt around the core of Greater London as well as a number of satellite towns to absorb any further development.

- Reference should also be made to the linear city concept, developed way back in 1882 for the city of Madrid and still used to some extent even now.

With many of the German settlement structure concepts designed for growing urban regions, building development was concentrated on axes with high-quality rail links (city/suburban lines). Up until the 1960s, the radial settlement and transport axes leading into the city centres actually did account for a large share of traffic movements owing to the predominately one-dimensional nature of commuter traffic at that time (with a high concentration of jobs in the inner city and expanding commuter towns close to the suburban railway stations and arterial roads). However, these settlement structures have since given way to new ones which are summed up below.

3.2.3. Modification of traditional concepts

In recent decades, living conditions and lifestyles have changed, thus altering the driving forces that led to a particular settlement structure. Unidimensional traffic flows have been replaced by a great many different and sometimes diffuse interweaving flows, including a high share of voluntary mobility (particularly leisure travel). For regional settlement structure concepts to have any real impact on settlement trends, they need to take account of the changes that have taken place in society. Many regions have already worked hard in this context to update their transport network, building tangential structures that complement the existing radial settlement and transport concepts (e.g. tangential road links and bus routes that cut across the radial city rail links).

However, many decentralised settlement structures grow up in places that are out of reach of traditional routes and the additional tangential links, particularly given the pressure that exists to build new property in smaller towns not linked up to efficient local public transport services. This explains why the principle of "decentralised concentration" was brought back into the regional planning debate in the 1990s. It is a concept which builds on and improves the basic infrastructure components of existing settlement structures, including radial axes, by adapting them to suit the new framework conditions.

3.2.4. Decentralised concentration

The regional planning debate on decentralised concentration was largely initiated by the Federal Government's submission of its regional planning policy guidelines (*Raumordnungspoltischen Orientierungsrahmen,* ORA, 1993) in early 1993. "Decentralised concentration" itself was interpreted in the guidelines mainly as a principle applied to large-scale settlement structures, but it was also developed further and put into practice on a smaller scale at the level of an urban region, particularly as a result of the regional planning policy debate in the emerging metropolis region of Berlin-Brandenburg (Stürmer, 1993). The main feature of decentralised concentration is the "compact" and "mixed" nature of the spatial development it produces (cf. Aring *et al.,* 1996). Its aim is to link public demand for less dense housing in clearly-defined units with the benefits that are to be gained from grouping infrastructure and facilities together, particularly public utilities. The main spatial development players in this context are medium-sized centres at regional level. The concept is intended, *inter alia*, to help protect resources and slow transport growth. The advantages of grouping infrastructure and facilities together and avoiding the need for transport (concentration means short travel distances) should be linked with attempts being made to prevent chaotic housing development and a disintegration of traditional city systems. A further advantage of decentralised concentration is that it is not rigid and should therefore be able to cope with the features specific to each urban region (Aring *et al.,* 1996).

3.2.5. Sustainable urban landscape

Although decentralised concentration already incorporates certain essential aspects of sustainable spatial development, particularly optimisation of interactions at local level, it is sometimes regarded as inadequate in planning circles, where it is argued that the only way of optimising spatial interaction in spite of decentralisation and saving on transport is to promote more extensive networking at local level. The principle of sustainable urban landscape is based therefore on very small-scale interaction patterns without, however, denying the importance of the inner cities. Unlike decentralised

concentration, however, the sustainable urban landscape model clearly rejects medium-sized centres as the main regional development players, in favour of clusters of smaller settlements (Hesse and Schmitz, 1998).

3.2.6. Status of the discussion

Over ten years ago, new impetus was injected into the debate about regional settlement structure concepts, as a result, chiefly, of the political transformations taking place in Germany, which rekindled development activity in built-up regions, the calls for more sustainable regional development and the quest for an appropriate European urban development model. Comparisons were often made in this context with American urban regions, with special attention paid to the break-up of cities[5] and the emergence of post-suburban structures[6]. It was found that, although there was a strong tendency towards the decentralisation of settlement structures in German urban regions, the situation in Germany was still very different to the dynamics of change affecting US urban regions (Hesse and Schmitz, 1998). The term "*Zwischenstadt*" (literally "in-between city") was coined as a metaphor (Sieverts, 1997) in Germany for the settlement structures emerging on the outskirts of big cities and in their wider surrounding areas. Although not a technical term, this metaphor accurately and vividly evokes the main problems relating to settlement structures.

It is generally acknowledged that there are more differences now between individuals' particular spatial requirements and preferences and that, in the current social policy context, traditional planning instruments and control mechanisms must be brought up to date to acquire the legitimacy they need. There are also important differences of opinion, however, concerning future regional development and the efficiency of certain instruments. Opinions differ, for example, as regards the relative future importance of inner cities in relation to the suburbs. The assessment which criticises spatial planning for its fixation with inner cities (Sieverts, 1997) and argues in favour of ending the supremacy of cities over their surrounding area (Müller and Rohr-Zänker, 1997) is offset by an opposite assessment according to which inner cities will continue to have a key role as the most important network nodes in the settlement system, or will at least retain "*primus inter pares*" status (Gatzweiler, 2000; Hesse and Schmitz, 1998). When assessing possibilities for controlling spatial development, a distinction must be made between an approach based on very stringent state planning, combined with pricing instruments (cf. Apel *et al*., 2000, as well as, from a different slant, Aring, 1999) and one that doubts the capacity of existing planning measures to exert control and therefore calls for a stronger reaction to the changes that have taken place in society (Sieverts, 1997). As regards the importance of regional planning at regional level for promoting sustainable development, some people maintain that planning at this level has failed so far to promote sustainability and will probably also be incapable of promoting it in future (Hübler, 1999 and 2001), while others claim, on the contrary, that a sustainable spatial and town planning policy cannot do without the mandatory regional planning instruments at the levels of the *Länder* and regions (Priebs, 1999).

The aim of arriving at a settlement structure that is economical with respect to both land and transport has found renewed expression in recent planning practice, in regional town planning concepts such as the Regional Plan for the Stuttgart region. Compared with traditional, rather abstract solutions, however, the concepts developed today take the form of very detailed, small-scale plans[7]. This is because, for reasons of case-law and market forces, regional plans now have to be increasingly specific and detailed in order to facilitate implementation of the concept as a whole. Because of painful defeats suffered in cases before the Administrative Court as a result of guiding principles that were not legally binding, or of regional planning objectives that were spatially inadequate, regional

planners now know that, for them to have any impact on planning at municipal level and actual building development, regional settlement structure concepts must be implemented in the form of plans that are binding, spatially-specific and concrete.

It is important, however, not to overestimate the impact of regional planning decisions alone. There are certainly differences between settlement structures in terms of their efficiency at cutting down on transport, but it is argued that the only reason the planning sphere is required to exert its influence is because the prices charged for transport are unrealistic (Sinz and Blach, 1994). Chapter 5 examines this aspect in more detail.

3.2.7. Assessment

It seems likely that it will still be in the interests of society in future to try to influence regional development and town planning -- rather than leave them to chance or market forces -- so that they cut down on the need for transport. On that basis, and for want of other instruments, an effort must be made to step up spatial planning and establish a more effective regional planning framework. The principle of decentralised concentration is still relevant as a realistic concept which suits the private players on the housing market without abandoning the attempt to cut down on transport. Compared with the sustainable urban landscape model, decentralised concentration should be better placed to ensure that public utilities and, in particular, retail businesses on their present scale do not disappear from integrated and efficient medium-sized towns. Both models have their advantages and drawbacks as regards cutting down on transport. Insofar as inner cities will continue to play a key role, relatively long journeys will be necessary for specific purposes. The concentration of decentralised units enables such journeys to be carried out to a large extent via environmentally-friendly means of mass transport (rapid-transit railways) but leads to longer travel distances.

Despite these and other limitations, there is empirical evidence to show that an approach based on multi-functional, dense and compact city systems, as well as polycentrality and decentralised concentration, creates the necessary preconditions, in terms of building development, for an economical transport structure and is the only hope of being able to transfer significant volumes of traffic onto more environmentally-friendly means of transport (Holz-Rau, 1997). This is especially true insofar as efforts to achieve regional planning policy objectives are currently thwarted by the prices charged for transport and land.

3.3. Instruments for implementing regional settlement structure concepts

3.3.1. Use of regional planning at regional level to control settlement trends

Decentralised concentration is only possible where there are effective instruments in place for preventing opposite settlement trends, coupled with incentives to make the right development choices. Suitable development areas (and open spaces not for development) must therefore be defined at regional level in the mandatory regional plan. Contrary to the regional planning practices of many regions, it is increasingly recommended that any policy restricting development in undesirable locations be accompanied by a pro-active policy of listing areas of building land in desirable regional planning locations and proposing them for development (Sinz and Blach, 1994; Aring, 1999). It is argued that a shortage of building land can be very counterproductive because it leads to higher land prices, which push homebuyers further out into the surrounding countryside and increase the amount of time and money that has to be spent on transport (Aring, 1999). However, efforts are also needed to

promote building development solutions that are economical with land so that the aim of traffic avoidance is not achieved at the expense of other adverse effects for the environment (Sinz and Blach, 1994).

"Priority areas" can be identified to encourage developers to build in places considered desirable from a regional planning perspective. However, insofar as this is an instrument which serves mainly to ensure that priority in a given place is accorded to building development rather than any other potentially conflicting uses of the land, it offers no guarantee that development will be confined solely to the priority areas. Consequently, new building work in outlying places, which cannot be linked up to efficient public transport services without unreasonable expense, also needs to be limited to building that is necessary to meet local needs ("self-development"). With respect to municipalities' powers of self-government, however, this is an approach that is bound to cause conflict. What are needed, therefore, are up-to-date, transparent instruments to define and control "self-development". A promising solution has recently been developed for the conurbation of Hanover but has yet to prove itself[8].

In addition to housing, locations that form part of the decentralised concentration model also need to offer a concentration of office jobs or, failing that, large regional sites capable of providing employment for large numbers of office workers must be established near railway stations and along bus and tram routes so that there is an incentive for workers to use public transport and commuter traffic can at least be grouped together along efficient public transport routes. However, in most of the German *Länder,* the regional planning instruments available are very limited in this respect.

Large-scale retail firms, which are also expected to develop rapidly in the future, have a major impact on spatial structure. Given that there is a big demand for large-scale structures at non-integrated locations, more stringent local measures are required to ensure members of the local community have access to a decentralised structure in the vicinity of their homes, which caters to their day-to-day needs and is capable of preventing the development of a one-sided supply structure, exclusively geared to car traffic and discriminating against people without their own means of transport. Reference should be made here to interesting schemes adopted in the regional plans for Stuttgart and Hanover. In the case of Hanover, for example, potential locations have been identified in detail, but with the intention of making development in undesirable places illegal[9].

Other regional planning rules are conceivable in addition to the aforementioned instruments, particularly as regards density of development at desirable locations from a regional planning perspective. However, this possibility is generally not available to regional planners at regional level, who, moreover, tend to be rather sceptical about the likely effectiveness of such an instrument, insofar as the municipalities might be tempted to circumvent the rules (Apel *et al*., 1995).

3.3.2. Budgetary approach to land

A more responsible approach to land management is not the only precondition for achieving a compact settlement structure and higher densities of development and limiting urban sprawl. More important still is a strict budgetary approach to land at regional level which allows for permanent monitoring of land claimed for development. Back in 1987 (ARL, 1987), the Regional Studies and Planning Academy suggested the need for a proper budgetary approach with regard to land, by analogy with public finances, whereby the usual budgetary principles would apply (e.g. no expenditure in excess of receipts, budget estimates, accountability and independent control). Twelve years later

(ALR, 1999), however, the Academy was forced to admit that there was hardly any evidence in spatial planning of a budgetary approach to land, and it has so far proved impossible either to present reliable land-use balance sheets or to set up an independent system for monitoring land use.

In addition to the need for balance sheets that attest to a proper budgetary approach to land, it is necessary to develop land management instruments to ensure optimum use is made of derelict land and under-developed sites and thereby enhance inner rather than outer development (cf. Pfeiffer, 1993).

Since it is unlikely that a coherent budgetary approach to land will be adopted in the foreseeable future, with strict balancing of accounts as in public finance, there is a need at least for a land and spatial policy that incorporates some basic budgetary principles. In 1996, the Federal Government commissioned an urban planning report which identifies a number of priority objectives in this respect. They include a significant reduction in the re-claiming of open spaces for housing development, more efficient use of the land and compensation for open spaces given up for development. The result is a series of measures that should be part of a land policy based on budgetary principles (BfLR, 1996):

- Re-use of existing building land (i.e. derelict land and land ripe for conversion);
- Economical use of the land (i.e. higher density of development and multi-purpose use);
- Compensation for land claimed for development purposes; and
- Economical management of supply and demand with respect to building land with the help of spatial planning and tax regulations.

These measures are essential for developing compact cities, which in turn are necessary for promoting lifestyles and business patterns that save on transport. Providing such instruments are consistently applied, they should result in a much stricter approach to planning. This will depend, however, on how far policymakers are prepared to define the extent of permissible land use and to set up effective administrative procedures for monitoring compliance with such regulations. At the moment, however, successful implementation of such measures is severely compromised by the lack of necessary political pressure and insufficient capacity at the level of the regional planning offices, which are often very short-staffed.

3.3.3. Negotiations and contracts

One of the distinctive features of an up-to-date approach to regional planning at regional level is that, in addition to "hard" planning instruments, there is greater reliance on the powers of negotiation and persuasion. Negotiated planning, in particular, is a method that has also been successfully applied in other countries. German planning legislation provides, *inter alia*, for the possibility of resorting to negotiation in the context of a regional planning procedure as a means of working out solutions that are acceptable to all the parties concerned. Recourse to such a "soft" instrument in the context of a formal procedure is known in political science as "behind-the-scenes co-operation" (*Kooperation im Schatten der Hierarchie*). It was used, for example, as a basis for developing the aforementioned regional retail trade concept for the conurbation of Hanover. The process, which took more than three years, involved reaching a negotiated consensus on common aims and restrictions with respect to the entire region's retail trade. Hanover's regional planning programme has since been formally amended so that the concept is now mandatory.

Regional planning contracts[10] come somewhere between hard and soft instruments. They are used to interpret existing regional planning objectives and, once again, the different parties involved -- local authorities, regional planners at regional level, investors -- can be brought together round the negotiating table (cf. Spannowsky, 1999). However, such an approach is only possible if all sides are willing to negotiate. To date, only relatively limited use appears to be made of regional planning contracts.

When comparing contract solutions with "hard" planning rules, particularly as regards the need to influence settlement trends in favour of compact structures that reduce the need for transport, it is important to start by seeing whether the aim can be achieved by softer means such as negotiations and contracts, in which case they should have priority. They can also prove to have a lasting effect, notably because of the opportunity they provide for supporting practices that are in the region's interests -- for example, through funding. Apart from that, one of the drawbacks with solutions negotiated between public partners -- and this also applies to contracts -- is that they afford scant protection against non-compliance. In other words, the other public partners stand very little chance of being able to impose compliance. This was the reason why, instead of being incorporated in a regional planning contract, the result of the negotiation procedure with respect to the retail trade concept for Hanover was ultimately defined as a mandatory regional planning objective, in an amendment to the binding regional planning programme. An ideal combination of instruments might be one where mandatory objectives define the general framework for development, and contracts are used to give concrete shape to the framework or objectives depending on the particular circumstances.

3.4. Conclusions with regard to the need to step up regional planning at regional level

Minimum requirements need to be laid down in respect of a strict regional planning policy, so as to achieve optimal assignment of settlement zones and transport infrastructure. In particular, the dispersion tendencies characteristic of a regional settlement system must be linked up with the benefits to be gained from the development of priority areas. Accordingly, with "decentralised concentration" it is possible to develop compact structures that save on transport in parts of the urban region. However, there are also contradictions with decentralised concentration: in some parts of the region it promotes short travel distances and dense, multi-functional structures, whereas in other parts on the periphery of the decentralised clusters, it significantly increases the time and money spent on transport. It also has to be borne in mind that scattered settlement structures and differing lifestyle rail systems, which are ideal for very dense traffic flows all travelling in the same direction, reach the point where they are no longer cost-effective. Whereas in the past most commuter traffic was concentrated on the main routes linking the city centre and outskirts, now demand for transport is more heterogeneous. The scope for more flexible forms of services (particularly bus systems) therefore needs to be discussed in more detail. It has to be said, however, that a more integrated approach to transport and settlement policies also means more account has to be taken of regional planning criteria in large-scale transport plans (federal transport network plan, Deutsche Bahn's network plan).

4. FIELD OF ACTION: THE NEED FOR A STRONGER REGIONAL IMPLEMENTATION LEVEL

The solutions for stepping up regional planning at regional level are only feasible if there is an organised and fully operational regional implementation level. However, there are many urban regions where this cannot be taken for granted, insofar as most of the bodies where all the thinking is done or action is taken are small, and the regions tend to be dominated by intra-regional competition and political fragmentation. Over the past decade, however, urban regions have given more thought to their internal organisation and the need for a regional implementation level. The results of this new development are very different, however, from one region to the next. Whereas some urban regions have only just started working more closely together with municipalities, others have already set about adopting highly sophisticated organisation models. These differences between the individual regions are ultimately a result of their very different political and historical contexts. An attempt is made below to classify the reform efforts, which may be divided between three main trends (cf. Danielzyk and Priebs, 2001).

4.1. Basic organisational models adopted by urban regions

4.1.1. Informal co-operation

The debate in Germany about the need to influence development and therefore about regional organisation structures for urban regions, was rekindled in the late 1980s/early 1990s, when action was needed in response to the new political scene in central Europe and the effects of European integration and economic globalisation. The 1990s were marked by a distinct reluctance to adopt ("hard") forms of organisation established under public law, which led to a swing in the opposite direction and a whole series of different informal ("soft") forms of regional co-operation. It was in North Rhine-Westphalia that informal structures first became part of the *Land's* official structural policy[11]. Since then, however, they have spread throughout the country in the form of round tables, regional conferences, regional development concepts and city networks, and there is even provision for them in the Federal Regional Planning Act. The scope of the informal structures varies from one region to the next, but typically they tend to be concerned with promoting regional development through a local and regional marketing approach, setting up networks of economic, political and administrative players and improving local conditions. It is interesting to note that, during the process to render regional structures more flexible and individualised, "hard" and "soft" solutions were increasingly used in parallel. One such example is the Rhine-Neckar region where, in addition to three associations set up under public law, since 1989 the Working Group for the Rhine-Neckar Region, an incorporated association, has been looking after the region's public relations work and promoting the regional image.

4.1.2. Further development of associations at the level of urban regions

In spite of regional players' overriding preference in the 1990s for informal and private bodies, thought was given, at the same time, to ways of strengthening structures established under public law. In certain regions, joint authorities were set up for specific regional functions and, in particular, local public transport. The whole of Germany followed with interest the establishment in 1994 of the Stuttgart regional association, set up by the government of Baden-Württemberg principally in an

attempt to improve the competitive position of this important economic area. The association is politically controlled by a directly-elected regional assembly. In addition to traditional planning responsibilities (regional planning at regional level, landscape planning), the association is entrusted with certain areas of waste management, as well as with regional transport planning (including responsibility for the *S-Bahn*) and with promoting business and marketing tourism. In 1999, the government of Baden-Württemberg transferred even more powers to the region[12]. In the debate currently under way in Germany, the Stuttgart model is seen as the most far-reaching and efficient example of an association at the level of an urban region. The integrated approach to town planning and transport planning, in particular, sets standards for other urban regions to follow.

4.1.3. Regional authorities

It is generally agreed that the associations set up by urban regions have contributed to the regions' integration and that, in some policy spheres such as overall spatial planning, promotion of business and local public transport, they enable regional functions to be performed without being influenced unduly by local interests. However, there are always limits to the scope of such associations. Often their powers are exclusively in the planning sphere and they have to share the more attractive task of implementing plans with several other regional bodies. The result is a splintering of responsibility. Synergy effects become impossible and the public often has difficulty in identifying any clear political responsibility for regional matters. Lastly, the funding of the associations out of municipal contributions leads to regular conflict. Against this background, the debate looked again in the 1990s at the most far-reaching organisational structure for urban regions, namely, a regional authority which is similar to an administrative district (*Kreis*) and well-suited to finding long-term and lasting solutions to the problems faced by conurbations, because of its combined responsibility for both financial and political matters. Models such as these were the subject of lengthy discussions at the time of the territorial and administrative reforms carried out in the 1970s, but (with the exception of the Saarbrücken city association) they could not be put into practice. Two decades later, however, in 1995, the proposal to set up a regional district for the Rhine-Main conurbation marked a "giant step" forward in the discussion about the future organisation of one of Germany's most important metropolitan regions. The proposal[13] strongly advocates the setting up of a regional authority for the Rhine-Main conurbation that would integrate all the district-free cities and take the place of the rural districts (*Landkreise)* and district presidencies (*Regierungspräsidien*). When this far-reaching proposal came to be discussed further, however, it was rejected when it became clear that it involved too many radical changes to the existing administrative structures.

4.1.4. Model for the Region of Hanover

The discussion launched slightly later with respect to the Region of Hanover proved more successful than the one in respect of the Rhine-Main conurbation which, however, provided much of the impetus for the Hanover model. Right from the start, it was important for the model's acceptance that, rather than trying to obtain a purely theoretical "optimum model", the aim should be to propose a realistic reform with as few "losers" as possible. The model for Hanover and its surrounding area is based, therefore, on a series of compromises that enabled all the parties involved to contribute without losing face. It should be pointed out that regional co-operation had already existed for four decades in the form of a regional association, which meant that Hanover had first-hand experience of regional handling of certain areas (notably regional planning, responsibility for local public transport, promotion of business and local leisure facilities) and that not only did it seem completely natural for some areas to be dealt with at regional level but also the public had a lot of confidence in regional players. On 1 November 2001, the Region of Hanover was set up as a regional authority with

wide-ranging responsibilities in such areas as spatial planning, transport, environmental protection, social matters and promotion of business. Above all, however, the new region also meant the creation of a directly-elected level of regional government, which can be expected to react very strongly to any local plans that are considered unacceptable for the region as a whole (Priebs, 2002).

4.1.5. Regional planning structures at regional level

Directly linked to the basic organisational and institutional framework is the possibility of using certain legal instruments in the planning sphere. Official plans can only be approved by "hard" institutions, whereby a distinction is to be made between the following:

- Joint zoning plans, as practised, for example, in the region of Saarbücken and a number of urban regions of Baden-Württemberg (also until recently the Rhine-Main area). These require regional co-ordination of local development projects. The advantage of this solution is that individual municipalities' local development plans have to be based directly on the zoning plan. One of its drawbacks from a regional perspective is that regional stringency is reduced as a result of the fact that all the municipalities are represented in the decisionmaking body.

- Mandatory regional planning at regional level, as practised for example in the regions of Hanover, Munich, Stuttgart, or even the Rhine-Neckar region stretching across *Länder* boundaries. This produces regional plans that are drawn up "at one casting" and therefore perfectly uniform, but the municipalities still have a fair amount of leeway with respect to their municipal zoning plans, on which their local development plans are then based.

- Zoning plans drawn up at regional level. This new and very interesting instrument combines regional plans drawn up at regional level and zoning plans. Its distinct advantage should be that it brings two planning levels together and creates a new type of plan. The procedure for drawing up such plans is quite complex, however, and so far most of the *Länder* have yet to put federal law into practice. It will not be possible to assess this new type of plan until practical results are available from the Rhine-Main region, where work has just started on drawing up Germany's first ever regional zoning plan[14].

In our view, even by itself, stringent regional planning at regional level can be a major step towards stringent regional development, and joint zoning plans are not absolutely necessary. However, experience in the Rhine-Main region shows that joint zoning plans also allow priority to be given to regional interests over the interests of individual municipalities.

4.1.6. Status of the discussion with respect to the institutional framework

A significant feature of the discussion about the need for a better institutional framework at regional level is the expectation that organisational reforms should also yield more efficient instruments for influencing regional settlement trends and thereby reduce the extent of forced mobility. It follows from the results of the above assessment, which showed that strict control of settlement trends is dependent on mandatory planning instruments, that "soft" forms of co-operation are generally not an effective solution. The reliability of "hard" structures for inter-municipal co-operation is also recognised (Fürst, 1999).

4.2. Conclusions concerning the need for a stronger regional implementation level

In our view, and especially where it is a case of applying building regulations, the only way of defining an effective framework for private parties is to make use of all the different instruments available under public planning and building laws -- from the regional planning programme down to the local development plan. Accordingly, when considering different organisational solutions, the aim must be the establishment of administrative structures at the level of the urban regions, whether in the form of an association or regional authority. It has to be stressed, of course, that it is difficult to see how the same organisational model could be imposed on all urban regions, insofar as there are too many differences between them in terms of their historical background and political cultures. Even soft forms of co-operation should not be rejected *en bloc* in regions characterised by extremely difficult structural and/or political conditions, since they represent the only realistic forms of co-operation in these regions. It is likely in such cases, as with Hanover, that the organisational structure will evolve over the course of time, in other words, that there will be a crossover from informal to binding structures, which will then open the way, in the long term, for a more reliable planning framework.

Efficient policymaking and implementation structures at the level of urban regions are necessary for stringent and successful regional town planning and transport policies. Although by themselves such structures are not sufficient, experience shows that regional government, which still does not exist in many urban regions, provides a good basis for implementing binding, long-term spatial structure concepts. The following organisational features are essential for stringent planning and for developing settlement structures that save on transport:

- Political decisionmaking powers entrusted to the regions (if possible, with direct democratic legitimacy, as in the regions of Stuttgart, Hanover and Saarbrücken, otherwise with indirect legitimacy, as is the case with a great many regional associations and regional planning communities);

- Planning responsibilities entrusted to the urban regions on the basis of joint zoning plans, mandatory regional plans drawn up at regional level or, more recently, regional zoning plans;

- Linking of spatial planning and transport planning (as in the regions of Hanover and Stuttgart) and possibly other areas of planning and policy execution, so that there are more opportunities for bartering and negotiating at regional level.

It should be borne in mind, however, that the best results are still to be achieved by applying different solutions to different regions.

5. FIELD OF ACTION: THE NEED TO REFORM PRICING INSTRUMENTS IN THE TRANSPORT SECTOR

As shown in Chapter 2, the growth in car traffic in Germany is due to many different factors. One of the main causes, in addition to social and economic trends, is rising prosperity among many segments of the population. The general rise in income levels created new desires and led to a shift in

priorities as to how the money should be spent, with people willing to spend more on transport than in the past (cf. Heinze, 1979). This particular development was quickened to a large extent by the significant drop in the share of disposable income taken up by transport costs -- in all sectors. With respect to cars, this means lower car purchase prices and a reduction in both the non-performance-related costs and variable costs associated with car ownership. Income-adjusted statistics show that, by 1995, the price of petrol, for example, had fallen to a third of its price in 1962 (cf. Schmitz, 2001). Recent price increases have not fundamentally altered this ratio[15] (cf., for example, UPI, 2002; cf. Section 5.3.).

Transport costs have an important role to play in the context of reduced spatial barriers and the known consequences thereof. Accordingly, most experts agree on the fundamental effectiveness of pricing measures. However, there are widely-differing opinions in Germany as to the aim, basis of calculation and exact form taken by such pricing instruments.

Aim of pricing instruments

The decision as to which pricing instrument to choose depends mainly on the aim being pursued. In the academic and political debate currently under way in Germany, special attention is drawn to the following aims (cf. *inter alia*, Kurnol, 1996):

- Infrastructure funding;
- Competitivity enhancement (including adjustments to bring Germany into line with other European countries);
- Traffic management, i.e. better use of infrastructure capacity; and
- A reduction in pollution, in particular through an internalisation of external costs.

In relation to the subject of this paper, there is a another important aim:

- Protection and rehabilitation of urban spaces through the avoidance of motorised traffic and reduced land consumption.

The definitions of these aims are not clear-cut by any means, and there is a tendency to overlapping, both in the discussions and at the implementation stage. They are very important, however, as a backdrop to the description and assessment of pricing instruments, insofar as they also influence the exact form taken by the instruments, including the prices actually charged.

Significance of external costs in the discussions

The discussion about vehicle taxes is always closely connected with the question of transport costs. In addition to infrastructure spending, the so-called “external” costs of transport are important in this regard. Many people believe that the internalisation of such costs, so that they become one of the factors determining the decisions taken by individual car drivers, should be a fundamental aim of pricing instruments (cf. Schütte, 1998).

Particularly in the first half of the 1990s, the advantages and disadvantages of internalisation and the feasibility of such an approach were the subject of intense discussion and controversy in Germany.

There is still no agreement today as to which costs should be included in the internalisation process (e.g. congestion costs). As a result, there are huge discrepancies in the level of external costs quoted in relation to Germany (cf. Schütte, 1998). According to the Federal Environmental Agency (*Umweltbundesamt*), external costs for 1993 totalled approximately 70 billion DM, compared with the figure of 257 billion DM given by the *Umwelt- und Prognose Institut* (UPI) (reference year 1996) (cf. UBA, 1995, UPI, 1994-1998).

In response to the growing calls for internalisation of external transport costs, a discussion also took place in Germany on the external *benefits* of transport (which, it was claimed, had to be set off against the external costs) and the benefits of transport generally (cf., *inter alia*, Baum, 1998; Willeke, 1996; UPI, 1994-1998). And even if, on the whole, the arguments supporting the existence of significant external benefits are not very convincing, they have nonetheless succeeded to a certain degree in bringing the discussion and implementation of more extensive internalisation to a standstill.

All in all, it would seem that, because of the many factors still to be agreed regarding the basis of calculation and actual nature of costs that can be charged to transport, it will not be possible for the foreseeable future to establish the "true costs" of transport with the help of pricing instruments. A broad public debate on the question of external costs can, however, be very important. It can help to identify the need for action and in so doing not only give rise to political pressure but also raise acceptance levels on the part of users.

5.1. Road pricing

For a long time now, "road pricing", which is the term used to encompass all the different kinds of road user charges, has been a key feature of the discussion on pricing instruments in the transport sector. Although this discussion, with its many facets, has links with the discussion on road privatisation, the two are by no means identical. Road pricing is intended only to prevent free use of infrastructure (cf. Kurnol, 1996).

5.1.1. Status of the discussion and implementation of road pricing in Germany

Germany has very little practical experience of road pricing. The only example worthy of mention to date is the "euro vignette" for heavy goods vehicles, which was introduced in 1995 in Germany along with four other European countries. So far, despite successful trial schemes[16], it has not been possible to implement any road user charges in conurbations similar to the tolls already in place or planned (London) in certain European cities, chiefly for political reasons but also owing to technical difficulties.

Nonetheless, experts and politicians tend to agree that, in Germany too, road pricing models -- and particularly performance-based systems -- will be an important part of future transport policy.

5.1.2. EU initiatives

The EU has been behind several important initiatives in favour of road pricing, especially since the mid-1990s. With the aforementioned Green Paper in 1995 and, in particular, the White Papers drawn up in 1998[17] and 2001[18], the question of road user charges has become a key feature of EU transport policy. Even if, in principle, infrastructure charges are meant to apply to all modes of transport and all categories of users, the EU's implementation proposals are clearly concerned only

with commercial traffic. It is unlikely, therefore, that the EU will be making any direct attempts in the medium term -- apart from research initiatives[19] -- to impose road pricing in the private car sector in its Member States. This has led to criticism of the EU in Germany [cf., for example, the German Advisory Council on Global Change (*Wissenschaftlicher Beirat),* 1999]. Even the marginal social cost charging principle, chosen by the EU as a step towards road pricing and based chiefly on the internalisation of the most important external costs, namely, overloaded capacity or congestion costs, has been much criticised. In addition to price calculation difficulties, there are doubts about the technical and organisational feasibility of this method (cf., for example, Eisenkopf, 2000; *Wissenschaftlicher Beirat*, 1999). Furthermore, at least in quantitative terms, congestion costs only affect those people stuck in a traffic jam, not the community at large, and to that extent can be regarded as already internalised (cf., for example, Kurnol, 1996).

5.1.3. Use of road pricing to fund transport infrastructure

Apart from the quarrel about EU initiatives, the German debate on road pricing is dominated by recent proposals for funding the German road transport network as set out in expert opinions and recommendations submitted to the Federal Government by, *inter alia*, the Committee on Transport Infrastructure Funding ("Pällmann Committee") (cf. Committee on Transport Infrastructure Funding, 2000; see also Berger & Partner, 1995). The proposals have been drawn up specifically to try to find a solution to funding difficulties with the plans to upgrade the national trunk road network.

The funding requirement is mainly a result of the 1992 Federal Transport Plan (*Bundesverkehrswegeplan*) and the subsequent plan of needs in respect of the German motorway network. The projects set out in the Federal Transport Plan, which has been under revision for a long time, are heavily under-financed and, where trunk roads are concerned, there is a funding gap of at least 100 billion DM (cf., for example, Alfen, 2000; BUND, 2001).

The expert opinion drawn up by the Pällman Committee, on the orders of the Federal Transport Ministry, echoes what experts have been saying for a long time, namely, that responsibility for financing the trunk road network should be transferred away from the State to the network's users, and that the revenue collected from users should be used to build new roads. Phased privatisation of the trunk road network is suggested as a long-term plan (cf. Committee on Transport Infrastructure Funding, 2000). In practice, such a step is still a long way off, although the 1994 Act on the Private Financing of Trunk Roads (*Fernstraβenbauprivatfinanzierungsgesetz*) contains provisions that allow, for the first time, for private financing of limited sections of road according to the operating model (*Betreibermodell*)[20].

The Pällmann Committee also recommended performance-related charges for heavy goods traffic, which the Federal Government intends to introduce in 2003 in the form of a kilometric motorway toll, to be paid electronically and to replace the existing, time-based euro vignette. According to the Government's plans, however, only part of the proceeds from the toll will go to the Transport Infrastructure Finance House (*Verkehrsinfrastrukturfinanzierungsgesellschaft*), currently being set up, and be used to finance transport infrastructure -- and not necessarily only in the road sector. In connection with the HGV toll, there are plans to introduce an operating model to pay for upgrading work on the motorways. Under this scheme, responsibility for adding extra lanes and for maintenance and traffic operations (all lanes) would be transferred for a fixed period to the private sector[21].

5.1.4. Assessment

In principle, the decision to convert the HGV toll from a flat-rate charge to one based on actual infrastructure use, as until now has existed only in Switzerland, is to be welcomed from the point of view of avoiding traffic and transferring more of it away from the roads. However, the level set for the toll, namely, between 0.10 and 0.17 €[22], is hardly a sufficient incentive for transferring more freight traffic onto the railway. Optimistic estimates predict that up to 10 per cent of road freight might cross over to rail (cf. Kossak, 2001). It would be worth considering extending the toll to include the secondary road network, although EU regulations currently prevent such a move.

The Federal Government is keen to point out, in connection with the HGV toll, that there are no plans for a similar system for private cars along the lines of the one to be introduced in the Netherlands in 2004. This goes against the opinions of not only the Pällmann Committee but also other experts, who think the toll should be extended to include all classes of vehicle (cf. Committee on Transport Infrastructure Funding, 2000; German Advisory Council on Global Change, 1999).

Quite apart from the political motives behind the Government's decision not to include cars in the road pricing system, there is a more practical reason, namely, the consequences of a traffic shift away from the motorways and onto the secondary road network. The risk of this happening is believed to be much higher (still) in the case of passenger traffic than for heavy utility vehicles and could have a significantly negative impact on the quality of life and living conditions in conurbations and other areas in the vicinity of motorways. The fact that the share of traffic transferring from the motorways to avoid paying the toll will depend chiefly on the pricing structure illustrates a fundamental weakness of the motorway road pricing system, namely that, while a modest user charge may well prevent unwanted transfer tendencies, it also misses an opportunity to offer sufficient incentives for road users to change their habits.

In terms of sustainability, there is another reason why an extension of the road pricing system to include private cars could be critical. There is a danger that, given the premises on which infrastructure funding is based, the need to secure revenue may be reason enough for not wanting a significant reduction in car traffic, particularly if greater use is made of private operating models, in which case more of the political control over pricing would be lost. The discounts already offered, for acceptance reasons, under the road pricing system are counterproductive in this respect, not least because they reward frequent travellers. *"The system offers no means of overcoming this contradiction* (between funding and environmental objectives) (Kurnol, 1996)."

There is more to be said in principle for models intended for use in limited urban areas, particularly if it becomes possible in the near future to use electronic charging systems to record car traffic on a performance basis, so that users anywhere within the selected boundaries can be required to pay according to their actual use of their vehicle. This would overcome the drawbacks inherent in the flat-rate charge, as well as offering real incentives for less car traffic.

Here too, however, there are a number of problems that need to be mentioned, the first of these being the importance of choosing road pricing zones wisely. The (potential) impact of road pricing on local decisions may also be a problem. If it means that people move house to live in areas where transport costs are lower, then it thwarts any efforts made in the planning sphere to promote concentration.

Lastly, the reason for introducing road pricing is crucial for determining the impact it will have. Such systems are to be welcomed only if their system of calculation and design are chosen with sustainable settlement and transport trends in mind -- including serious scenarios for reducing heavy goods traffic -- rather than infrastructure funding and optimisation of use.

5.2. Tax benefits granted for private car transport

Motor vehicle owners and users enjoy a number of different tax privileges in Germany. In addition to the tax relief that can be claimed on business trips and the cost of buying and running a vehicle (also) used for business purposes, the "*Entfernungpauschale",* or distance-based lump-sum, is of particular importance.

5.2.1. "Entfernungspauschale"

The possibility of offsetting travelling expenses against tax has a long and troubled history in Germany. No other tax privilege has been the subject of so many reforms or such controversy in both the transport and fiscal policy spheres as what, until the end of 2001, was known as the "*Kilometerpauschale*" (kilometric lump-sum) (cf., for example, Stollberg, 2000).

The most recent and certainly most far-reaching reform came into force on 1 January 2001. Whereas before car traffic had a distinct advantage over other means of transport, now commuters are entitled to the same distance-based deductions on their taxable income, whether they travel to work by non-motorised means of transport, local public transport or car.

5.2.2. Assessment

In 2000, shortly before the new measure came into force, a pan-European comparative survey of the effectiveness of tax rules, in respect of commuters and business travel, for reducing transport demand gave Germany the worst rating of all the countries included in the survey (European Commission DG Tren, 2000). Even if the new *Entfernungspauschale* has helped to overcome one of the main weaknesses of the old system and the placing of all means of transport on an equal footing is basically to be welcomed, the new system also has its failings and, in the context of ever-increasing travel distances, this kind of tax privilege is fundamentally flawed. Basically, it means that long-distance commuters, who have taken advantage of the lower property prices in the suburbs, have a fiscal advantage over colleagues who live close to where they work and pay significantly higher housing costs (cf. Apel *et al.,* 1995). This is very important, especially since the distanced-based lump-sum is higher now for distances in excess of 10 km (long-distance commuters) and at least for this category of commuters represents a substantial amount.

The *Entfernungspauschale* therefore sends out clear signals in favour of lifestyles that involve a great deal of travelling. This has earned it the nickname "lump-sum sprawl".

The example of the Netherlands shows that other solutions are possible. There, the costs of commuting to work by car are only tax-deductible up to a maximum distance of 30 km. No such ceiling applies, however, to public transport. All in all, much more money can be deducted for journeys using local public transport than for travel by car (cf. European Commission DG Tren, 2000).

5.2.3. Other tax benefits

Action could also be taken with regard to other tax benefits available to motor vehicle users and owners. In terms of the aim of avoiding traffic or transferring it onto other modes, negative features include the absence of an upper limit on deductible running costs, in the case of vehicles used for business purposes, and the vehicle depreciation rules that currently apply in the case of self-employed workers and employers. However, Germany is not alone here. Nearly all EU Member States, including the Netherlands, grant similar benefits, all of which are qualified in the aforementioned European Commission survey as a "strong disincentive" with respect to sustainable mobility (cf. European Commission DG Tren, 2000).

5.3. Motor fuel tax

Motor fuel tax is Germany's biggest source of tax revenue in the transport field and its most lucrative excise duty. In 2001, 40.7 billion DM were raised from the sale of fuel alone. Revenue from motor fuel tax is not earmarked, although a sizeable share is reinvested in road building and local public transport (e.g. regionalisation funds).

Of all the pricing instruments that exist in the transport sector, an increase in motor fuel tax is the one most often mooted and recommended by experts. The reason for this is that the effect of an increase is directly linked to consumption (and therefore CO_2 emissions) and can be expected to have a direct and immediate impact on individual users' transport costs. This is why the tax is often referred to as the "mainstay" of pricing and market-oriented instruments (cf., for example, Kurnol, 1996; Kanslerski, 1998).

It is generally agreed that the effectiveness of any increase in motor fuel tax depends on the level of the tax, which has to be sufficiently high[23], and that the increase needs to be phased in over time in a way that is largely predictable, to give users time to adjust their behaviour and in order to attenuate any social hardship.

5.3.1. Status of the discussion in Germany

The debate about an increase in motor fuel tax recently received fresh impetus in Germany with the introduction of the Eco-Tax (*Ökosteuer*), in accordance with the 1999 Ecological Tax Reform Act, which provides for a gradual increase in motor fuel tax. Despite the very moderate rate of increase (3 cents per litre of petrol or diesel per annum until 2003), the new tax has been very controversial and shows just how sensitive the issue is in Germany.

German fuel prices rose only moderately between the 1960s and 2000, and even fell sharply in relation to the growth in income. More substantial increases have taken place only in the last two years and are chiefly a result of market processes. The Eco-Tax has played only a very minor part (now totalling 14 cents). Based on a comparison of the price of ordinary petrol and diesel in other European countries, Germany still ranks in the (upper) middle group but is by no means at the top.

At EU level, efforts connected with motor fuel tax are currently focused on heavy commercial vehicles. The European Commission's 2001 White Paper proposes a "decoupling" of fuels used for commercial purposes from the general system of taxation. With respect to private cars, and in accordance with the minimum rates given for taxing motor fuel[24], there would still be room for manoeuvre at national level (cf. European Commission, 2001).

5.3.2. Assessment

Motor fuel tax is a crucial instrument not only for reducing environmental damage caused by transport but also for the main subject being discussed here, namely, the promotion of a settlement structure that reduces the need for transport. Its effectiveness was highlighted first in the early 1990s -- for example in the Prognos study (cf. Prognos, 1991) -- and has been confirmed in a number of more recent studies [including those of the German Institute for Economic Research (DIW) in 1996; cf. Halbritter *et al*., 1999].

Reactions to an increase in motor fuel tax can be expected in the short- and medium-terms, whether it be vehicle-related adjustments, such as the purchase of smaller cars that save on fuel, or different travel habits, such as the avoidance of certain journeys, different destination choices or a preference for other means of transport (cf. Halbritter *et al.,* 1999). This was borne out recently by the drop in fuel consumption brought about by substantial increases in petrol and diesel prices[25], although this drop has since largely been cancelled out by the subsequent lowering of fuel prices. This development also shows that, on the whole, one-off price increases that offer no long-term visibility for the consumer have only a slight impact on behaviour [cf. Federal Research Institute for Regional Geography and Regional Planning (BfLR), 1997; Kanzlerski, 1998].

In the long term, higher or rising fuel prices affect the settlement decisions of private households and firms, creating a higher demand for dwellings and land located close to urban centres. As a result, although some suburban development is unavoidable, it may be possible for it to be concentrated in attractive places served by local public transport, so that traffic trends become more acceptable.

From an environmental perspective, there is no real justification any more for the much lower rates of tax applied to diesel vehicles. Any changes to the system of motor fuel tax should therefore include adjustments that bring the diesel rates into line with those applied to petrol. The higher vehicle tax levied on diesel vehicles (see Section 5.4.) should also be aligned with the rate applied to those that run on petrol.

Clearly, it is important not to overestimate the impact of motor fuel tax on developing a settlement structure that reduces the need for transport. Experts have been saying for a long time that social and economic developments have made it much harder for people to find work very close to home. There are also (unwanted) secondary effects to be taken into account. There is a danger, therefore, that the land price differences that exist between city centres and their surrounding areas will continue to grow, with potential negative consequences in particular for low-income households (cf. Kurnol, 1996).

However, with the help of the extra revenue alone that can be expected from raising motor fuel tax, it should be possible to minimise the negative effects of such an increase -- which would only concern a small share of the population[26] -- with the help of accompanying measures, such as targeted improvements to public transport services to make them more attractive.

Studies show that by increasing motor fuel tax it is possible to reduce the volume of traffic significantly. According to a simulation carried out by the DIW, for example, a gradual increase in motor fuel tax over a period of fifteen years to 4 DM per litre of petrol should reduce the volume of car traffic by about a quarter (cf. Halbritter *et al*., 1999).

It is a shame, therefore, that the debate on motor fuel tax as a means of reducing the volume of traffic should have fallen by the wayside. It is true that, in principle, the recently-introduced Eco-Tax will lead to a steady increase at least in the medium term, but the modest rise is unlikely to have any

concrete impact in terms of a reduction of the volume of car traffic or an increase in the use of public transport. Furthermore, given the sometimes very fierce controversy that surrounded the Eco-Tax, no further tax increases are planned for the next few years and any plans there were have had to be taken off the political agenda.

5.4. Motor vehicle tax

In 2001, revenue from motor vehicle tax, which dates back to 1922, totalled 8.4 billion DM. After motor fuel tax, it is therefore the second most important tax levied in the transport sector. All the revenue from the tax goes to the *Länder*.

5.4.1. History of the motor vehicle tax

The purpose and method of calculating motor vehicle tax have changed considerably since the tax was first introduced in 1922. Whereas its original purpose was to finance transport infrastructure[27], in its present form the tax serves a mainly environmental purpose, based on threshold targets for harmful car exhaust emissions. However, the level of the tax is still calculated according to engine size (cubic capacity). Older vehicles are taxed much more heavily than new, "greener" vehicles, which are currently even exempt from the tax for a limited period of time. The tax levied on diesel vehicles is much higher than that levied on other vehicles, to compensate, on a lump-sum basis, for the lower excise duty on diesel fuel (see Section 5.3.).

No direct account has been taken to date of CO_2 emissions, which are strictly consumption-linked, although there is talk of introducing a partial vehicle-tax exemption for low-consumption vehicles with 3-litre engines.

5.4.2. Status of the discussion in Germany

Motor vehicle tax is currently being discussed in the context of the reform of the HGV toll and in connection with motor fuel tax. However, the Federal Government has finally rejected calls -- mainly from commercial pressure groups -- for a reduction in motor vehicle tax to compensate for the planned introduction of road pricing in the heavy goods sector. The idea of abolishing motor vehicle tax altogether in favour of use-related pricing instruments, and in particular fuel tax, was discussed at length in the 1990s but could not be put into practice, notably for (finance) policy reasons (cf. Wuppertal Institute, 1997). Since then, experts and environmental associations have been (and still are) strongly critical of the idea, claiming in particular that abolition would take away an important means of making car owners pay for some of the negative environmental effects associated with cars (including land consumption) (cf., for example, Kemming/Klewe, 1993).

5.4.3. Assessment

The fact that motor vehicle tax is in the form of an emissions-based levy can offer a certain incentive to purchase vehicles boasting low emission levels and is therefore to be welcomed. The tax is to be criticised, however, for failing to take sufficient account of factors relating to use. Given the continuing rise in energy consumption in the transport sector, an important step forward would have been to move away, as other EU Member States have done, from a system based for historical reasons on engine capacity to one based on energy consumption (cf., for example, Wuppertal Institute, 1997;

European Commission DG Tren, 2000). The way diesel vehicles are taxed should also be changed. Against the background of the growing number of diesel vehicles being registered, resulting in more pollution from emissions, the principle behind taxation in respect of this type of vehicle needs to be re-worked, insofar as the system of a high rate of tax on fixed costs coupled with low variable costs principally benefits frequent travellers (see also subsection 5.1.1).

With respect to the aim of cutting down on transport, the question of whether and to what extent motor vehicle tax can act as a direct incentive for reducing car-ownership also needs to be examined. It is clear that with the present levels of tax on cars in Germany no such incentive exists[28]. However, motor vehicle tax also needs to be seen in relation to other factors, such as the aforementioned tax benefits available to car users (see Section 5.2.). In comparison to other European countries, the overall tax burden on cars in Germany is low (cf. European Commission DG Tren, 2000).

5.5. Conclusions concerning pricing instruments in the transport sector

The ongoing academic and political debate about pricing measures in respect of motor vehicles started a long time ago and is still highly relevant today. Particularly in the 1990s, environmental aspects became a major concern. Significant partial successes have been recorded in this field, such as the reform of motor vehicle tax, which is now based on emission levels. Recently, however, the debate has come to a standstill, partly owing to successes with reducing harmful emissions, but more as a result of social and political developments which have pushed the demand for unrestricted mobility (by car) increasingly into the forefront of the discussions.

The current debate is unmistakably dominated by attempts to find a way out of the financial difficulties hampering road building. This is understandable given the present budgetary situation in Germany, where even the Federal Government's Finance Minister has described the Federal Transport Network Plan as a "fairytale".

The direction taken by the discussions is scarcely conducive to the implementation of an integrated transport and town planning policy, which must inevitably include efforts to promote the avoidance and reduction of motorised traffic. It is feared, for example, that the much-prized road pricing system will ultimately lead to more car traffic. In addition to the further shift in the infrastructure saturation threshold, that can be expected to result from implementation of the EU initiative to make road users pay for congestion costs, the move towards (partial) privatisation of the trunk road network comes in for particularly severe criticism. In this context, decisions about pricing structures and about upgrading the motorway network generally will increasingly be taken independently of objectives and constraints in the transport and financial policy spheres, with the result that the State will generally cease to have any influence over them. Road user charges -- in whatever form -- can also be expected to have a negative impact on the acceptance of other pricing instruments, insofar as users have the impression that the charges alone represent complete atonement for any costs they have engendered. In this context, the earmarking of revenue raised from the various transport charges -- which many would like to see -- so that the proceeds are injected back into the transport sector, is also to be regarded critically. Admittedly, it might be a way of improving acceptance of road pricing systems, but (political) scope for other measures would be even more limited, as illustrated by the Federal Government's promise that lorries required to pay the HGV toll will be entitled to claim back tax paid on motor fuel.

Road pricing should not be rejected out of hand, however, and can be a very effective complementary instrument, owing to the scope it offers for differentiated control, particularly where pollution priorities are concerned. What is important is that it should only be used where there is the political will necessary to design it in such a way that it is environmentally and socially sustainable.

Motor fuel tax should be a key element of such a well-thought-out, long-term strategy. Its fundamental effectiveness has been known for a long time, and few would dispute it. The heated discussions about the Eco-Tax, even though its rate is so low, and about the introduction of road user charges show just how difficult it is, however, to implement measures that (might) restrict car-borne mobility, albeit only to an extent that is justifiable and may be individually organised.

Basically, it is important to remain open to all solutions that allow for fair and efficient pricing in the transport sector. Discussions on the subject of external costs, and other measures not described here such as the introduction of traffic-based licensing models, should therefore definitely be stepped up.

In the short term, however, a start should be made by tackling those instruments that are clearly counter-productive to sustainability. In addition to the need for a critical review of infrastructure investment, particularly as regards the federal trunk road network, other measures that should be re-examined include the distance-based *Entfernungspauschale* and the different tax benefits granted to car users.

6. FIELD OF ACTION: PRICING INSTRUMENTS WITH RESPECT TO LAND

In addition to pricing structures in the transport field, land costs are another important factor for spatial decisions. They determine where people choose to live, which in turn determines an individual's daily transport habits (cf., for example, BBR, 1999). This link explains why, if the aim is to develop a settlement structure that reduces the need for transport, pricing measures are needed to influence land use.

Measures relating to land should mainly be oriented towards limiting land consumption and, connected with this, concentrating land use in areas that have already been developed. Owing to the persistently intensive use of new land for development, the need to be economical with land has long been a key concern among experts. In addition to the environmental criteria that are part of any sustainable town planning policy, the financial feasibility and cost of development work and infrastructure also play an important role here (cf., for example, Mäding, 2001). Because density of building, the existence of facilities and traffic volume are so closely linked, a land policy which saves on land and concentrates on inner city locations is also central to the development of settlement structures that save on transport (cf. Apel *et al.,* 1995).

Compared with the transport sector, there are only a few significant pricing instruments that can be implemented in relation to land. In addition to an analysis of land tax (*Grundsteuer*), this paper looks in particular at state housing aid, which has a significant impact on land use in Germany.

6.1. Land tax (*Grundsteuer*)

All revenue from land tax, which is the most important land-related tax in Germany, goes to the municipalities. The factors taken into account for determining the level of the tax are the use of the land, the nature of the development, and the value of the land, which, however, is based on rateable values that are very out of date and do not fully reflect the true value of the land. The importance of land tax for local finances varies insofar as municipalities can adjust the level of the tax by applying their own assessment rates. In 1998, land tax revenue totalled 16 billion DM, accounting on average for 15.6 per cent of municipalities' total tax yield (cf. Difu, 1998).

6.1.1. Status of the discussion in Germany

Land tax has been a subject of controversy for a long time in Germany. While it is generally agreed that the tax is in need of reform, particularly the rateable values, there are striking differences between the models proposed in replacement of the old system (cf. Dieterich, 2001). They range from a model that updates the values but otherwise basically continues to apply existing rules, to one that converts the old system into a tax based solely on the value of the land, which, irrespective of present use or property on the land, taxes a plot's potential value on the basis of existing guidelines. The model that stands the best chance of being implemented is the solution favoured by the conference of finance ministers of the *Länder* ("Model B"). It combines a number of different elements, including the area of land, the land value and a flat-rate amount for property built on the land, based on the value attached to living in, or using the property. Leading municipal organisations have signalled that they are prepared to accept this model, providing towns and municipalities are allowed to differentiate according to zones -- which has not been the case up until now -- as well as being able to fix their own assessment rates (cf. Dieterich, 2001).

6.1.2. Assessment

Without going into any more detail here, it can be said that the system proposed under Model B is basically the same as the existing system and, according to the results of a management game organised by the German Institute of Urban Affairs (Difu), the hoped-for simplification of administrative work and, therefore, cost savings to the State are not realistic, owing to the highly complicated calculation method (cf. Coulmas/Lehmbrock, 2001). It is true that mobilisation of unused land ripe for development could be encouraged by the higher tax levied on such land under Model B but, insofar as the new system is not expected to generate any additional tax yield, experts consider that such an increase would be unlikely to have any major impact. The same can be said of the model preferred in academic circles of a tax based solely on land value, although this particular model would have other advantages, including administrative simplicity. The fact that the impact of a new system would depend to a large extent on the level of the tax can be seen from the Danish model, where the introduction of a model based purely on the value of land had hardly any impact on the land made available for development, because of the low level of tax levied on owners of plots of land (cf. Apel *et al*., 1995). Since raising the level of the tax seems out of the question, owing to the existence of objectives that would clash with such a move (home-ownership, promotion of the building trade, etc.), the most effective lever for mobilising building land will continue to be the local assessment rates, whereby the possibility provided under Model B for municipalities to classify land within their boundaries according to different tax zones could be an interesting new feature of the law. In practice, however, municipalities' room for manoeuvre should not be overestimated, owing, for example, to possible competition between them.

With respect to the aim of economical land use, another convincing land tax model is one based on the size of a plot of land (*Bodenflächensteuer*). According to the *difu,* this model could be combined with the model based on the value of land. Big plots of land not worth very much would be taxed more heavily, small plots worth a lot, less heavily (cf. Dieterich, 2001). However, not much attention is being paid to this model in the debate currently under way in Germany.

6.2. Housing aid

6.2.1. Federal home ownership subsidies

Home ownership subsidies are a very important form of housing aid, both in terms of their share of the funds committed to housing aid and from a land-use perspective. .

Since 1996, federal home ownership subsidies have basically been in the form of a lump-sum amount. "Home grants", as they are called, amount to approximately 2 500 € per annum over an eight-year period[29]. This amount is halved for purchases of existing property. The grants are awarded jointly by the Federal Government, the *Land* and the municipality. It is predicted that in 2003 such subsidies will total 21 billion DM [cf. Federal Ministry of Finance (BMF) 2001]. In addition to the home grant, the state-owned Reconstruction Loan Corporation (*Kreditanstalt für Wiederaufbau*) issues subsidised loans. Access to the home grant and the Corporation's subsidised borrowing facilities is not subject to any criteria relating to the land, such as the position or size of the plot[30]. They are awarded at random, according to the "watering-can principle".

6.2.2. Status of the discussion in Germany

In view of the extent of state housing aid, there is growing concern among experts about the negative spatial effects associated with such aid, particularly as regards support for suburbanisation. A number of reform proposals are currently being considered, including some submitted by the German convention of municipal authorities, that would double the home grant in respect of existing property and halve it in respect of new building or, alternatively, introduce a regional component (cf. German convention of municipal authorities, 2001). There are currently no signs that any of these concepts or compromise solutions will be accepted, however, and in the lead-up to the forthcoming elections the Federal Government is treading very careful (cf. DIW, 2002).

6.2.3. Construction of social housing

The Federal Government and the *Länder* make available funding in the form of loans or grants for the construction and rehabilitation of housing for rent or purchase. Funds are transferred from the Federal Government to the *Länder* (e.g. approximately 20 billion DM between 1991 and 1998), who are then required to contribute at least an equivalent amount (BBR, 2000)[31]. Over the past few decades, state funding has largely changed from the traditional system of subsidies for the building of social housing, for rent by low-income groups, to a system of subsidies for the building of homes for rent or purchase by broader income groups. On the whole, the social housing building sector is in decline at the level of the Federal Government and the *Länder* and there is frequent talk of transforming the system completely into one based on personal subsidies (in particular, via housing allowances). However, social housing building still accounts, with substantial differences between the *Länder*, for a significant share of all new building. In North-Rhine Westphalia, for example, it

currently accounts for 22 per cent of all housing completions (cf. *Wohnungsbauförderanstalt NRW,* 2002); each year approximately 12 per cent of all new dwellings in Germany are subsidised by the state (BMF, 2001).

The Federal Government has no direct influence over the form taken by social housing subsidies. Responsibility rests with the *Länder*, who, in addition to applying the federal framework legislation (Housing Aid Act[32]), draw up relevant guidelines as well as programmes setting out policy priorities.

6.2.4. Housing aid in North Rhine-Westphalia

North Rhine-Westphalia is the only *Land* to have established, long ago, a direct link in its legislation between housing aid and environmental criteria. Of the many provisions laid down in the housing aid guidelines and 2002 housing aid programme, worth approximately 1 billion €, the following are particularly significant (MSWKS, 2002):

- Since 1998, rented housing must in principle be linked up to public local transport in order to be eligible for housing aid[33];

- With regard to home-ownership subsidies, in addition to the fact that the level of the subsidy is means-tested, there are also substantial differences based on spatial criteria. For example, subsidised loans are up to 50 per cent higher in inner cities than in rural areas[34];

- In NRW, subsidies are only awarded, in principle, for plots of land measuring no more than 400 m², with the possibility of an additional "Eco-bonus" for building that is particularly economical in terms of land use (up to 200 m²).

6.2.5. Assessment

The inclusion of spatial and land-use criteria in the building regulations in force in North Rhine-Westphalia is positive, but its impact should not be overestimated. According to the results of a recent survey of the building situation in respect of social housing, NRW is still the *Land* where the number of sites incompatible with a town-planning policy which saves on transport is growing most rapidly. Conversely, the survey also found that the level of new housing development in more sustainable sites is much higher in the state-subsidised building sector than in the ordinary sector (cf. Holz-Rau/Hesse, 2000).

The rules applicable in North Rhine-Westphalia could certainly be improved. The lower rates of subsidies for the acquisition of existing -- as opposed to new -- property, for example, need to be raised in the interests of economical use of the land. On the whole, however, a positive development would be for the rules applied in NRW to be extended to other *Länder*. The Federal Government could play an important role here by incorporating relevant standards and objectives in the Housing Aid Act.

6.3. Conclusions concerning pricing instruments in the land sector

As shown, land-use trends continue to be largely unrelated to actual demographic growth. The discussions currently under way in respect of individual pricing instruments in this field miss out on a valuable opportunity to issue clear signals in favour of more economical use of the land, with settlement structures that cut down on the need for transport.

Land tax is a good example. The efforts to reform the existing system will probably lead to a number of individual improvements, but their impact on land use will be insignificant, not least because of the level of the tax. Another example concerns the present housing aid system which, with the exception of North Rhine-Westphalia, has so far failed to include any criteria relating to economical land use or the concentration of housing in areas that have already been developed. This is highly regrettable, given the importance of housing aid for new building and, consequently, more extensive development of the countryside.

The area of housing aid where action is most urgently required concerns home grants and the loans issued by the Reconstruction Loan Corporation. It is an area that is rocketing in budget terms, yet it mainly serves to promote the building of single-family, detached houses which take up a great deal of land and tend to be built where there is inadequate infrastructure. Without going into detail concerning the (legitimate) question of whether or not home-ownership subsidies actually make good sense, suffice it to say that any reform of the system needs to fulfil two basic requirements; it should impose an upper limit on the size of eligible plots of land and should increase the level of subsidy available in the case of existing housing, which should be placed at least on an equal footing with new property.

Any reform of housing aid instruments should therefore follow the basic premise in respect of all changes made to pricing rules, namely, that pricing instruments which are often contradictory and counterproductive in terms of their effect on the environment should be replaced by clear and consistent signals in favour of a sustainable transport and town planning policy.

7. CONCLUSIONS

There can be no sustainable town planning and transport policy unless the State first establishes appropriate -- in other words, consistent -- general conditions which give local and, in particular, regional players the resources they need to develop settlement structures which save on transport and at the same time send out clear signals to private individuals to help them with their daily and more long-term mobility decisions. Concerning the different fields of action examined in this paper, it is possible to issue the following key recommendations:

The need to reinforce mandatory planning instruments

Optimum assignment of development land and transport infrastructure is crucial for achieving settlement structures which reduce the need for transport. In this respect, local public transport should also be a priority when deciding where to build offices and shopping centres. With regard to housing developments and business zones, the tendency towards dispersion should be combined with the advantages of concentration, which is why the "decentralised concentration" model is best placed to achieve compact structures that save on transport. Since rail systems, which are best suited to high densities of traffic all flowing in the same direction, reach the point where their cost-effectiveness is stretched to the limit, in a context of decentralised settlement structures, more attention should also be paid to the further possibilities offered by more flexible means of transport (particularly buses).

The need for a stronger regional level

Insofar as regional problems need to be solved at regional level, the regions must be endowed with far-reaching decisionmaking powers and, where possible, should have direct democratic legitimacy. For the sake of strict regional control of town planning, urban regions must have their own powers in the planning sphere, and institutional links should be established between regional planning and transport planning, with specific responsibilities for implementation.

The need to reform counterproductive pricing instruments

In order to put an end to the conflicting messages currently conveyed by German pricing rules and replace them with a clear general framework, state incentives in the form of housing aid (particularly home grants) or the tax benefits granted to car owners (distance-based *Entfernungspauschale*, etc.) are in urgent need of review. Positive solutions that are either planned or already in place, such as motor-vehicle tax, land tax or even motor-fuel tax (via the Eco-Tax), should also be improved so that they are effective in the longer term.

Medium and long-term intervention in the pricing structures in respect of car traffic

Unless action is taken at the level of the pricing structures which apply in respect of car traffic, it is unlikely that there will be any significant change in people's choice of transport destination and means of transport or their decisions with regard to housing. Politically, such a step may be very difficult to take, but there is no real alternative. Of the different pricing instruments available, motor fuel tax is still of key importance, although road user charges could also help to influence mobility patterns in favour of more sustainability while, at the same time, leaving individuals largely free to make their own choices -- providing they are designed in accordance with a sustainable transport and town-planning policy.

Use of persuasive means and "soft policies"

Future policies must make use of a combination of all available instruments. This paper has focused principally on regulatory and fiscal instruments, but reference should also be made to accompanying "soft" instruments. "Soft policies" in the information and advisory spheres, in particular, are of growing importance. Mandatory plans, clear political structures and intelligent fiscal instruments are an essential challenge for the future. Also important, however, is the need to promote awareness so that people learn to act in an environmentally responsible way, according to their own personal convictions.

NOTES

1. As claimed by parts of the German building and housing sector as well as banks (cf. *Initiative Wohneigentum*, 2002).

2. For examples of upgraded railway lines and stations and housing developments geared to local public transport, see, among others: ILS, 2000; MASSKS, 1999; MBW, 1999; Topp, 1999; as well as the Website for the BahnVille project (www.bahn-ville.net).

3. Cf. Section 9 of the version of Regional Planning Act dated 18 August 1997.

4. Section 1, subsection 4 of the Building Code.

5. See, for example, Bose, M. (Ed.): *Die unaufhaltsame Auflösung der Stadt in die Region? Harburger Berichte zur Stadtplanung,* 9; Hamburg, 1997; and Krämer-Badoni, T. & W. Petrowsky (Eds.): *Das Verschwinden der Städte.: Forschungsberichte,* 8; Bremen, 1997.

6. WG of regional associations in conurbations and Hanover municipal association (Ed.): *Postsuburbia – Herausforderungen für stadtregionales Management*. *Beiträge zur regionalen Entwicklung*, Vol. 90, Hanover, 2001.

7. Cf., for example, the "priority development areas" in the 1996 regional planning programme for Hanover.

8. Hanover Municipal Association (Ed.): *Eigenentwicklung in ländlichen Siedlungen als Ziel der Raumordnung. Beiträge zur regionalen Entwicklung,* Vol. 87, Hanover, 2001.

9. Hanover Municipal Association (Ed.): *Regionales Einzelhandelskonzept für den Großraum Hannover (4. Änderung des Regionalen Raumordnungsprogramms 1996 für den Großraum Hannover). Beiträge zur regionalen Entwicklung*, Vol. 95, Hanover, 2001.

10. Cf. Section of the 13 Regional Planning Act.

11. Cf. Ministry of Economic Affairs, Small and Medium-Sized Enterprises, and Technology of North Rhine-Westphalia (Ed.): *Regionalisierung. Neue Wege in der Strukturpolitik Nordrhein-Westfalens*, Dusseldorf, 1992.

12. Steinacher, Bernd (1999), Regionales Management für regionale Probleme, in: *Auf dem Weg zu einer neuen regionalen Organisation? = Rhein-Mainische Forschungen,* Vol. 116, Frankfurt am Main, pp. 35-63.

13. The "Jordan-Paper" is documented in: Hanover Region 2001 -- Vorschläge zur Entwicklung neuer Organisationsstrukturen für die Wahrnehmung regionaler Verwaltungsaufgaben. Hanover Municipal Association (Ed.): *Beiträge zur regionalen Entwicklung*, Vol. 19, Hanover, 1997.

14. Cf. with respect to this planning instrument: Regional Studies and Planning Academy (*Akademie für Raumforschung und Landesplanung)* (Ed.): *Regionaler Flächennutzungsplan. Rechtlicher Rahmen und Empfehlungen zur Umsetzung. Forschungs- und Sitzungsberichte*, Vol. 213, Hanover, 2000.

15. The latest price increase is still below the general rate of inflation and the growth in income. If it had followed general price trends since 1960, the price of petrol today would be approximately 2.70 DM, or as much as 5.70 DM if seen in relation to the growth in income. The Federal Environmental Agency (*Umweltbundesamt*) shows just how small the petrol price increase has been by comparing it with the increase in the cost of local public transport. The price of a ticket sold by the transport company in Berlin has risen from 0.25 in 1951 to 3.70 DM in 1997, a 1 480 per cent increase; the price of petrol over the same period has risen by only 230 per cent (from 0.65 to 1.51 DM, cf. UBA, 1997).

16. In particular, the Stuttgart MobilPass (cf. Baden-Württemberg Ministry of Transport, 1995).

17. "Fair payment for infrastructure use -- a phased approach to a common transport infrastructure charging framework in the EU", 1998 White Paper of the EU Commission.

18. "European transport policy for 2010: time to decide", 2001 White Paper of the EU Commission.

19. Eg. in the context of the Civitas (City-VITAlity-Sustainability) initiative.

20. In accordance with European rules, the scope for private funding is limited in the Act to new bridges, tunnels and mountain passes, and the upgrading of (two-lane) highways; two such projects are currently under way (Warnequerung, Rostock; Travequerung, Lübeck; cf. Balthaus/ Keppel, 2000).

21. The plan is for revenue from heavy goods traffic on the road section in need of upgrading to be passed on to the operators. The infrastructure costs resulting from use by cars and light goods vehicles will be paid for out of the road-building budget in the form of knock-on financing (approximately 50 per cent of building costs) (cf. "Betreibermodelle für die Bundesfernstraβen", press release of the Federal Ministry of Transport, Building and Housing, 1 November 2001).

22. Calculated according to axle load and the level of emissions.

23. Opinions vary as to the exact level of the necessary increase, but it is generally felt that prices need to rise by at least 100 to 500 per cent over a period of 15 to 25 years.

24. The minimum rates per litre are 29 cents for unleaded petrol, and 24.5 cents for diesel (position 2000; cf. European Commission, 2002).

25. According to the Federal Environment Minister, fuel consumption fell in the first half of 2001 by 5 per cent compared with the same period in 1999 (petrol 12 per cent; diesel 2 per cent). According to the same source, small vehicle sales (3- and 5-litre cars) have also risen, as a positive effect of the Eco-Tax (cf. Federal Environment Ministry, 2002).

26. According to the DIW, a gradual increase in motor fuel tax to 4 DM over a period of 15 years would significantly impair the mobility of (only) 10 per cent of car-owning households (approximately 2 million households) (cf. Halbritter *et al.,* 1999). Furthermore, according to the Federal Regional Studies and Planning Research Institute (BfLR), use of this pricing instrument would be "safe" from a regional planning perspective and would not place undue strain on rural areas (BfLR, 1997).

27. Up until World War II, revenue from the tax was earmarked for road maintenance and for building new roads.

28. According to the German automobile association, the ADAC motor vehicle tax in Germany currently accounts for between 2 and 5 per cent of total costs per year (cf. also DIW, 1997).

29. An additional allowance of 750 € is paid for each child. Because of the very high income limits (120 000 DM for single persons in 1999) the vast majority of the population are eligible for housing grants.

30. However, other schemes run by the Reconstruction Loan Corporation are subject to environmental criteria (e.g. a reduction in CO_2) (cf. BBR, 2000).

31. In practice, all *Länder* actually grant much more than their required share. Nationally, their participation is over 85 per cent (cf. BBR, 2000).

32. As of 1 January 2002, the Housing Aid Act (*Wohnraumförderungsgesetz*) replaces the second Housing Construction Act (*Wohnungsbaugesetz*).

33. There must be a bus stop, etc., within 1.5 km, although there are a number of possible exceptions to this rule (special housing need, etc.).

34. In the case of higher income groups, subsidies are also limited in principle to inner city areas (or stand-alone, densely populated areas).

BIBLIOGRAPHY

Alfen, Hans Wilhelm (2000), Privatwirtschaftliche Modelle für eine bedarfsgerechte Straßenverkehrsinfrastruktur, *Internationales Verkehrswesen*, Vol. 4.

Apel, Dieter *et al.* (1995), Flächen sparen, Verkehr reduzieren -- Möglichkeiten zur Steuerung der Siedlungs- und Verkehrsentwicklung. Deutsches Institut für Urbanistik (difu) (German Institute of Urban Affairs) (ed.): *Difu Beiträge zur Stadtentwicklung*, Vol. 16, Berlin.

Apel, Dieter *et al.* (1997), Kompakt, mobil urban: Stadtentwicklungskonzepte zur Verkehrsvermeidung im internationalen Vergleich. Difu-BeiträgApel, Dietere zur Stadtforschung 24, Berlin.

Apel, Dieter *et al.* (2000), Szenarien und Potentiale einer nachhaltig flächensparenden und landschaftsschonenden Siedlungsentwicklung, Berichte 1/00 des Umweltbundesamtes, Berlin.

Aring, Jürgen (1999), *Suburbia-Postsuburbia-Zwischenstadt*, ARL-Arbeitsmaterial 262, Hanover.

Aring, Jürgen *et al.* (1996), *Dezentrale Konzentration. Schriftenreihe des Bundesministeriums für Raumordnung, Bauwesen und Städtebau*, No. 497, Bonn.

Akademie für Raumforschung und Landesplanung (ARL), (Regional Studies and Planning Academy) (ed.) (1987), *Flächenhaushaltspolitik. Forschungs- und Sitzungsberichte,* 173, Hanover.

Akademie für Raumforschung und Landesplanung (ARL), (Regional Studies and Planning Academy) (ed.) (1999), *Flächenhaushaltspolitik. Forschungs- und Sitzungsberichte*, 208, Hanover.

Balthaus, Hansgeorg and Armin Keppel (2000), Privatfinanzierung von Bundesfernstraßen nach dem Betreibermodell, *Internationales Verkehrswesen,* Vol. 11.

Baum, Herbert *et al.* (1998), *Volkswirtschaftliche Kosten und Nutzen des Verkehrs*, Kirschbaum Verlag, Bonn.

Beckmann, Klaus J. (2001), Nahmobilität und stadtplanerische Konzepte, in: Vereinigung für Stadt-, Regional- und Landesplanung e.V. (SRL) (ed.): *Nahmobilität und Städtebau – Tagungsdokumentation*, Zusatzband, Berlin.

Roland Berger & Partner GmbH (ed.) (1995), *Untersuchung zur Privatisierung von Bundesautobahnen. Zusammenfassender Abschlußbericht*. Study commissioned by the Federal Ministry of Transport, Munich, Bonn.

Bundesforschungsanstalt für Landeskunde und Raumordnung (BfLR), (Federal Regional Studies and Planning Research Institute) (ed.) (1996), *Städtebaulicher Bericht*.

Bundesamt für Bauwesen und Raumordnung (BBR) (Federal Housing and Regional Planning Agency) (ed.) (1999), *Siedlungsstrukturen der kurzen Wege*. *Reihe Werkstatt: Praxis*, Bonn.

Bundesamt für Bauwesen und Raumordnung (BBR) (Federal Housing and Regional Planning Agency) (ed.) (2000), *Raumordnungsbericht 2000*, Bonn.

Bundesforschungsanstalt für Landeskunde und Raumordnung (BfLR) (Federal Regional Studies and Planning Research Institute) (ed.) (1997), Bergmann, Eckhard *et al.*: Räumliche Wirkung einer Mineralölsteuererhöhung. BfLR-Arbeitspapiere 6/1997, Bonn.

Bundesministerium der Finanzen (BMF) (Federal Ministry of Finance) (ed.) (2001), *Bericht der Bundesregierung über die Entwicklung der Finanzhilfen des Bundes und der Steuervergünstigungen für die Jahre 1999-2002* (18. Subventionsbericht), Berlin.

Bundesumweltministerium (BMU) (Federal Ministry for the Environment) (ed.) (2002), Positive Umwelteffekte der Ökologischen Steuerreform, in: *Umwelt*, Ausgabe 2.

Bund für Umwelt und Naturschutz Deutschland (BUND) (German association for environmental protection and conservation) (ed.) (2001), *BUNDInfo Verkehr*, Ausgabe 2.

Coulmas, Diana and Michael Lehmbrock (2001), Grundsteuerreform -- Was kommt nach dem Praxistest?, in: Deutsches Volksheimstättenwerk (Vhw) (ed.): *Forum Wohneigentum*, Vol. 6.

Danielzyk, Rainer and Axel Priebs (2001), Suburbia und stadtregionale Kooperation, in: Brake, Klaus *et al.* (eds.), *Suburbanisierung in Deutschland*, pp. 261-269, Opladen.

Deutscher Städtetag (German convention of municipal authorities) (ed.) (2001), Regionalisierung der Eigenheimzulage: Beschluß des Präsidiums des Deutschen Städtetages vom 28.3.2001.

Dietrich, Hartmut (2001), Reform der Grundsteuer -- Zum Stand der Diskussion, in: Deutsches Volksheimstättenwerk (Vhw) (ed.), *Forum Wohneigentum*, Vol. 6.

Deutsches Institut für Urbanistik (German Institute of Urban Affairs) (difu) (ed.) (1998), Bodenpolitik und Grundsteuer -- Bericht über ein Expertengespräch, in: *Difu-Berichte* 4/1996.

Deutsches Institut für Wirtschaftsforschung (DIW) (German Institute for Economic Research) (ed.) (1997), Kfz-Steuerreform: Nur geringe Umweltwirkung zu erwarten, in: *DIW-Wochenbericht* 35/97.

Deutsches Institut für Wirtschaftsforschung (DIW) (German Institute for Economic Research) (ed.) (2002), Wohnungsbau und Eigentumsbildung -- Für eine einfachere und effizientere Wohnungsbauförderung, in: *DIW-Wochenbericht* 22/2002.

Eisenkopf, Alexander (2000), Staugebühren, Infrastrukturkostendeckung und optimale Investition: Welchen Beitrag leistet die Anlastung von Stauungskosten zur gesamtwirtschaftlichen Effizienz?, in: *Zeitschrift für Verkehrswissenschaft*, Vol. 3.

European Commission DG Tren in association with EC DG Taxud and EC DG ENV (eds.) (2000), *Fair and efficient pricing in transport -- the role of charges and taxes (national) in commuter and business travel, Final Report*, Amsterdam.

European Commission (ed.) (2001), European transport policy for 2010: time to decide -- White Paper, Luxembourg.

European Commission (ed.) (2002), Towards a European strategy for the security of energy supply -- Green Paper, Luxembourg.

Fürst, Dietrich (1999), "Weiche Kooperationsstrukturen" -- eine ausreichende Antwort auf den Kooperationsbedarf in Stadtregionen?, in: *Informationen zur Raumentwicklung 1999*, pp. 609-615.

Gatzweiler, Hans-Peter (2000), Die Städte dehnen sich weiter räumlich und funktional aus, in: *Der Städtetag* 1/2000, pp. 13-17.

Halbritter, Günter *et al.* (1999), Umweltverträgliche Verkehrskonzepte -- Entwicklung und Analyse von Optionen zur Entlastung des Verkehrsnetzes und zur Verlagerung von Straßenverkehr auf umweltfreundlichere Verkehrsträger. Erich Schmidt Verlag, Beiträge zur Umweltgestaltung A 143, Berlin.

Heinze, G.W. (1979), Verkehr schafft Verkehr. Ansätze zu einer Theorie des Verkehrs als Selbstinduktion, in: *Berichte zur Raumforschung und Raumplanung*, 23, Vol. 4/5, Vienna.

Hesse, Markus and Stefan Schmitz (1998), Stadtentwicklung im Zeichen von „Auflösung" und Nachhaltigkeit, in: *Informationen zur Raumentwicklung*, pp. 435-453.

Holz-Rau, Christian (1997), Verkehrsreduktion im Personenverkehr: Reichen die städtebaulichen Konzepte?, in: Bundesforschungsanstalt für Landeskunde und Raumordnung (ed.), *ExWoSt-Informationen zum Forschungsfeld Städtebau und Verkehr*, No. 06.14, Bonn, pp. 26-31.

Holz-Rau, Christian and Markus Hesse (2000), Quantifizierung der Verkehrsentstehung und deren Umweltauswirkungen durch Entscheidungen, Regelwerke und Maßnahmen mit indirektem Verkehrsbezug. Umweltbundesamt (ed.), UBA-Texte 35/00, Berlin.

Hübler, Karl-Herrmann (1999), Genügen die klassischen normativen Siedlungsstrukturkonzepte den Anforderungen einer nachhaltigen Raumentwicklung?, in: *Raumforschung und Raumordnung*, pp. 241-248.

Hübler, Karl-Herrmann (2001), Für eine Modernisierung der Regionalplanung. Anmerkungen zu einem Positionspapier des Informations- und Initiativkreises Regionalplanung der ARL, in: *ARL-Nachrichten,* 3/2001, pp. 6-7.

Institut für Landes und Stadtentwicklungsforschung des Landes Nordrhein-Westfalen (ILS) (ed.) (2000), *Bahnhöfe und Bahnstrecken ganzheitlich erneuern! -- Das IBA-Projekt "Köln-Mindener Eisenbahn"*, Dortmund.

Initiative Wohneigentum (ed.) (2002), Eigenheimzulage muss uneingeschränkt erhalten bleiben -- branchenübergreifende Bündnis zur Wohneigentumsförderung. Discussion paper of 18 April 2002; published on www.vhw-online.de/aktuell, June.

Kanzlerski, Dieter (1998), Preispolitische Instrumente zur Förderung eines raum- und umweltverträglichen Verkehrs. In: Bundesamt für Bauwesen und Raumordnung (ed.), *Strategien*

für einen raum- und umweltverträglichen Verkehr. Informationen zur Raumentwicklung, Vol. 6, Bonn.

Kemming, Herbert and Heinz Klewe (1993), Wer soll das bezahlen, wer hat das bestellt?, in: Institut für Landes- und Stadtentwicklungsforschung des Landes NRW (ILS) (ed.): *Monatsberichte des Forschungsbereichs Verkehr*, 1/2, Dortmund.

Kommission Verkehrsinfrastrukturfinanzierung (Committee on Transport Infrastructure Funding) (2000), Final Report, September, Berlin.

Kossak, Andreas (2001), Lkw-Maut -- Weichen richtig gestellt?, in: *Internationales Verkehrswesen*, 9/2001.

Kurnol, Jens (1996), Was bringen Verteuerungsstrategien im Stadtverkehr? Vorschläge -- Wirkung -- Kritik, in: Bundesamt für Bauwesen und Raumordnung (ed.), *Ballungsraumverkehr. Informationen zur Raumentwicklung*, Vols. 7/8, Bonn.

Mäding, Heinrich (2001), Suburbanisierung und kommunale Finanzen, in: Brake, Klaus *et al.* (eds.): *Suburbanisierung in Deutschland*, Opladen.

Ministry of Labour, Social Affairs and Town Planning, Culture and Sport of North Rhine-Westfalia (MASSKS) (ed.) (1999), *Bahnhöfe -- Impulse für die Stadtentwicklung*, Dusseldorf.

Ministry for Building and Housing of North Rhine-Westfalia (MBW) (ed.) (1998), *Wohnen am Lipperländer*, Dusseldorf.

Menke, Rudolf (2001), Die Einheit von Siedlungs- und Verkehrsplanung, in: Kommunalverband Großraum Hannover (ed.), *Großraum Hannover -- Eine Region mit Vergangenheit und Zukunft. Beiträge zur regionalen Entwicklung*, Vol. 96, Hanover, pp. 253-258.

Müller, Wolfgang and Ruth Rohr-Zänker (1997), Die Städte und ihr Umland -- Plädoyer für einen Perspektivenwechsel, in: *RaumPlanung* 78, pp. 153-158.

Ministry for Town Planning and Housing, Culture and Sport of North Rhine-Westphalia (MSWKS) (ed.) (2002), *Wohnungsbauförderbestimmungen -- WFB*. Reihe MSWKS aktuell, Dusseldorf.

Federal Ministry of Regional Planning, Building and Town Planning (ORA) (ed.) (1993), *Raumordnungspolitischer Orientierungsrahmen. Leitbilder für die räumliche Entwicklung der Bundesrepublik Deutschland*, Bonn.

Pfeiffer, Ulrich (1993), Flächenhaushaltspolitik -- Bodenmanagement als flächensparende Strategie der Stadtentwicklung, in: *Informationen zur Raumentwicklung*, pp. 17-24.

Priebs, Axel (1999), Räumliche Planung und nachhaltige Siedlungsentwicklung -- Lohnt es sich, an den bisherigen planerischen Konzepten und Verfahren festzuhalten?, in: *Raumforschung und Raumordnung*, pp. 249-254.

Priebs, Axel (2000), Auf dem Weg zur leistungsstarken Stadtregion, in: *Der Städtetag* 1/2000, pp. 18-21.

Priebs, Axel (2002), Die Bildung der Region Hannover und ihre Bedeutung für die Zukunft stadtregionaler Organisationsstrukturen, in: *Die Öffentliche Verwaltung* 55, pp. 144-151.

Prognos (ed.) (1991), *Wirksamkeit verschiedener Maßnahmen zur Reduktion der verkehrlichen CO_2-Emissionen bis zum Jahr 2005*. Study commissioned by the Federal Ministry of Transport, Basle.

Prognos (ed.) (2001), Kritzinger, Stephan *et al*. (2001), Erarbeitung von Entwürfen alternativer verkehrspolitischer Szenarien zur Verkehrsprognose 2015. Commissioned by the Federal Ministry of Transport, Building and Housing. Final report, Basle.

Schmitz, Stefan (2001), Revolution der Erreichbarkeit -- Gesellschaft, Raum und Verkehr im Wandel, in: Wollmann, Hellmut (ed.): *Reihe Stadtforschung aktuell*, Band 83, Verlag Leske+Budrich, Opladen.

Schütte, Christian (1998), Road-pricing in der Praxis -- Ein konkretes Preiskonzept für Deutschland; dissertation at Berlin Technical University (ed.), Berlin.

Sieverts, Thomas (1997), *Zwischenstadt: zwischen Ort und Welt, Raum und Zeit, Stadt und Land*, Braunschweig/Wiesbaden.

Sinz, Manfred and Antonia Blach (1994), Peneldistanzen als Kriterium siedlungsstruktureller Effizienz, in: *Informationen zur Raumentwicklung,* 1994, pp. 465-480.

Spannowsky, Willy (1999), Verwirklichung von Raumordnungsplänen durch vertragliche Vereinbarungen, in: Bundesamt für Bauwesen und Raumordnung (ed.): *Forschungen*, Vol. 93, Bonn.

Steinacher, Bernd (1999), Regionales Management für regionale Probleme, in: *Auf dem Weg zu einer neuen regionalen Organisation?, Rhein-Mainische Forschungen* 116, Frankfurt am Main, pp. 35-63.

Stürmer, Wilhelmine (1993), Raumordnerisches Strukturkonzept für das Land Brandenburg, in: *Raumforschung und Raumordnung,* 51, pp. 84-90.

Stollberg (2000), Die Besteuerung von Berufspendlern im Spannungsfeld von Steuergerechtigkeit und Verkehrspolitik, in: Verband Deutscher Verkehrsunternehmen (VDV) (ed): *2000 Annual Report*, Cologne.

Topp, Hartmut H. (ed.) (1999), *Reaktivierung von Zweigstrecken der Eisenbahn im ländlichen Raum*. Fachgebiet Verkehrswesen der Universität Kaiserslautern, Grüne Reihe No. 46, Kaiserslautern.

Umweltbundesamt (UBA) (Federal Environmental Agency) (ed.) (1995), *1995 Annual Report,* Berlin.

Umweltbundesamt (UBA) (Federal Environmental Agency) (ed.) (1997), *Maßnahmenplan Umwelt und Verkehr -- Ein Konzept für eine nachhaltig umweltverträgliche Verkehrsentwicklung in der Bundesrepublik Deutschland*, Berlin.

Umwelt- und Prognose-Institut e.V. (UPI) (ed.) (1994-1998), Teufel, Dieter *et al.*: *Umweltwirkungen von Finanzinstrumenten im Verkehrsbereich*. UPI-Bericht 21; 4. Erw. Auflage. Heidelberg. Aktualisierte Berechnung 1998 [cf. www.upi-institut.de (May 2002)].

Umwelt- und Prognose-Institut e.V. (UPI) (ed.) (2002), *Benzinpreise und Ökosteuer*.

Baden-Württemberg Transport Ministry; Forschungsinstitut für anwendungsorientierte Wissensverarbeitung (ed.) (1995), *MobilPass-Feldversuch. Modell einer flexiblen Verkehrssteuerung, final report*, Ulm.

Willeke, Rainer (1996), *Externe Kosten und Nutzen des Verkehr*, Frankfurt am Main.

Winkel, Rainer (2001), Weg vom Rand -- Zur Endlichkeit von Suburbanisierung, in: SRL (ed.), *Planerin*, Ausgabe, 3/2001.

Wissenschaftlicher Beirat (Advisory Board at the Federal Ministry for Transport, Building and Housing) (1999), Faire Preise für die Infrastrukturbenutzung -- Ansätze für ein alternatives Konzept zum Weißbuch der Europäischen Kommission, in: *Internationales Verkehrswesen*, 10.

Wohnungsbauförderanstalt NRW (North Rhine-Westphalia Housing Aid Institute) (ed.) (2002), *Geförderter Wohnungsbau 2001. Statistischer Bericht Nordrhein-Westfalen*, Dusseldorf.

Wuppertal Institute for Climate, Energy, Environment (ed.) (1997), Ökologische Reform der Kfz-Steuer: Eine halbe Sache, in: *Wuppertal Bulletin*, 2/97.

Susan HANDY
Department of Environment Science and Policy
University of California
Davis
United States

ACCESSIBILITY- VS. MOBILITY-ENHANCING STRATEGIES FOR ADDRESSING AUTOMOBILE DEPENDENCE IN THE US

SUMMARY

Davis, May 2002

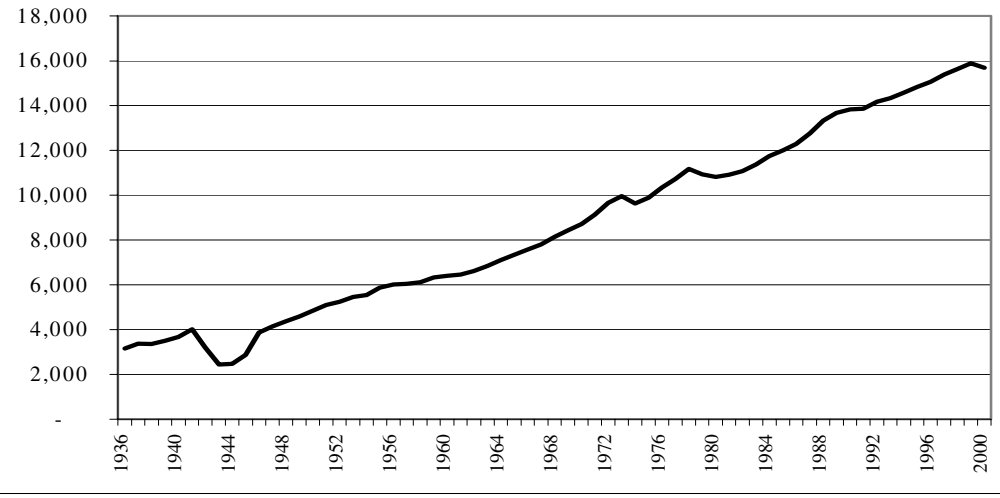
1. INTRODUCTION

In 1995, the average American spent 56 minutes a day in a car, a 14 per cent increase from only five years earlier (US DOT, 2001). The average American household drove over 33 000 kilometres per year (US DOT, 2001) and the average American car was driven over 19 000 kilometres per year (US DOT, 2000a). The growth in total vehicle-kilometres travelled in the US has continued unabated for decades, far exceeding the growth in population (Figure 1). The US is clearly the most auto-dependent society on earth, but other parts of the world are catching up. By 2000, there were more cars per person in Germany than in the US, and nearly as many in Sweden, France and Canada (US DOT, 2000a). The average vehicle in the United Kingdom was driven over 17 000 kilometres per year, just 11 per cent behind the average in the US (US DOT, 2000a). Automobile dependence is growing throughout the world.

Growth in automobile travel has been well supported by public investments in roads. Total capital outlays for roads in the US by all levels of government have totalled between $30 billion and $50 billion per year (in constant 2000 dollars) for decades and have approached $60 billion per year in recent years (Figure 2). By 2000, the US had over 3.9 million miles of roads, including over 21 000 miles of freeways in urban areas, and the annual cost of maintaining this system had reached nearly $30 billion per year (US DOT, 2000a). From the beginning, the mission of the US Department of Transportation has been to accommodate the growing demand for vehicle travel. Today, the department has established "mobility" as one of its strategic goals and uses trends in vehicle travel as an indicator of progress towards this goal (BTS, 2002). In its 2001 "Report to the American People," the Federal Highway Administration said, "*we must continue to invest in America's highways in order to achieve our national goals*" (FHWA, 2001).

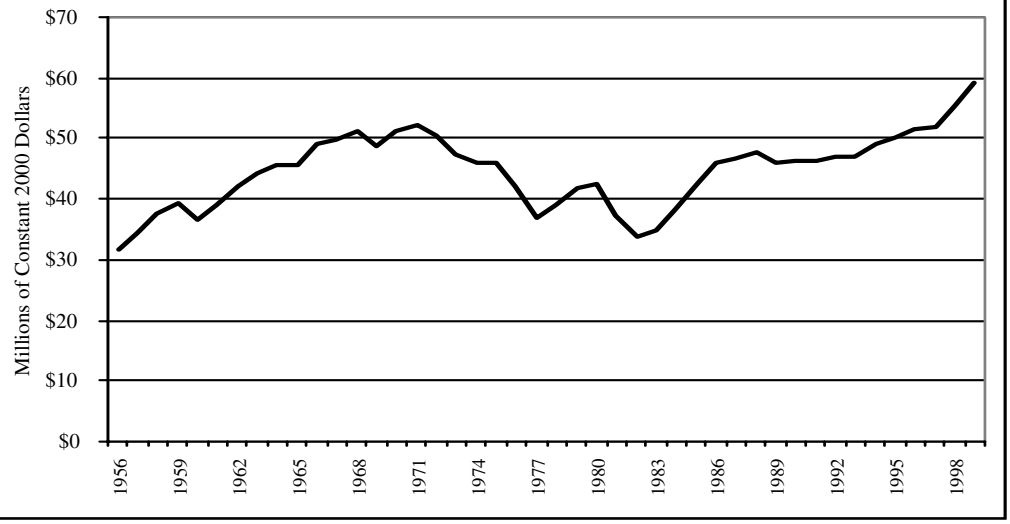
But the investments in roads have not kept up with the growth in vehicle travel. Between 1941 and 2000, total kilometres of roads in the US increased by 145 per cent but vehicle-kilometres travelled increased by 724 per cent. The gap is significant even when accounting for population growth: kilometres of roads per person increased by 16 per cent while vehicle-kilometres travelled per person increased by 290 per cent between 1941 and 2000. As demand has outpaced supply, levels of congestion have increased. The Texas Transportation Institute (TTI) calculates that in the 68 largest metropolitan areas in the US the average annual hours of delay per person grew from 11 in 1982 to 36 in 1999, an increase of 227 per cent (TTI, 2001). The estimated cost of this delay reached $77.8 billion in 1999. How much more road building would it take to eliminate this delay? TTI estimates that metropolitan areas added only 48 per cent of the roads they needed to keep up with the growth in vehicle travel in 1999.

Figure 1. Vehicle-kilometres travelled per person in the U.S. (1936 - 2000)



Source: US DOT, 2000; US DOT, 1985.

Figure 2. Total Capital Outlays for Roads in the U.S. (1956 - 2000)



Source: US DOT, 2000; US DOT, 1985.

At the same time, the environmental consequences of this steady growth in automobile use are well known. Although air quality is better now in places like Los Angeles than it has been in decades, the problem is far from solved. In the US, emissions of volatile organic compounds from transportation have been decreasing steadily for the last three decades (BTS, 2002) but emissions of nitrogen oxides have been going up, and 36 areas that are home to a total of 85 million people still fail to officially meet the national standards for ozone (EPA, 2002). The transportation sector dumped 513 million metric tons of carbon dioxide, a major greenhouse gas, into the atmosphere in 2000, a 3.43 per cent increase from the year before (BTS, 2002). In 1999, the US consumed 19.5 million barrels of oil per day, 26.5 per cent of the world's consumption; 68 per cent of oil consumption in the US was for transportation, and consumption of oil in the US for transportation alone exceeded total production of oil in the US by 50 per cent (Davis, 2001). These statistics and others seem to provide ample justification for policies to reduce automobile use.

That leads to something of a dilemma for policymakers. Should policies focus on accommodating growing levels of vehicle travel because driving more is apparently what the public wants to do? Or should policies focus on limiting driving so as to reduce environmental and other costs? The former strategy has so far been more politically palatable, at least in the US, but it is also becoming increasingly unaffordable. The latter strategy means reversing a trend that has slowed only for wars and recessions and goes against American traditions of freedom of movement. So what's the right thing to do? One obvious approach is to push for further improvements in vehicle and fuel technologies which will reduce the environmental impacts of driving without in anyway limiting driving. But the problem remains that driving is growing faster than capacity possibly can. Another remaining problem is that a significant share of the population cannot drive or does not have access to a car, for reasons of income, age or ability. An alternative approach, that is gaining wide support in the US, is to reduce the need for driving by bringing activities closer to home, by improving the quality of transit, bicycling and walking -- by enhancing accessibility. Such an approach represents a fundamental shift from a traditional focus on enhancing mobility through road building. This report looks at what it means to focus on enhancing accessibility rather than enhancing mobility, first by defining these concepts, then by reviewing the US experience with mobility-enhancing strategies, accessibility-enhancing strategies and others.

2. ACCESSIBILITY *VS.* MOBILITY

The terms "accessibility" and "mobility" are often used together in transportation plans but without clear distinction. For example, the long-range transportation plan for the Austin, Texas metropolitan region has as a primary goal "*to provide an acceptable level of accessibility and mobility for the region's residents with the least detrimental effects*" (CAMPO, 2000). The long-range plan for the Chicago metropolitan area establishes the goal of providing "*an integrated and coordinated transportation system that maximizes accessibility and includes a variety of mobility options*" (CATS, 2002). The Transportation Equity Act of the 21st Century (TEA-21), passed by the US Congress in 1998, requires that regional planning agencies consider the goal of increasing "*the accessibility and mobility options available to people and for freight*" (FHWA, 1998). In none of these examples are these terms explicitly defined.

The distinction between the two concepts is important, however. The American Heritage Dictionary, Fourth Edition, defines "mobility" as "*the quality or state of being mobile*" and "mobile" as "*capable of moving or of being moved readily from place to place*" (Picket *et al*., 2000). The Oxford English Dictionary defines "mobility" as the "*ability to move or to be moved… facility of movement*" (OED, 2002). In the context of transportation planning, mobility has been defined as the potential for movement, the ability to get from one place to another (Hansen, 1959; Handy, 1994). Traditional level-of-service measures used in transportation planning are measures of mobility; higher volume-to-capacity ratios mean slower travel times, less ease of movement and thus lower mobility. Mobility is sometimes also measured by actual movement, either numbers of trips made or total kilometres travelled. Actual movement is not necessarily an accurate measure of the potential for movement, however. First, potential movement can exceed actual movement, for example, if individuals choose to drive less than they could. Second, increases in actual movement can mean decreases in potential movement, as is the case when roads are congested.

Accessibility has been both harder for planners to define and to measure. The American Heritage Dictionary, Fourth Edition, defines "accessibility" as "*easily approached or entered*" (Picket *et al.,* 2000). The Oxford English Dictionary defines "accessibility" as "*the quality of being accessible, or of admitting approach*" (OED, 2002). Accessibility was perhaps more clearly defined for the planning context by Hansen (1959) as "*the potential for interaction*." In most cases, measures of accessibility include both an impedance factor, reflecting the time or cost of reaching a destination, and an attractiveness factor, reflecting the qualities of the potential destinations. Researchers have used many different forms of accessibility measures and have raised many important issues about these measures (Handy and Niemeier, 1996). Simple "cumulative-opportunities" measures, which count the number of destinations of interest within a certain time or distance of the origin point, seem to be coming into greater use in transportation planning. Choice is an important element of accessibility: more choices in both destinations and modes of travel mean greater accessibility by most definitions.

Part of the confusion in the use of these terms may stem from the relationship between them. Mobility, the potential for movement, is related to the impedance component of accessibility, in other words, how difficult it is to reach a destination. Policies to increase mobility will generally increase accessibility as well by making it easier to reach destinations. But it is possible to have good accessibility with poor mobility. For example, a community with severe congestion but where residents live within a short distance of all needed and desired destinations has poor mobility but good accessibility. In this case, accessibility is not dependent on good mobility. It is also possible to have good mobility but poor accessibility. For example, a community with ample roads and low levels of congestion but with relatively few destinations for shopping or other activities or with undesirable or inadequate destinations has good mobility but poor accessibility. Good mobility is neither a sufficient nor a necessary condition for good accessibility.

Planning efforts which focus on enhancing accessibility have very different consequences than planning efforts which focus on enhancing mobility. To plan for mobility is to focus on the means without direct concern for the ends: can people move around with relative ease? The traditional emphasis on road building in the US is consistent with a planning-for-mobility perspective in that the aim is to accommodate growing levels of travel and increase the potential for movement. The planning process traditionally started with a projection of future traffic volumes which was followed by a determination of the capacity needed to accommodate those volumes at acceptable levels of service. The focus was on the performance of the system. Many of the Intelligent Transportation System (ITS) applications being implemented and proposed today can also be classified as mobility-enhancing strategies in that their goal is to improve the efficiency of the system. To plan for accessibility, in contrast, is to focus on the ends rather than the means and to focus on the traveller rather than the system: do people have access to the activities that they need or want to participate in?

This perspective broadens the range of possible strategies beyond road building and ITS to strategies which enhance accessibility without necessarily increasing travel, including the use of land-use policies and telecommunications technologies to provide accessibility, as discussed in the chapters that follow.

Although planning for mobility can be compatible with planning for accessibility, the entrenched focus on mobility in transportation planning in the US has, over time, helped to decrease accessibility, primarily by encouraging sprawling patterns of development that limit choices. In the suburban areas of metropolitan regions, transit service is relatively sparse and destinations are generally beyond walking distance, leaving residents with no option but to drive. Growing homogeneity in destinations as a result of the proliferation of chain stores, especially "big box" stores, further limits choices. The result is a decline in accessibility, at least for those who need or would like to travel by modes other than the automobile and those whose needs and desires are not met by the kinds of shopping, services and other activities found in the suburbs. But even for those residents who prefer to drive, accessibility is threatened. Accessibility in suburban areas depends on driving but this dependence leads to increases in driving, and as driving increases, traffic increases and accessibility ultimately declines (Handy, 1993).

Planning for accessibility rather than mobility can create benefits by expanding choices and reducing the need to drive. For example, a city might adopt policies to encourage small-scale retail development in residential areas, thereby bringing shops within walking distance, or a city might operate a circulator bus route which links residential areas to commercial areas, or a city might provide access to its services via the Internet and eliminate the need for a trip to city hall altogether. Instead of being forced to deal with increasingly pervasive traffic, residents can then choose to participate in needed and desired activities without driving. Everyone wins: residents get to do the things they need and want to do while reducing the time and cost they devote to driving, and the community as a whole gets potentially lower costs for building and maintaining roads as well as fewer negative impacts on the environment.

But there is no guarantee that planning for accessibility will actually reduce driving, even if it succeeds in reducing the need for driving. Recent data in the US, presented earlier, suggests that the steady growth in vehicle travel has slowed but not stopped even as congestion levels have dramatically increased. These trends suggest that the demand for driving is relatively inelastic with respect to time, although this apparent inelasticity may have more to do with the lack of alternatives to driving than to a preference for driving. The effectiveness of accessibility-enhancing strategies to reduce driving may be constrained by the fact that certain segments of the population value driving more than they do the opportunity to drive less (Salomon and Mokhtarian, 1998). Indeed, researchers have found evidence that driving has a positive utility for some individuals on some occasions, challenging the standard assumption that travel is purely a derived demand. Mokhtarian and Salomon (2001), in a survey of residents of the San Francisco Bay Area, found that three-quarters of respondents sometimes or often travel "*just for the fun of it*" and nearly two-thirds at least sometimes travel "*by a longer route to experience more of your surroundings*." Americans may complain about traffic and about spending too much time in their cars, but most Americans on at least some occasions actually enjoy driving. Whether providing good alternatives will get them out of their cars to a significant degree is uncertain, as discussed below.

What could more directly help to reduce the total amount of vehicle travel are strategies designed to limit mobility. While strategies to enhance accessibility may lead to changes in behaviour by improving the alternatives to driving, strategies to limit mobility may lead to changes in behaviour by reducing the utility of driving. Mobility-limiting strategies include physical barriers to driving, such as auto-restricted zones, and pricing strategies, including gas taxes, parking fees and congestion

pricing. Mobility-limiting strategies on their own, however, offer little promise for reducing driving: there must be alternatives of the sort that accessibility-enhancing strategies can provide, or residents will simply pay more and spend longer getting to where they need to go. Together, accessibility-enhancing and mobility-limiting strategies have more potential to change behaviour than either approach on its own. Together, they balance the need to ensure access to needed and desired activities with the imperative of reducing the environmental impacts of driving.

Both accessibility-enhancing and mobility-limiting strategies have received more attention in the US in recent years as decisionmakers increasingly recognize that the funds available for road building and maintenance fall far short of the projected needs. The mobility-enhancing approach is deeply entrenched in transportation planning in the US, but the willingness to consider other approaches is growing. The case for accessibility-enhancing strategies is easier to make than the case for mobility-limiting strategies, given the value placed on freedom of movement and the unpopularity of taxes in the US. But accessibility-enhancing strategies pose significant challenges of their own, including traditional divisions between agencies with responsibilities for transportation planning and those with responsibility for land-use planning. Still, the idea that planning should focus on expanding choices is catching on.

The remainder of this report reviews the US experience with mobility-enhancing strategies, accessibility-enhancing strategies and mobility-limiting strategies. The following chapters will examine both the kinds of strategies that have been used and the available empirical evidence of their effectiveness. A growing body of evidence suggests that mobility-enhancing strategies, particularly road building, are not sustainable from either a financial or a mobility standpoint. The evidence on accessibility-enhancing strategies is surprisingly mixed, at least with respect to their ability to reduce driving. The evidence on mobility-limiting strategies is more promising, but the examples of their implementation are notably limited. In the end, this review points to the need for a new way of thinking about transportation in the US.

3. MOBILITY-ENHANCING STRATEGIES

Mobility-enhancing strategies generally focus on improving the flow of traffic and improving the performance of the system. Road building, both the construction of new roads and the expansion of existing roads, has long been the dominant mobility-enhancing strategy in the US and the dominant transportation strategy. In the last decade or so, the field of Intelligent Transportation Systems (ITS) has evolved as another important mobility-enhancing strategy. Although ITS comprises many very different applications, the general aim of these applications is to improve the efficiency of the transportation system and make better use of existing capacity. The primary goal of both road building and ITS is to increase the potential for movement. However, at least in the case of road building, a growing body of evidence suggests that the effectiveness of this strategy is limited and, in the case of ITS, many questions about its effectiveness have not yet been addressed by the research. The primary issue is the degree to which mobility-enhancing strategies increase actual movement and, by doing so, offset improvements in potential movement.

3.1. Road building

Road building has a long and gloried history in the US. The most obvious example of this tradition is the Dwight D. Eisenhower Interstate System, first funded by the US Congress in the 1950s. This highway system, declared nearly complete at 47 794 miles and a total cost of $128 billion by the 1990s (FHWA, 2002a), is often touted as the greatest public works programme in history (e.g. Weingroff 1996; WashDOT, 1996). But road building, in the form of the widening of existing roads and the building of entirely new roads, has not stopped. The Transportation Equity Act for the 21st Century (TEA-21), passed by Congress in 1998, authorized over $218 billion for surface transportation over a six-year period, 82 per cent of it for highway programmes. Although TEA-21 provided flexibility to shift funds from highways to transit and other projects, state departments of transportation "*continue to focus on 'core' highway projects*," according to the Federal Highway Administration (FHWA, 2002b).

Even with recent increases in funding available for highways, however, the projected needs far exceed the projected funds. In response to this shortfall, TEA-21 emphasized the need for innovative financing techniques and created new programmes to help state departments of transportation raise sufficient funds to build needed roads sooner than later. The TIFIA (Transportation Infrastructure Finance and Innovation Act) programme, for example, provided $2.4 billion in credit assistance in 2001 in the form of direct loans, loan guarantees and standby lines of credit for selected projects across the US. GARVEE (Grant Anticipation Revenue Vehicle) bonds allow states to borrow against future transportation funding from the Federal Government. Selected states can now transfer up to 10 per cent of federal funds into State Infrastructure Banks (SIBs), which provide a revolving loan fund that local jurisdictions can tap to begin projects sooner than they would otherwise be able to. These programmes, which increase the rate of borrowing against future transportation funding but do not increase the total amount of transportation funding, reflect a compromise between the American distaste of new taxes and the demand for new and wider roads.

But even if the available funding were sufficient to meet the projected needs, it is not clear that this strategy would actually work. The problem is that new road capacity may itself generate new travel in two ways, first, by increasing the potential for development in the corridor and, second, by reducing the cost of driving. Studies of the land-use impacts of highways generally conclude that highways influence where in a region new development occurs but do not increase the rate of growth for a region (e.g. Boarnet and Haughwout, 2002). If so, then the new development which occurs along a new or widened road generates traffic on that road but does not necessarily produce a net increase in traffic for the region. The possibility that new road capacity generates an increase in travel beyond any increases generated by new development has been called the "induced travel" effect. If significant, this effect represents a serious limitation on the effectiveness of the road building strategy.

The economic theory of supply and demand provides an explanation of the induced travel effect. New capacity reduces the price of travel by reducing travel times and, in economic terms, shifts the supply curve. As the price of travel goes down, the consumption of travel goes up; the supply curve intersects a new point on the demand curve. This effect should occur even without an increase in population, as existing residents choose to make more trips, longer trips and more trips by car as a result of the decline in price. But it is important to note that only capacity increases which reduce travel times will have this effect. Definitions of these concepts and explanations of this theory are provided by Downs (1992), Litman (2000), Noland and Lem (2002) and Mokhtarian *et al.* (2002), among others. Documenting the extent or even existence of this effect has been a significant challenge for researchers, however. Following a string of studies showing a strong connection, three recent studies failed to find a statistical link between increases in capacity and increases in driving.

The debate over induced travel seemed to have been put to rest over the last decade, with series of studies showing a statistically significant connection between highway capacity and travel. A special session on the topic of induced travel was held at the 1997 annual meeting of the Transportation Research Board and summarized in four papers published as a Transportation Research Circular in 1998. The introduction to this circular notes that "*the range of disagreement between highway proponents and opponents on the subject of induced travel has narrowed considerably*." The decline in disagreement was attributed to a recognition on the part of highway proponents that new capacity induces a variety of changes in land use and travel behaviour and on the part of highway opponents that the induced travel effect is a result of time savings rather than capacity increases *per se*.

Noland and Lem (2002) reviewed nine studies of induced travel and their estimates of the elasticity of vehicle-miles travelled (VMT) with either travel time or lane miles. The studies reviewed in this paper had consistently estimated elasticities from at least 0.3 to as much as 1.1 for lane miles: a 10 per cent increase in lane miles is associated with at least a 3 per cent increase in VMT and as much as an 11 per cent increase. The elasticities for travel time ranged from –0.3 to –1.0: a 10 per cent decrease in travel time could lead to a 3 per cent to 10 per cent increase in VMT. These results do not take into account additional travel which might be generated by new development that occurs in response to the new highway capacity. The authors conclude: "*The research evidence on induced travel effects clearly shows that behavioural responses are real and can have significant impacts on the congestion reduction benefits of capacity expansion projects.*"

However, a new article by Mokhtarian *et al.* (2002) appears to refute the earlier studies. This study took a more disaggregate approach, matching 18 highway segments in California whose capacities had been expanded with similar segments whose capacities had not been expanded. The data set consisted of average daily traffic (ADT, a count of the number of vehicles passing a particular point) and design-hour-traffic-to-capacity ratio (DTC, a measure of congestion) for each of twenty years and for each of the expanded segments and their matched pairs. Three different statistical approaches used to test for a difference in ADT and DTC between expanded and unexpanded segments consistently showed no statistically significant difference and thus "*no evidence of induced demand.*" However, the researchers suggest several factors which might explain the apparent discrepancy between their results and those of earlier studies: regional differences in the induced effect, a stronger induced effect on vehicle-miles travelled (VMT) rather than ADT, the possibility that the true effect lies somewhere between zero and the results of earlier studies which may have overestimated the effect, and the fact that the matched-pairs approach looked for an effect only on a selected set of segments rather than on the entire roadway system. However, additional evidence seems to be coming in which also suggests that the induced travel effect is limited. Choo, Mokhtarian and Salomon (2001) developed a national-level model of VMT growth as a function of a variety of factors but found that the coefficient for highway capacity was not statistically significant. Using a path model which sorted out the causal links between freeway investments and traffic increases and which focused on operating conditions rather than amount of pavement, Cervero has reportedly found elasticities considerably lower than those found in previous studies (IURD, 2002).

The debate will most likely continue as new data sets and more sophisticated statistical techniques are used to test for a relationship between the expansion of highway capacity and increases in the amount of driving. The degree to which increases in highway capacity have themselves contributed to the growth in vehicle travel, or simply helped to accommodate the relentless growth in vehicle travel driven by rising incomes, changing lifestyle patterns or other factors, remains to be proved. What is beyond doubt is that vehicle travel has grown faster than highway capacity, population, the economy or just about any other possible causal factor. If those trends continue, road building will fall far short of vehicle growth, even if the induced travel effect is minimal, and the potential for movement will eventually decline.

3.2. ITS Applications

Intelligent Transportation Systems (ITS) offer an alternative approach for enhancing mobility. ITS applications fall into many different categories, including traveller information, intelligent vehicles, commercial vehicles, transit and traffic management, and involve a variety of technologies, including information processing, communications and control technologies, among others. The primary goal of these applications is to improve the efficiency and safety of the transportation system. According to ITS America, an international coalition of public and private organizations involved in the development of ITS which was initiated by the US Congress in 1991, "*Joining these technologies to our transportation system will save lives, save time, and save money*" (ITS America, 2001).

The Federal Government has played a significant role in encouraging the development and deployment of ITS. In 1996, the Secretary of the US Department of Transportation, Frederico Pena, launched the "Operation TimeSaver" project, the goal of which was "*to build the Intelligent Transportation Infrastructure (ITI) across the United States within a decade -- to save time and lives and improve the quality of life for Americans everywhere*" (US DOT, 1996a). At that time, the US DOT estimated that Americans' travel times would decline by 15 per cent for Americans as a result of the ITS infrastructure. In 1998, TEA-21 authorized over $1.3 billion for "*research, development, and operational testing of Intelligent Transportation Systems (ITS) aimed at solving congestion and safety problems*" (FHWA, 1998b). ITS America estimates that $209 billion will be spent on ITS between 2001 and 2011, with 80 per cent of that total coming from the private sector (ITS America, 1998).

TEA-21 also mandated that US DOT work with ITS America to maintain and update a National ITS Program Plan, which was released in January 2002. This plan lays out a ten-year vision to improve the efficiency and safety of transportation systems and their operation. However, the stated goals of the plan go beyond the original ITS goals of safety and efficiency to include security, "mobility/access" and "energy/environment" (ITS America, 2002). Under the goal of "efficiency/ economy", the plan aims to save "*at least $20 billion per year by enhancing throughput and capacity with better information, better system management, and the containment of congestion…*" Under the goal of "mobility/access", the plan aims to provide "*universally available information that supports seamless, end-to-end travel choices for all users of the system.*" Under the goal of "energy/ environment", the plan aims to save "*a minimum of one billion gallons of gasoline each year and to reduce emissions at least in proportion to this fuel saving*."

Whether all these goals can be met simultaneously is far from certain. The plan does not explain how ITS will reduce fuel consumption and emissions, but others have outlined the possibilities (e.g. Washington *et al.*, 1994). Improvements in transit service, access to information about transit and transitions between modes have the potential to reduce automobile use by increasing the attractiveness of transit and other alternatives. Control applications which improve the flow of vehicle traffic have the potential to reduce fuel consumption and emissions per kilometre of vehicle travel, as do applications which provide information that enables drivers to avoid congested conditions. However, if ITS enhances the "throughput and capacity" of the system, as it is supposed to do (ITS America, 2001), it will effectively reduce the cost of driving and could thus increase the total amount of driving, in the same way that road building, at least in theory, does. To reduce fuel consumption and emissions while at the same time increasing vehicle travel, ITS would then have to generate an even greater reduction in gas consumption and emissions per kilometre.

An early review of the experience with ITS concluded that "significant benefits have been recorded in areas such as accident reduction, time savings, transit customer service, roadway capacity, emission reduction, fuel consumption, and vehicle stops" (USDOT, 1996b). In support of this conclusion, the report cites studies of freeway management systems, traffic signal systems, incident

response programmes, multimodal traveller information systems, and systems for transit management, electronic toll collection and electronic fare payment. The report examines several studies in each of these areas which show reductions in travel times, improvements in travel speeds and reductions in traffic stops. But the studies cited have important limitations. For one thing, savings in fuel consumption and emissions are apparently estimated based on the measured changes in traffic flow and are not measured directly. For another, these studies do not explore long-term changes in patterns of development which the time savings might produce, nor do they account for the possibility that these time savings might themselves generate additional travel. In addition, they focus on changes in the performance of the system rather than changes in individual travel behaviour and thus provide a limited understanding of the underlying causal mechanisms involved.

Unfortunately, the available empirical evidence on the impact of ITS on individual travel behaviour is limited (Mahmassani, 1999). Much of the published research on the impact of ITS on travel behaviour falls into one of three categories: theoretical studies which establish frameworks for understanding the impacts of ITS on travel (e.g. Stern, 1999); experimental studies which use simulators, stated preferences or other techniques to predict traveller response to information provided by ITS systems (e.g. Kraan *et al*., 2001; Shah *et al*., 2001; Mahmassani and Liu, 1999; Fujiwara and Sugie, 1995); or marketing-type studies which measure the attitudes and preferences of travellers for ITS applications (e.g. Bottom *et al*., 2002; Pagan *et al*., 2000). Given the diversity of ITS applications, the empirical studies which are available in most cases measure the impacts of specific applications of ITS on the travel behaviour of specific populations (e.g. Viswanathan *et al*., 2000; Furuya *et al*., 1995). The emphasis on research that indirectly measures the impacts of ITS reflects the limited applications of ITS available for study, at least in comparison to the extensive ITS deployment envisioned for the US and elsewhere. As that deployment progresses, the research opportunities will increase. In the meantime, the purported impacts of ITS on travel behaviour remain more theoretical than proven.

4. ACCESSIBILITY-ENHANCING STRATEGIES

The goal of accessibility-enhancing strategies is to improve access to needed and desired activities. Although improved access may be one of the stated goals of road building and ITS applications, it is not necessarily the outcome of those strategies. Strategies which more directly impact access include a variety of land-use strategies and strategies to provide services via telecommunications technologies. All of these approaches have an important potential advantage over mobility-enhancing strategies: they more directly ensure better access at the same time that they reduce the need for travel. As a result, they have the potential to both meet the needs of individuals and reduce the negative impacts of automobile dependence. The emphasis must be on "potential", however: if these strategies succeed in enhancing accessibility -- the potential for interaction -- they may contribute to an increase in actual interaction that produces an increase in driving as a side effect. The idea that land-use policies and telecommunications services can be used to address transportation problems is relatively new in the field of transportation planning, and their effectiveness in actually reducing automobile travel is still uncertain. Nevertheless, these approaches have received considerable attention for both their potential transportation benefits and their potential benefits to quality of life.

4.1. Land use: New Urbanism, transit-oriented development, infill development and more

If accessibility is defined as including both a travel impedance element and a destination attractiveness element, then land-use strategies can play an important role in enhancing accessibility in two ways. First, land-use strategies which affect the distribution of activities can reduce travel impedance by reducing the distances between activities. For example, traditional zoning practices in the US are often blamed for segregating land uses and increasing the distances between them; innovative zoning practices which encourage a mix of land uses may help to decrease distances. Second, land-use strategies which affect the aesthetic qualities of a place can increase destination attractiveness. For example, ordinances that require landscaping or that require bicycle racks at retail centres can increase the attractiveness of that centre for shoppers. Existing land-use policies of all sorts have contributed to the automobile-oriented development patterns pervasive in the US. However, a growing list of promising new land-use strategies aims to reduce automobile dependence. These interrelated strategies include the New Urbanism, transit-oriented development, infill development, Main Street programs and street connectivity, among many others.

4.1.1. New Urbanism

The New Urbanism movement encompasses many different land-use strategies, including all of those described below in some form, and has been an effective force in advocating for these strategies. As defined by the Congress for the New Urbanism (CNU), this movement embraces urban design and planning principles that both create great public places and reduce automobile use. According to the CNU, one of the primary tenets of the New Urbanism is the idea that "*communities should be designed for the pedestrian and transit as well as the car*" (CNU, 2002a). Authors identified with the New Urbanism have articulated specific design characteristics to achieve this goal, including interconnected street networks, narrow streets with sidewalks, mixes of housing types, front porches and other traditional design features, commercial areas and public facilities within walking distance of residential areas, access to transit and so on (e.g. Duany and Plater-Zyberk, 1991; Calthorpe, 1993; Katz, 1994). These authors and other supporters claim that by putting the activities of daily living within walking distance and providing an interconnected network of streets and sidewalks, walking will increase and driving will decrease. According to the CNU, over 210 new urbanist projects are under construction or complete in the US as of mid-2002 (CNU, 2002b). The most famous of these developments include Seaside, Florida, featured in the film "The Truman Show," and Celebration, Florida, built by the Disney Company. The movement has received considerable attention not just in professional planning and design circles but also in the popular press as an alternative to suburban sprawl. A growing number of cities in the US, including Austin and San Antonio, Texas, have adopted "traditional-neighbourhood ordinances" which reflect the principles of the New Urbanism and encourage or even require narrower streets, shorter setbacks from the street, front porches, access to parks and other traditional design features.

4.1.2. Transit-oriented development

Transit-oriented development, defined as relatively high-density, mixed-use, pedestrian-oriented development in transit station areas, capitalizes on the ability of transit to deliver large numbers of people to a particular destination and increases the numbers of people transit is likely to carry. The concept of transit-oriented development under various labels has had, perhaps, the longest history of all these accessibility-enhancing land-use strategies. The development potential of transit was explicitly recognized in plans for modern rapid transit systems, beginning with the Bay Area Rapid Transit (BART) system in the San Francisco Bay Area, both as a way to generate revenues for transit

agencies and as a way to increase potential ridership. Although the development around BART stations has been more limited than planners expected, joint-development efforts involving partnerships between public agencies and private enterprises in Washington, DC and Atlanta, Georgia were successful in increasing the density of development, especially office development, around transit stations (Landis *et al*., 1991). However, a 1995 report by the Transit Cooperative Research Program concluded that cities outside the US have been more successful in using transit as a tool to shape development, thanks largely to greater involvement by regional planning agencies and the involvement of local governments in buying considerable amounts of land around proposed stations which could later be sold or leased to developers, a strategy not legally available to US transit agencies (TCRP, 1995). Another form of involvement by the public sector is the development and adoption of design guidelines for development in station areas. These guidelines do not ensure that development will happen, but they do help to ensure that, if it does happen, it is designed in such a way as to be supportive of transit use. Design guidelines for transit-supportive development have been used in numerous communities in the US and Canada; as of 1993, 26 transit agencies had prepared and adopted design guidelines and twelve more were in the process of preparing them (Cervero, 1993). The Federal Transit Administration promotes transit-oriented development in several ways, including its inclusion of transit-supportive land use in the criteria by which it evaluates proposed urban rail projects (FTA, 2002).

4.1.3. Infill development

Infill development can be broadly defined as development within the existing limits of an urbanized area. Considered an important element of "smart growth" in that it helps to slow the expansion of urbanized areas, infill development also offers potential benefits for transportation by increasing densities and reducing the distances between activities, thus increasing the viability of transit, walking and bicycling. The US Environmental Protection Agency promotes infill development as an "antidote to sprawl" and says that "*Infill developments not only keep greenfields green, they are able to take advantage of proximity to a larger pool of potential employees, transit, and utility infrastructures*" (EPA, 1999). A report by the Municipal Research & Services Center argues, "*Infill development offers increased mobility for those who can't drive or prefer not to drive. It is also an important part of the formula for minimizing traffic congestion. In-city living offers other transportation choices in addition to the automobile*" (MRSC, 1997). In one version of infill development, development occurs on previously unused land, sites which, for one of any number of reasons, have not been developed in the past. In most cases, these sites are relatively small, for example, one or two individual lots in a residential neighbourhood. The bias towards large-scale real estate development in the US often means that such lots remain vacant for decades, at least until rising land values warrant their use. In another version, development occurs on land that has been previously used. The redevelopment of industrial land, or "brownfield development," may involve the clean-up of industrial wastes. The adaptive reuse of historic industrial buildings in central cities and their conversion to offices, shopping centres or loft apartments is one type of brownfield development that can be found in cities throughout the US. The redevelopment of underutilized or abandoned retail sites, or "grayfield development," is growing in popularity in older suburban areas in the US. Countless examples of all three kinds of infill development can be found throughout the country, not just in central cities but also in older suburbs, and the trend seems to be towards more infill development in response to a combination of market forces and government encouragement. In 2001, Los Angeles issued more building permits for housing inside the city that in any year in the prior decade (Egan, 2002). Many important infill projects have been tied to transit systems. For example, in the San Francisco Bay Area, a mixed-use neighbourhood is being developed on land formerly owned by the US Navy and scheduled to be the site of a new station for the BART system

(Newman, 2001). Also in the Bay Area, a new, mixed-use community called The Crossings was developed on the site of an abandoned shopping mall next to a commuter rail station (Benfield *et al*., 2001).

4.1.4. Main Street programmes

In 1980, the National Trust for Historic Preservation launched its Main Street Program with the goal of helping communities across the US revitalize their traditional or historic commercial areas (NTHP, 2002a). Most cities which have participated in the programme are outside metropolitan areas, but the programme has been adapted for commercial areas within metropolitan areas as well. A total of 1 650 communities have participated, resulting in an estimated total investment in these communities of $16.1 billion (NTHP, 2002b). Although this programme is motivated by the goal of historic preservation, it may have important benefits for transportation by encouraging shopping and services in a pedestrian-oriented setting within walking distance of residential areas. The Main Street concept has spread to other cities not officially involved in the formal programme. Metro, the regional planning agency in Portland, Oregon, published a *Main Street Handbook* in 1996 to help local communities preserve their traditional shopping districts. Many other efforts to preserve neighbourhood shopping have sprung up around the US, motivated more often by community development goals than by potential transportation benefits. For example, the Cleveland Neighbourhood Development Corporation created a retail Commercial Support Initiative and a Main Street Initiative to provide technical assistance, advocacy and training opportunities "*to help neighbourhoods strengthen their retail base*" (CNDC, 2002). In 1996, Norfolk, Virginia established a Neighbourhood Commercial Corridor Programme and has spent $3.9 million to revitalize neighbourhood commercial areas through infrastructure improvements (City of Norfolk, 2002). The Mayor of Chicago has proposed a new zoning ordinance which would provide more locations for neighbourhood services, such as bakeries, banks, restaurants and dry cleaners, "*within walking distances from people's homes*" (City of Chicago, 2002). Efforts to restrict "big-box" stores, such as Wal-Mart, Home Depot and numerous others, complement these efforts to promote neighbourhood shopping districts. Some retailers, such as Walgreen's drug stores, have adopted a strategy of building small stores in neighbourhood areas, and even Home Depot has now developed a neighbourhood-scale hardware store concept (Washburn, 1997). In other places, the problem is not to attract new businesses but rather to save already vibrant shopping districts from intrusion by chain stores and/or ground-level offices that reduce the local character of the district. A growing number of communities have adopted ordinances to restrict ground-floor spaces to retail uses (Kline and Schutz, 2001) and many others are finding ways to restrict "formula" businesses, particularly restaurants (Institute for Local Self-Reliance, 2002). Both kinds of efforts reflect a growing appreciation of the value of the traditional Main Street shopping district.

4.1.5. Street connectivity

Policies to increase the connectivity of the local street network might at first seem to be more about enhancing mobility than about enhancing accessibility, but they are often combined with other land-use strategies in efforts to improve neighbourhood design, particularly in new urbanist projects. Street connectivity policies are a response to the standard style of street network found in suburban subdivisions in the US, developed after World War II. This style is characterized by cul-de-sacs, loop streets, and limited connections between residential streets and arterial streets. Often labelled "curvilinear" or "disconnected", this style was itself a response to the growing use of the car and reflects the efforts of engineers, planners and developers to minimize the impact of automobile traffic on residential areas through the establishment of a hierarchy of streets (Handy, 1993). The street

hierarchy concept, which differentiates between the access and movement functions of streets, became entrenched in transportation engineering practices as early as the 1950s and provides the basis for the design requirements for streets found in zoning codes throughout the US still today. However, a growing number of cities in the US have now adopted street connectivity ordinances that require shorter distances between intersections and more intersections relative to street length (Handy *et al*., 1999). The goal of these ordinances is to more evenly distribute automobile traffic, improve emergency access to neighbourhoods, reduce travel distances within the network and increase the feasibility of walking and biking. However, residents are often resistant to giving up the relative quiet and safety of cul-de-sacs, and developers are mostly resistant to giving up the greater profits associated with cul-de-sacs. An effort to pass a street connectivity ordinance in Austin, Texas met with considerable opposition from the development community and ultimately lost a crucial vote of the city council. Still, interest in promoting connectivity more generally seems to be growing. Many cities in the US have recognized the importance of providing local connections across freeways, which form significant barriers to local movement. Cities such as San Antonio, Texas and Davis and Berkeley, California, have recently built pedestrian and bicycle bridges or paths to link areas on either side of their freeways. The Texas Department of Transportation is exploring the possibility of depressing an Interstate freeway in Austin, Texas, at least in part to improve the physical and social connections between the middle- and upper-income west side of the city and the lower-income and predominantly minority east side of the city.

4.1.6. Discussion

These examples represent a small sample of the efforts underway in the US to change the way in which communities are designed and to improve the quality of new and existing communities. The Congress for the New Urbanism has perhaps been the most visible advocate of better community design, but many other organizations have pushed similar or related agendas. In 1994, the Federal Transit Administration established its Livable Communities Initiative, and in 1996 the Federal Highway Administration joined the initiative. In its publication, "Building Livable Communities Through Transportation", the US Department of Transportation argued that "*The location and appearance of transportation facilities, the design of streets and sidewalks, and the placement of on-street parking can make all the difference in how we experience our daily activities*" (US DOT, 1996c). Numerous environmental organizations and other non-profit advocacy groups have also pushed for better design, many times as a part of more general "smart growth" efforts, designed to counteract suburban sprawl. The Natural Resources Defense Council, for example, published a guide to model smart growth efforts from throughout the US which make use of a wide variety of strategies (Benfield *et al.,* 2001). State governments are getting into the act, too. The State of Maryland, as a part of its Smart Growth Initiative, has put into place policies to support existing communities and neighbourhoods and reduce the need for costly new infrastructure, including the establishment of priority funding areas, a brownfield redevelopment programme, and a "live-near-your-work" programme (Maryland, 2002). The efforts across the US are far too extensive to fully catalogue here.

Concerns about the environment and about quality of life are the dominant motivations behind these efforts, and the belief that land-use strategies will reduce driving and promote transit use, walking and bicycling relates to both of these concerns. However, the available empirical evidence does not provide conclusive support for this belief. The idea that land use and design policies could be used to influence travel behaviour was not widely tested by researchers until the 1980s. Early interest focused on the connection between density and transit use. The 1977 study by Pushkarev and Zupan is often taken to suggest that transit use can be increased through polices which increase densities. A heated debated ensued in the early 1990s over analysis by Newman and Kenworthy of the correlation between densities and gasoline consumption for a sample of international cities (Newman and

Kenworthy, 1999). In response to the emergence of the new urbanism movement, more recent studies have taken on the broader question of the link between travel behaviour and characteristics of the built environment more generally and have set out to test the hypothesis that policies which shape the built environment can be used to reduce automobile travel. Since the early 1990s, studies of the link between the built environment and travel behaviour have appeared in the literature with increasing frequency. Recent literature reviews document over 70 studies published during the 1990s which have explored and quantified these relationships (e.g. Handy, 1996a; Boarnet and Crane, 2001a; Ewing and Cervero, 2001).

Studies which focus on land-use strategies fall into three general categories: simulation studies, aggregate studies and disaggregate studies (Handy *et al*., 2002). Simulation studies use travel demand forecasting models to estimate the impacts of changes in the built environment on travel behaviour. This approach has been most often used to test the impact of the design of the street network on vehicle travel (e.g. Kulsah *et al*., 1990; McNally and Ryan, 1993). Aggregate studies use data on average travel characteristics in zones or tracts (or sometimes cities or regions) to test for correlations between travel patterns and characteristics of the built environment such as density or era of development (e.g. Cervero and Gorham 1995; Friedman, et al. 1992). Disaggregate studies use individual or household-level data to model the relationships between characteristics of the built environment and travel behaviour. Most of these studies have focused on the frequency of trips or amount of travel by different modes (e.g. Cervero and Kockelman 1997; Boarnet and Crane 2001b; Handy and Clifton 2001). Cutting across these three categories are differences in the travel characteristic used as the dependent variable (e.g. vehicle kilometres travelled, trip frequency, trip length, mode choice) and the characteristics of the built environment used as independent variables (e.g. density, era of development, network characteristics, access to jobs or shopping, etc.). Most studies have focused on travel in general, while some studies have distinguished between work travel and nonwork travel.

One of the challenges in these studies has been to sort out the relative importance of socioeconomic characteristics and characteristics of the built environment in explaining travel behaviour. Ewing and Cervero (2002), after one of the most thorough reviews of these studies, came to the conclusion that the built environment is more significant than socio-economic characteristics in predicting trip lengths, but that socio-economic characteristics are more significant than the built environment in predicting trip frequencies and mode choice. They also concluded that characteristics of the built environment are much more significant predictors of vehicle-miles-travelled, which depends on the combination of trip lengths, trip frequencies, and mode split. In other words, it appears that land-use strategies have the potential to reduce vehicle travel by bringing activities closer to home and thereby reducing the length of trips.

In a form of meta-analysis, Ewing and Cervero (2002) estimated elasticities for vehicle-miles travelled and vehicle trips based on the results of all available studies as well as original data analysis for available data sets. The results showed a statistically significant but rather limited link between characteristics of the built environment and travel behaviour. A 10 per cent increase in local density, for example, was associated with only a 0.5 per cent decline in vehicle trips and vehicle-miles travelled. The highest elasticity was for regional accessibility rather than density, design characteristics or land-use mix: a 10 per cent increase in a certain measure of regional accessibility was associated with a 2 per cent decline in vehicle-miles travelled. It is important to note that almost all of the available studies have used a cross-sectional design that compares travel behaviour for different people or places at one point in time. These studies thus reveal correlations between the built environment and travel behaviour but do not prove causality. In other words, it is not possible to say that a 10 per cent increase in local density in a particular neighbourhood will lead to a 0.5 per cent decline in vehicle trips and vehicle-miles travelled.

The available research suggests two reasons why land-use strategies do not seem to reduce driving any more than that. First, enhancements to accessibility produced by these land-use strategies may actually increase travel. Although these land-use strategies reduce the need for driving, they also tend to increase the potential for driving. Although residents may drive shorter distances on average, the may also choose to drive more frequently. A study of shopping behaviour in neighbourhoods in the San Francisco Bay Area found evidence that residents made use of local shopping areas when they were available but that they continued to make use of shopping areas beyond their neighbourhoods. In other words, residents made trips to local stores in addition to rather than in place of trips to larger, more distant stores (Handy, 1992; Handy, 1996b). A study of six neighbourhoods in Austin, Texas found similar results for grocery shopping: the overall amount of driving for grocery shopping did not vary significantly across neighbourhoods, even for neighbourhoods in which residents frequently walked to a local grocery store (Handy and Clifton, 2001). In both studies, stores and shopping areas which offered an especially attractive environment drew residents from a considerable distance. Both studies also found evidence that even if local shopping did not lead to a reduction in driving, residents valued the opportunity to drive less when they chose to.

Second, land-use strategies are only effective if people respond to the changes in the built environment those strategies produce, and whether or not they respond depends on deeply-seated attitudes and preferences. So far, only Kitamura *et al*. (1997) have looked at the importance of attitudes and preferences relative to the built environment in a substantial way, and they found that attitudes were a more significant predictor of travel behaviour than either socioeconomic characteristics or the built environment. These results suggest that this issue has not been given the emphasis it needs in the research to date. A related problem with the available studies is the issue of "self-selection", the possibility that individuals who would prefer to drive less choose to live in neighbourhoods more conducive to driving less. In other words, the characteristics of the built environment did not cause them to drive less, rather their desire to drive less caused them to select a neighbourhood with those characteristics -- the reverse of the presumed causality. Handy and Clifton (2001) found both quantitative and qualitative evidence that residents of an Austin neighbourhood where the average frequency of walking to the store is significantly higher than in other neighbourhoods did, in fact, choose that neighbourhood because they like to walk to the store. In this case, the preference to walk was at the root of the walking behaviour, not the design of the neighbourhood. On this same issue, one of the few longitudinal studies of the link between the built environment and travel behaviour found that residents who move to higher-access neighbourhoods drive less than when they lived in lower-access neighbourhoods (Krizek, forthcoming). What this study did not show is whether residents who haven't chosen to live in a high-access neighbourhood would drive less if they suddenly found themselves living there.

Besides the need for more research, these issues suggest that hopes for land-use strategies as a tool for reducing automobile use should be tempered. But they do not suggest that efforts to employ these strategies should be aborted, in fact, quite the opposite. These strategies create greater diversity in the kinds of places available for living, working, shopping, recreation, etc., and may guarantee residents the choice not to drive. Without such strategies, there is little question that Americans will continue to drive most of the time because they have little choice. With such strategies, there is the possibility that Americans will choose to drive at least a little less.

4.2. Telecommunications

Information and telecommunications technologies (ICT) also represent an important strategy for enhancing accessibility by reducing travel impedance to essentially nothing. The ability to work, shop, bank, recreate and engage in all kinds of activities from home without travel, expands access to

these activities beyond what can be reached by physical travel. Access to such activities from home has been available in one form or another for decades -- shopping by catalogue and telephone, banking by mail, bringing work home from the office and so on. But the Internet has vastly increased the range of activities available from home and, arguably, the ease of engaging in those activities from home. Exactly what impact the Internet has had on accessibility is hard to measure, although available data on the Internet supports the conclusion that it is significant. As of 2000, the Internet reportedly offered 1.2 billion "unique, publicly available" web pages, with the number of pages growing by 7 million per day (Cyveillance, 2000). The dramatic growth in the use of the Internet perhaps provides the best indicator of its impact. By the end of 2000, 104 million American adults, or 56 per cent of the adult population in the US, had access to the Internet and, on a typical day, 58 million Americans logged onto the Internet (Pew, 2001). In December 2001, an estimated 18.7 million households in the US shopped online, despite the slow economy, spending a total of $5.7 billion, and total on-line sales for 2001 reached $47.6 billion (Forrester Research, Inc., 2002). Worldwide, an estimated 544.2 million people were online in 2002 (Nua, 2001).

Of the extensive list of ICT applications which potentially enhance accessibility, telecommuting has the longest history in the field of transportation planning. Telecommuting is generally defined as working at home in place of commuting to an office or other work site or as travelling to a "telecentre" located closer to home than the usual work site (Handy and Mokhtarian, 1995). Use of the Internet or other telecommunications technologies is not essential to this definition, although these technologies may enable telecommuting for many kinds of workers. Because of its potential for reducing travel, telecommuting has been widely pushed as a transportation demand management strategy by federal, state and local governments in the US. The Environmental Protection Agency promotes telecommuting as a part of its Commuter Choice Leadership Initiative, designed to encourage employers to provide more commuting choices for their employees (EPA, 2002). The General Services Administration has actively promoted telecommuting for federal employees and operates a network of telework centres in the Washington, DC area which are open to employees of any federal agency (GSA, 2002). The states of Washington, Oregon, California, Arizona and Texas have joined forces to form the Telework Collaborative, the mission of which is to "*accelerate the acceptance and adoption of telework programmes in public and private organizations*" (Telework Collaborative, 2002). As early as 1990, the County of Los Angeles and the City and County of San Diego had telecommuting programmes for their employees (Rathbone, 1992).

The available empirical evidence suggests that telecommuting has not had the impact on vehicle travel that early proponents had hoped. First, employers and employees have not adopted telecommuting to the extent expected. In 1993, the US Department of Transportation released a report which predicted that anywhere from 7.5 million to 15 million workers or 5.2 per cent to 10.4 per cent of the workforce in the US would be telecommuting three to four days per week by 2002 (US DOT, 1993). The available data on current levels of telecommuting are extremely problematic but suggest that the number of telecommuters is towards the lower end of that range and that the frequency of telecommuting is closer to one to two days per week (Choo *et al*., 2001). Employers are not always comfortable with allowing their employees to telecommute, and workers themselves are often not interested in telecommuting even when given the option. Despite the obvious savings in travel time and cost, workers may miss the social interaction of being in the office, fear that they will not be evaluated fairly at promotion time, find that the rest of the household puts greater burdens on them to take care of household chores, or for many other reasons choose not to telecommute (Mokhtarian and Salomon, 1994).

Second, savings in vehicle travel are not guaranteed for those who do choose to telecommute (Mokhtarian *et al*., 1995). Although by definition telecommuters eliminate or reduce their commute travel, they may at the same time increase their travel for purposes other than work. In addition, other

members of the household may travel more, due to the increased availability of car or because the telecommuter previously took care of household chores on the way to or from work. Some telecommuters may have previously taken transit, so that telecommuting reduces transit travel but not automobile travel. In the long run, telecommuters may choose to live farther from work, thereby increasing their commute distances on the days they do not telecommute. The limited empirical evidence available so far suggests that the savings in driving for commute trips outweighs other increases in driving, resulting in a net savings. But the limitations of the data available to study these issues mean the results are far from conclusive. A recent study concluded at a 90 per cent level of confidence that telecommuting reduces vehicle-miles travelled in the US by somewhere between 0 and 2 per cent (Choo *et al.*, 2001).

The impacts on travel of other ICT applications are even less clear. Most of the speculation on this topic has focused on online shopping, e-shopping, B2C e-commerce, or what researchers have for some time referred to as teleshopping. Three important questions need to be addressed. The first question is the extent to which consumers will choose to shop online. Surveys by Forrester Research, Inc. and others show steady growth in online sales, although the share of total retail sales in the US remains relatively small at 1-2 per cent. As outlined by Mokhtarian (2001), potential benefits of shopping online include unlimited selection, lower prices and search costs, information, personalization, convenience and speed. But store shopping continues to offer potential benefits over online shopping: sensory information, tangibility, immediate possession, social interaction, entertainment, movement and the ability to link shopping with other activities. Consumers weigh these costs and benefits in deciding whether to store shop or shop online. The second question is whether online shopping will lead to a decline in personal travel. Rather than substituting for a trip to the store, an online purchase or visits to online shopping sites may represent additional shopping activity. Information available via the Internet might even increase the amount of travel for shopping, for example, by making consumers aware of new product or more distant stores. In addition, travel purchases -- airline tickets, car rentals, hotels -- represent over a quarter of total online sales (Mokhtarian, 2001). One study of teleshopping from pre-Internet days asked survey participants about their last purchase from a catalogue and what they would have done had they not found that item in the catalogue: 31 per cent said they would not have made a purchase, 40 per cent said they would have looked for the item on their next trip to the store, and only 20 per cent said they would have made a special trip to the store, suggesting that few catalogue purchases actually decrease trips to the store (Handy and Yantis, 1994). Finally, the third question is the degree to which an increase in freight travel offsets any possible declines in personal travel. The net impact on travel of online shopping today is simply not known, and the likely impacts in the future are even more uncertain.

The conclusions for telecommunications strategies are thus similar to those for land-use strategies. There is little evidence that telecommunications strategies will significantly reduce travel and convincing arguments that these strategies may actually increase vehicle travel. However, these strategies clearly enhance accessibility by making it possible to participate in work, shopping and other kinds of activities from home. They increase the potential for interaction without an increase in actual movement.

5. MOBILITY-LIMITING STRATEGIES

Although accessibility-enhancing strategies expand the range of choice for individuals and increase the possibility of driving less, they do not ensure that individuals will actually choose to drive less. If the goal is to reduce vehicle travel -- for environmental, social or other reasons -- then drivers will need additional discouragements. Strategies to limit mobility by car, including pricing strategies and road restriction and removal strategies, help to reduce the attractiveness of the driving choice relative to the alternatives. If the alternatives can be sufficiently enhanced -- through strategies like those outlined in the previous chapter -- then the amount of driving may decline. Mobility-limiting strategies on their own may also reduce driving, but at the cost of reducing the ability to participate in needed and desired activities. When combined, accessibility-enhancing strategies and mobility-limiting strategies together may reduce the potential for movement but enhance the potential for interaction.

5.1. Pricing strategies

Pricing strategies include a wide variety of techniques designed to increase what drivers directly pay for their use of the road system. Two arguments are offered in support of pricing strategies. First, drivers take into account only a small subset of the full costs they incur when making day-to-day decisions about driving. In many cases, drivers may not consider any costs other than time. In reality, they have paid the cost of the vehicle itself, maintenance, insurance, roads, parking and so on in one form or another. If the perceived cost is much lower than the actual cost, drivers will over-consume and drive more than is economically efficient. Second, drivers do not take into account the costs they impose on other drivers, the "externalities" of their driving, including the emissions, noise and other pollutants from their vehicles and the delays they create for others. If drivers were forced to pay the monetary equivalent of these costs, through a process of "internalizing the externalities", they would choose to drive less.

Several pricing strategies have been proposed in the US, but few adopted. Proposals generally fall into one of three categories: road, distance or parking pricing strategies. Successful efforts can be found in all three categories and technology is often important to the feasibility of these strategies.

5.1.1. Road pricing strategies

Toll roads and toll bridges are common in many parts of the US, but in most cases tolls are collected to pay off the bonds used to construct and maintain the facility rather than as a demand management tool. Texas and other states where toll roads have not been common are now turning to toll roads, often privately constructed and operated, as a way to build more roads more quickly. Although toll roads mean that drivers pay more directly for their use of the road, they do not take full advantage of the potential of road pricing to manage transportation demand. The concept of congestion pricing, in which fees are imposed for using the road system during congested times of day, has been widely praised in academic circles for decades as a strategy for making more efficient use of the existing road system. But the concept was unpopular with decisionmakers and the public and eventually was given the more positive label "value pricing". The Transportation Equity Act for the 21st Century authorized $55 million for a Value Pricing Pilot Programme to fund the development and implementation of value pricing projects, most of which have been one of two types (UMN, 2002a). First, value pricing has been implemented in the US on selected bridges which were already tolled. Higher tolls during peak periods were implemented on the New Jersey Turnpike in 2000 and on

several bridges and tunnels linking New York and New Jersey in 2001; peak period tolls are now 25 per cent higher than off-peak rates for the bridges and tunnels. In 1998, Lee County, Florida, took a different approach and reduced the toll on two bridges during the times just before and after the peak period. Second, value pricing has also been implemented in Texas and Southern California in the form of high-occupancy/toll (HOT) lanes, lanes on an otherwise untolled freeway that are reserved for high-occupancy vehicles (carpools, buses) and for single-occupant vehicles willing to pay the price. On Interstate 15 in San Diego, California, an existing but underutilized high-occupancy vehicle (HOV) lane was converted to an HOT lane in 1996. Tolls on this facility vary from $0.50 to $4.00 depending on the level of congestion on the main lanes of the freeway, and commuters are issued with transponders which pay charge tolls electronically and eliminate the need for stopping at a toll booth. The Katy Freeway in Houston, Texas, has a slightly different system: only carpools with three or more passengers are allowed to use the HOV lane, but carpools of two people are now allowed to "buy-in" to the HOV lane for a $2 charge; this programme also uses electronic transponders for toll payment. However, HOT lanes have been criticized as exclusive and elitist and are sometimes dubbed "Lexis lanes" after the high-priced cars expected to use them. In response, the Federal Highway Administration has proposed the idea of "FAIR lanes" which provide drivers with the choice of paying for the use of express lanes or earning "credits" for sitting in traffic in the regular lanes (UMN, 2002a). The goals of these value pricing projects include time savings, environmental benefits, reduced frustration and delay, increased travel choices, more efficient modal choices, revenue generation, increased economic productivity and improved highway investment decisions (FHWA, 2002c).

5.1.2. Distance pricing strategies

Raising the gasoline tax, a relatively direct user fee which is paid roughly in proportion to the distance driven, seems like an obvious approach to discouraging automobile travel but has little chance of succeeding politically in the US. In fact, pressure to reduce the gasoline tax seems to grow every time that gasoline prices rise a significant amount, particularly if gasoline prices rise during the summer vacation season. Gasoline taxes in the US are considerably lower than elsewhere in the world, as are per gallon prices: sales tax accounted for $0.37 of the $1.13 per gallon cost of gasoline in the US in 1999, compared to $2.78 of the $3.66 per gallon cost in Germany , $3.00 of the $3.79 per gallon cost in France, and $3.02 of the $3.97 cost per gallon in the United Kingdom (Davis, 2001). Other pricing strategies based on distance have also been proposed and seem to be more politically palatable. Mileage-based auto insurance, called "pay-as-you-drive" or PAYD insurance, in which rates are set based on the amount the vehicle is driven rather than where its owner lives (the standard practice in the US), has generated interest on the part of transportation planners as well as insurance companies (Paul, 2002). Progressive Auto Insurance recently implemented a pilot programme with over 1 200 Texas drivers which charges them by the amount of time, time of day and places they drive (UMN, 2002b). The Federal Value Pricing Pilot Programme has funded simulation studies of PAYD in Georgia and Massachusetts. In these studies, data on the travel behaviour of the participants before and after implementation of the programme will be collected and analyzed (UMN, 2002b). In-vehicle global positioning system (GPS) units have enabled more sophisticated approaches to PAYD insurance. Earlier proposals for PAYD included pay-at-the-pump insurance, which drivers purchase as a percentage fee on top of the price of gasoline, and odometer-based registration fees (Wenzel, 1995).

5.1.3. Parking pricing strategies

Another obvious pricing strategy is to raise fees for parking, but parking fees are perhaps even more unpopular in the US than gasoline taxes, for the simple reason that most Americans rarely have to pay for parking, at least not directly. According to the Nationwide Personal Transportation Survey, parking is free for 99 per cent of the vehicle trips in the US (Shoup, 2002). However, where parking is not free, mostly in urban centres where parking is relatively scarce, several options exist. In many downtown areas, parking fees already vary to reflect peak and off-peak periods of demand. These price variations help to encourage commuters to use transit during peak periods but do not overly discourage evening and weekend visitors. Many downtown employers, however, lease parking for at least some of their employees who then do not directly bear the cost of parking and thus have less incentive not to drive. Those employees who choose not to take advantage of the leased parking are usually not compensated for the expense their employer saves. Parking "cash-out" programmes were developed to address these problems: employers offer employees the option of receiving a (taxable) cash payment or transit passes in place of the parking subsidy (UMN, 2002c). Although these programmes do not force drivers to pay for parking, they do help to balance the pricing incentives between driving and transit. Unfortunately, parking cash-out programmes are rarely workable in suburban areas.

5.1.4. Discussion

Pricing strategies clearly have an impact on driving, although just how much impact is often uncertain. The impacts of pricing strategies on travel are usually quantified as elasticities, the percentage change in travel associated with a given percentage change in price. The Victoria Transport Policy Institute has compiled estimated elasticities from available studies from the US and elsewhere and provides one of the most thorough summaries available on this topic (VTPI, 2002). Not all of the proposed pricing strategies have been adequately studied yet, but the available evidence suggests their potential. For example, studies of road pricing generated estimated elasticities ranging from –0.1 to –0.2 for the US, indicating that a 10 per cent increase in prices would lead to a 1 per cent to 2 per cent decrease in vehicle trips. Studies of parking pricing generated estimated elasticities ranging from –0.1 to –0.3, indicating that a 10 per cent increase in prices would lead to a 1 per cent to 3 per cent decrease in vehicle trips. Even if the payment per trip is the same, the form of payment can make a difference: the US Environmental Protection Agency estimated that a $1 increase in parking fees would have the same effect on travel as a $1.50 to $2.00 increase in gasoline taxes per trip (EPA, 1998). Elasticities also vary depending on the purpose of the trip: not surprisingly, commute trips tend to be less elastic than shopping and other kinds of non-work trips. Elasticities may also vary over time and tend to be lower in the short run and higher in the long run, as drivers find more ways to adjust to the increases in prices. Given the evidence, the question is not whether pricing strategies could significantly reduce driving. Rather, the question is whether pricing strategies sufficient to significantly reduce driving can be adopted.

The resistance to pricing strategies comes from both a pervasive American dislike of taxes (and thus an unwillingness on the part of politicians to raise taxes) and concerns about the impacts of pricing on lower-income households. Low-income households in the US depend on automobiles to a surprising degree, despite the significant cost of owning and operating even a cheap car. According to the 1995 Nationwide Personal Transportation Survey, 74 per cent of low-income households in the US owned an automobile, as many as had a telephone in their house, and many that do not own an automobile borrow one or accept rides from family and friends who do (Murakami and Young, 1997). Imposing new tolls and other fees on drivers disproportionately impacts lower-income households,

who already pay a higher share of their income for transportation than middle-income households. The issue of equity can be addressed in a number of ways. First, a portion of the revenues raised by the toll or fee can be devoted to improving the alternatives to driving, particularly transit. Second, a portion of the revenues can be used to offer reduced tolls or fees to lower-income households. Third, the fixed costs of driving can be reduced to offset increases in out-of-pocket costs so that the overall cost of driving does not increase. Proponents of pricing strategies often make the case that these strategies are ultimately more equitable in that they charge drivers more directly for their actual use of the system and for their impacts on their environment. Under the current pricing structure, those who drive relatively little are subsidizing those who drive a lot. Finding a politically acceptable solution to these equity issues is challenging but not impossible.

5.2. Road restrictions and removals

Mobility can also be limited through restrictions on the use of roads and on the actual removal of roads. The imposition of vehicle restrictions on selected roads at all times or at selected times of day reduces mobility by temporarily reducing the total capacity of the road system. In effect, road restrictions and removals increase the price of driving and may thus lead to a decrease in driving. In general, restrictions and removals force drivers to use other roads, other modes or other destinations, or to travel less. The impact of these strategies thus depends on the availability of routes which can be used in place of the restricted or removed facilities, the availability of transit or other modes, the availability of other possible destinations which meet the needs of the traveller, and the importance to the traveller of making that trip. The removal of roads represents a more extreme approach to limiting mobility and has been employed only rarely, and usually for goals other than a reduction in mobility. Neither road restrictions nor removals are common in the US, but they are not unheard of.

Road restrictions are more common in Europe than the US. American cities, for example, have had few successes with pedestrian-only districts in downtown areas. Popular in the 1960s and 1970s, as downtown shopping districts faced increasing competition from suburban shopping malls, pedestrian malls proved to be largely a failure, and at least half of the 200 pedestrian malls that once existed in the US have been transformed in one way or another (Steinhauer, 1996). The Pearl Street pedestrian mall in Boulder, Colorado is often cited as a success, but many other cities, including Baltimore, Pittsburgh and Seattle, have given up on pedestrian malls, re-opening them in recent years to car traffic. Many of the remaining "car-free" areas in the US are found in tourist destinations (Carfree.com, 2002). Another form of road restriction found in older areas in the US is the closing of residential streets to through traffic, creating cul-de-sacs out of traditional street grids. Programmes in cities like Los Angeles and Houston have been motivated by a desire to reduce crime in residential areas. Although these programmes have succeeded in reducing traffic and crime in neighbourhoods, they have also come under attack for racial and class segregation (Williams, 1994). A more extreme approach, justified on the same grounds but criticized on the same points, is to put gates on the neighbourhood. The mixed-income, mixed-race Five Oaks neighbourhood in Dayton, Ohio, installed gates and barricades in 1992 after a doubling of robberies in five years. They apparently succeeded: crime dropped and "*the only universal complaint about gates, one cited by opponents and proponents alike, seems to be that of inconvenience*" (Owen, 1994). Other kinds of restrictions on cars are rare, with the exception of restrictions relating to weather and construction, although restrictions on trucks are not uncommon. In the wake of 9/11, New York City implemented restrictions on single-occupant vehicles coming into southern Manhattan during the morning peak period from 6 a.m. to 10 a.m. Although the ban was dropped on three entry points, it remains in effect on two tunnels and three bridges (NYC, 2002). These restrictions are by far the most ambitious ever in the US and reflect the exceptional circumstances facing New York in recent months.

Believe it or not, a handful of cities in the US have chosen to remove freeways in downtown areas (Schreibman, 2001). In San Francisco, the Embarcadero Freeway was originally planned to link the Bay Bridge to the Golden Gate Bridge, but only a mile or two was ever constructed because of resistance from residents of the city to the construction of a freeway along their waterfront. The short stub of freeway that was built was unpopular with residents but perceived as necessary for bringing tourists into the city. In the early 1980s, a ballot initiative on the removal of the freeway stub failed to gain approval with a majority of voters. However, in 1989, the Loma Prieta earthquake severely damaged the freeway stub and the city, together with the California Department of Transportation, took advantage of the situation to remove the stub and rebuild the waterfront boulevard for transit and pedestrians as well as cars. When another freeway stub in the city was closed, the expected increases in traffic did not occur and traffic along several major corridors actually decreased (Schreibman, 2001). Under the leadership of a dynamic mayor, Milwaukee, Wisconsin has also decided to remove the stub of a freeway that had never been completed and which created a barrier between downtown and neighbourhoods to the north. The removal is partly motivated by the estimated cost of repairing the ageing freeway stub and partly motivated by the development potential of the land consumed by the freeway structure (Schreibman, 2001). Although the US Department of Transportation does not generally encourage road removals, federal transportation funds were used for both of these projects. Hard evidence on the impacts of road removals on traffic is scant, but a 1976 study by the New York Department of Transportation found that traffic counts dropped by 53 per cent on the West Side Highway in Manhattan after a portion of the highway was closed and that only 7 per cent of that traffic reappeared on other streets (Kruse, 1998). Although it would be hard to justify the removal of freeways solely to reduce traffic, freeway removal projects motivated by other concerns will nevertheless reduce the potential for movement and may reduce actual movement as a result.

6. CONCLUSIONS

The appropriateness of adopting mobility-enhancing, accessibility-enhancing or mobility-limiting strategies depends on the goal to be achieved. Mobility-enhancing strategies aim to increase the potential for movement by increasing the capacity of the system and the speed of travel. Accessibility-enhancing strategies aim to increase access to needed and desired activities, by bringing activities closer to home, enhancing the alternatives for reaching those activities and expanding the choices among activities. Mobility-limiting strategies aim to decrease the potential for movement by increasing the monetary or time cost of travel. The challenge in choosing between these strategies is to balance the needs of the individual with the environmental and societal costs of their choices. The evidence reviewed in this report suggests that a combination of accessibility-enhancing strategies and mobility-limiting strategies achieves this balance better than mobility-enhancing strategies do.

Other strategies not reviewed in this report also offer promise. A variety of interesting strategies fall into a category which might be called accessibility-oriented mobility strategies -- strategies which enhance mobility in ways specifically designed to enhance accessibility, which increase the potential for movement so that the potential for interaction is also increased. The concept of “new mobility” focuses on strategies which use technologies to provide mobility options which generate fewer environmental impacts than privately-owned, gasoline-powered cars and which may be more tailored to the specific mobility needs of each household (Shaheen and Sperling, 2001). These options might include car-sharing programmes, neighbourhood electric vehicles and “smart” paratransit. Transit

service more generally can be an accessibility-oriented mobility strategy, especially when bus routes and rail lines are designed to serve the specific needs of specific segments of the population. Efforts under the label of "community transportation" have focused on filling the gaps in service provided by regular transit systems through more personalized service for transit-dependent segments of the population, but the philosophy could be applied more widely in transit planning. The Community Transportation Association of America argues that, while a mobile society is essential to a free society, our approach to providing mobility has become outdated (CTA, 2001). Not all mobility enhancing strategies are created equal, and the most important ones are those which also enhance accessibility.

There is no question that Americans have come to expect and demand good mobility. Congestion is seen as a threat to personal freedom, and freeway building is justified on the grounds of preserving that freedom. For example, Mary Peters, the administrator of the Federal Highway Administration, recently testified before a committee of the US Senate that "*mobility is one of our greatest freedoms*" and that "*congestion must be addressed with a long-term strategy to increase capacity*" (FHWA, 2002d). In its 2001 *Report to the Nation*, the Federal Highway Administration declared that "*our highway transportation system serves to unify America and sustain the American way of life*" (FHWA, 2001). Implicit in such statements is the belief that Americans have a right to drive and, more specifically, that Americans have the right to drive anywhere they want at any time of day they want at speeds unimpeded by congestion. Time and monetary losses resulting from congestion are officially measured relative to free-flow conditions, thereby establishing free-flow conditions as the unquestioned standard. Mobility may be essential to the economy and to quality of life, but just how much mobility can we rightly expect and demand?

Accessibility-enhancing strategies can also be justified on the grounds of personal freedom. The importance of expanding choices through such strategies is gaining more recognition. For example, the Strategic Plan for the US Department of Transportation, adopted in 2000 under the Clinton administration, stated that "*Transportation, at its core, is about more than concrete, asphalt and steel -- it is about people and their access to work, school, loved ones and nature's bounty*" (US DOT, 2000b). Norm Mineta, the Secretary of the US Department of Transportation, recently commended pioneering efforts by public agencies and private organizations to provide "*choices for commuters*" in "*dealing with congestion and the challenge of getting to work*" (FHWA, 2002e). These statements both reflect an emerging new mindset in transportation planning in the US, one that focuses on enhancing accessibility. This new mindset may or may not challenge the dominance of mobility-enhancing strategies in the long run, but it is at least fostering an important discussion about the direction of transportation planning in the US in the short run.

BIBLIOGRAPHY

Benfield, F. Kaid, Jutka Terris and Nancy Vorsanger (2001), *Solving Sprawl: Models of Smart Growth in Communities Across America,* Natural Resources Defense Council, New York.

Boarnet, Marlon G. and Randall Crane (2001a), *Travel by Design: The Influence of Urban Form on Travel,* New York: Oxford University Press.

Boarnet, Marlon and Randall Crane (2001b), The Influence of Land Use on Travel Behavior: Empirical Strategies, *Transportation Research, A: Policy and Practice*, Vol. 35, No. 9, pp. 823-845.

Boarnet, Marlon G. and Andrew F. Haughwout (2002), Do Highways Matter? Evidence and Policy Implications of Highways' Influence on Metropolitan Development. A discussion paper prepared for the Brookings Institution Center on Urban and Metropolitan Policy, Washington, DC, August.

Bottom, Jon, Masroor Hasan and Jane Lappin (2002), Traveler Response to Information: Who Responds and How?, *TR News*, No. 218 (January-February), pp. 25-30.

Bureau of Transportation Statistics (BTS) (2002), *Transportation Indicators,* US Department of Transportation, Washington, DC, April.

Calthorpe, Peter (1993), *The Next American Metropolis: Ecology, Community and the American Dream,* New York: Princeton Architectural Press.

Capital Area Metropolitan Planning Organization (CAMPO) (2000), *CAMPO 2025 Transportation Plan,* Austin, TX, adopted June 12, modified August 7.

Carfree.com (2002), Carfree Places. Available: http://www.carfree.com/carfree_places.html Accessed: 5/27/02.

Cervero, Robert and Kara Kockelman (1997), Travel Demand and the 3Ds: Density, Diversity, and Design, *Transportation Research Record D: Transport and the Environment*, Vol. 3, pp. 199-219.

Cervero, Robert and Roger Gorham (1995), Commuting in Transit Versus Automobile Neighbourhoods, *Journal of the American Planning Association*, Vol. 61, pp. 210-225.

Cervero, Robert (1993), *Transit-Supportive Development in the United States: Experiences and Prospects*. Federal Transit Administration, US Department of Transportation, December.

Chicago Area Transportation Study (CATS) (2002), *2020* Regional Transportation Plan Summary. Available: http://www.catsmpo.com/pubs/rtp-sum00.htm. Accessed: 5/28/02.

Chicago, City of (2002), Strengthening Chicago's Neighbourhood Retail Districts. Available: http://www.ci.chi.il.us/Mayor/Zoning/ordin_3.html. Accessed: 5/21/02.

Choo, Sangho, Patricia L. Mokhtarian and Ilan Salomon (2001), *Impacts of Home-Based Telecommuting on Vehicle-Miles Traveled: A Nationwide Time Series Analysis.* Prepared for the California Energy Commission, December.

Choo, Sangho, Patricia L. Mokhtarian and Ilan Salomon (2001), *Impacts of Home-Based Telecommuting on Vehicle-Miles Traveled: A Nationwide Time Series Analysis*. Prepared for the California Energy Commission, Sacramento, CA, December.

Cleveland Neighbourhood Development Corporation (CNDC) (2002), Retail/Commercial. Available: http://www.cndc2.org/retail_commercial.htm. Accessed: 5/21/02.

Community Transportation Association (CTA) (2001), What is Community Transportation? Available: http://www.ctaa.org/about/. Accessed: 5/29/02.

Congress for the New Urbanism (CNU) (2002a), CNU Charter. Available: http://www.cnu.org/aboutcnu/index.cfm. Accessed: 1/29/02.

Congress for the New Urbanism (CNU) (2002b), CNU History. Available: http://www.cnu.org/aboutcnu/index.cfm. Accessed: 5/21/02.

Cyveillance (2000), Internet Exceeds 2 Billion Pages, Press Release, July 10, Available: http://www.cyveillance.com/web/newsroom/releases/2000/2000-07-10.htm. Accessed: 5/23/02.

Davis, Stacy (2001), *Transportation Energy Data Book: Edition 21,* Oak Ridge National Laboratory, Office of Transportation Technologies, US Department of Energy, Oak Ridge, TN, October.

Downs, Anthony (1992), *Stuck in Traffic: Coping with Peak-Hour Traffic Congestion*, Washington, DC: Brookings Institution.

Duany, Andres and Elizabeth Plater-Zyberk (1991), *Towns and Town-Making Principles*, New York: Rizzoli.

Egan, Timothy (2002), Sprawl-Weary Los Angeles Builds Up and In, *The New York Times*, March 10, pp. 1, 30.

Environmental Protection Agency (EPA) (1998), Technical Methods for Analyzing Pricing Measures to Reduce Transportation Emissions, USEPA Report #231-R-98-006, Available: www.epa.gov/clariton/clhtml/pubtitle.html.

Environmental Protection Agency (EPA) (1999), *Antidotes to Sprawl: Infill Development*. Available: http://www.epa.gov/region5/sprawl/infill.htm. Accessed: 5/29/02.

Environmental Protection Agency (EPA) (2002), *Commuter Choice Leadership Initiative*. Available: http://www.commuterchoice.gov/index.htm. Accessed: 5/23/02.

Environmental Protection Agency (EPA) (2002), *USA Air Quality Nonattainment Areas,* Office of Air Quality Planning and Standards, Washington, DC.
Available: http://www.epa.gov/airs/nonattn.html. Accessed 5/9/02.

Ewing, Reid and Robert Cervero (2001), Travel and the Built Environment, *Transportation Research Record*, No. 1780 87-114.

Federal Highway Adminstration (FHWA) (1998a), TEA-21 Fact Sheet: Metropolitan Planning. September 14. Available: http://www.fhwa.dot.gov/tea21/factsheets/metropln.htm. Accessed: 5/28/02.

Federal Highway Adminstration (FHWA) (1998b), TEA-21 Fact Sheet: Intelligent Transportation Systems Program. September 14. Available: http://www.fhwa.dot.gov/tea21/factsheets/its.htm. Accessed: 5/28/02.

Federal Highway Administration (FHWA) (2001), *Unifying America: Report to the American People*. US Department of Transportation, Washington, DC.

Federal Highway Administration (FHWA) (2002a), The Dwight D. Eisenhower Interstate System. Available: http://www.fhwa.dot.gov/programadmin/interstate.html. Accessed 5/17/02.

Federal Highway Administration (FHWA) (2002b), Investing in Our Future: An Analysis by the Federal Highway Administration. Updated as of February 4, 2002. Available: http://www.fhwa.dot.gov/tea21/teafunds.htm. Accessed: 5/17/02.

Federal Highway Administration (FHWA) (2002c), Value Pricing Pilot Program: Notice of Grant Opportunities. US Department of Transportation. Available: http://www.fhwa.dot.gov/policy/vppp.htm. Accessed: 5/25/02.

Federal Highway Administration (FHWA) (2002d), FHWA Administrator Testifies That Growing Congestion Threatens Nation's Economy, Quality of Life. Press Release, May 21.

Federal Highway Administration (FHWA) (2002e), US Transportation Department Recognizes Commuter Choice Pioneers. Press Release, May 14.

Federal Transit Administration (FTA) (2002), New Starts Evaluation and Rating Process. Available: http://www.fta.dot.gov/library/policy/ns/nserp.htm. Accessed: 5/22/02.

Forrester Research, Inc. (2002), December Shopping Up From Last Year Despite Slow Economy. Press Release, 2/24. Available: http://www.forrester.com/ER/Press/Release/0,1769,678,00.html. Accessed 5/24/02.

Friedman, Bruce, Stephen P. Gordon and John B. Peers (1992), *The Effect of Neotraditional Design on Travel Characteristics,* Compendium of Technical Papers, Anchorage, Alaska: Institute of Transportation Engineers, 1992 District 6 Annual Meeting, pp. 195-208.

Fujiwara, A. and Y. Sugie (1995), Influence of Pre-Trip Information on Traveler's Choice Behavior. Paper presented at "Steps Forward," the Intelligent Transport Systems World Congress, Yokohama, Japan, November.

Furuya, H., K. Nishii and Y. Asakura (1995), User Evaluation and Response to Parking Guidance and Information System in a Central City Shopping Area in Japan. Paper presented at "Steps Forward," the Intelligent Transport Systems World Congress, Yokohama, Japan, November.

General Services Administration (GSA) (2002), *Interagency Telework/Telecommuting* site. Available: http://www.telework.gov/. Accessed: 5/23/02.

Handy, Susan (1992), Regional versus Local Accessibility: Neo-Traditional Development and its Implications for Non-Work Travel, *Built Environment*, Vol. 18, No. 4, pp. 253-267.

Handy, Susan (1993), A Cycle of Dependence: Automobiles, Accessibility and the Evolution of the Transportation and Retail Hierarchies, *The Berkeley Planning Journal*, Vol. 9, pp. 21-43.

Handy, Susan (1994), Highway Blues: Nothing a Little Accessibility Can't Cure, *Access*, No. 5, pp. 3-7.

Handy, Susan (1996a), Methodologies for Exploring the Link Between Urban Form and Travel Behavior. *Transportation Research D*, Vol. 1, No. 2, pp. 151-165.

Handy, Susan (1996b), Understanding the Link Between Urban Form and Nonwork Travel Behavior, *Journal of Planning Education and Research*, Vol. 15, No. 3, pp. 183-198.

Handy, Susan L., Marlon Boarnet, Reid Ewing and Richard G. Killingsworth (2002), How the Built Environment Affects Physical Activity: Views from Urban Planning, *American Journal of Preventative Medicine* (Forthcoming).

Handy, Susan L. and Kelly J. Clifton (2001), Local Shopping as a Strategy for Reducing Automobile Travel, *Transportation*, Vol. 28, No. 4, pp. 317-346.

Handy, S. and D. Niemeier (1997), Measuring Accessibility: An Exploration of Issues and Alternatives, *Environment and Planning A*, Vol. 29, pp. 1175-1194.

Handy, Susan and Patricia L. Mokhtarian (1995), Planning for Telecommuting: Measurement and Policy Issues, *Journal of the American Planning Association*, Vol. 61, No. 1 (Winter), pp. 99-111.

Handy, Susan, Robert Paterson, Andrew De Garmo, Christina Stanland (1999), *Street Connectivity: A Report to the City of Austin on Cities with Connectivity Requirements,* Community and Regional Planning Program, University of Texas at Austin, August.

Handy, Susan and Tom Yantis (1994), *The Impacts of Telecommunications Technologies on Nonwork Travel Behavior*. Report No. SWUTC/97/721927-1, Southwest Region University Transportation Center, Center for Transportation Research, University of Texas at Austin, Austin, TX, January.

Hansen, W.G. (1959), How Accessiblity Shapes Land Use, *Journal of the American Planning Institute*, Vol. 25, pp. 73-76.

Institute for Local Self-Reliance (ILSR) (2002), Formula Business Restrictions. Available: http://www.newrules.org/retail/formula.html. Accessed: 5/22/02.

Institute of Urban and Regional Development (IURD) (2002), Induced travel effects not so dramatic, *IURD Developments*, Vol. 12, No. 1, p. 3.

ITS America (1998), ITS offers a new approach. Available: http://www.itsa.org/resources.nsf Accessed: 5/20/02.

ITS America (2001), What is ITS? Available: http://www.itsa.orb/whatits.html Accessed: 5/20/02.

ITS America (2002), Delivering the Future of Transportation: The National Intelligent Transportation Systems Program Plan: A Ten-Year Vision. January.

Katz, Peter (1994), *The New Urbanism: Toward an Architecture of Community*. New York: McGraw-Hill.

Kitamura, Ryuichi, Patricia L. Mokhtarian and Laura Laidet (1997), A Micro-Analysis of Land Use and Travel in Five Neighbourhoods in the San Francisco Bay Area, *Transportation*, Vol. 24, No. 2, pp. 125-158.

Kline, Kelly and Jim Schutz (2001), Getting in the Ground Floor, *Planning,* August, pp. 14-17.

Kraan, Mariette, Hani S. Mahmassani and Nhan Huynh (2001), Traveler Responses to Advanced Traveler Information Systems for Shopping Trips: Interactive Survey Approach. *Transportation Research Record*, No. 1725, pp. 116-123.

Krizek, Kevin (Forthcoming), Residential Relocation and Changes in Urban Travel: Does Neighbourhood-Scale Urban Form Matter?, *Journal of the American Planning Association*.

Kruse, Jill (1998), Closing Roads, *Urban Land,* May, pp. 64-65.

Kulash, Walter, Joe Anglin and David Marks (1990), Traditional Neighbourhood Development: Will the Traffic Work?, *Development*, Vol. 21, pp. 21-24.

Landis, John, Robert Cervero and Peter Hall (1991), *Transit Joint Development in the US: An Inventory and Policy Assessment*, Institute of Urban and Regional Development, University of California at Berkeley.

Litman, Todd (2000), Generated Traffic: Implications for Transport Planning, *ITE Journal*, Vol. 71, No. 4.

Mahmassani, Hani S. (1999), Traveler Behavior and Intelligent Transportation Systems, *Transportation Research Part C*, Vol. 7, pp. 73-74.

Mahmassani, Hani S. and Yu-Hsin Liu (1999), Dynamics of Commuting Decision Behaviour Under Advanced Traveller Information Systems, *Transportation Research Part C*, Vol. 7, pp. 91-107.

Maryland, State of (2002), *Smart Growth in Maryland*. Available: http://www.op.state.md.us/smartgrowth/. Accessed: 5/22/02.

McNally, Michael G. and Sherry Ryan (1993), Comparative Assessment of Travel Characteristics for Neotraditional Designs, *Transportation Research Record*, No. 1607, pp. 105-115.

Metro (1996), *Main Street Handbook: A User's Guide to Main Streets*, Portland, OR, March.

Mokhtarian, Patricia L. (2001), The Impacts of B2C E-Commerce on Transportation and Urban Form. Prepared for the Conference on Electronic Commerce (B2C) and its Consequences for Urban Development and Transportation, University of Stuttgart, November 23.

Mokhtarian, P.L., S. Handy and I. Salomon (1995), Methodological Issues in the Estimation of the Travel, Energy and Air Quality Impacts of Telecommuting, *Transportation Research Part A*, Vol. 29A, No. 4, pp. 283-302.

Mokhtarian, P.L. and I. Salomon (1994), Modeling the choice of Telecommuting: Setting the Context, *Environment and Planning A*, Vol. 26, No. 5, pp. 749-766.

Mokhtarian, Patricia L. and Ilan Salomon (2001), How derived is the demand for travel? Some conceptual and measurement considerations, *Transportation Research Part A*, Vol. 35, pp. 695-719.

Mokhtarian, Patricia L., Francisco J. Samaniego, Robert H. Shumway and Neil H. Willits (2002), Revisiting the notion of induced traffic through a matched-pairs study, *Transportation*, Vol. 29, pp. 193-220.

Municipal Research & Services Center (MRSC) (1997), Infill Development: Strategies for Shaping Livable Communities, Report No. 28, June. Available: http://www.mrsc.org/textfill.htm#E19E1. Accessed: 5/29/02.

Murakami, Elaine and Jennifer Young (1997), Daily Travel by Persons with Low Income. Paper for NPTS Symposium, Bethesda, MD, October.
Available: http://www-cta.ornl.gov/npts/1995/Doc/LowInc.pdf. Accessed: 5/29/02.

National Trust for Historic Preservation (NTHP) (2002a), About the Main Street Program. Available: http://www.mainst.org/AboutMainStreet/aboutmain.htm. Accessed: 5/22/02.

National Trust for Historic Preservation (NTHP) (2002b), Historic Preservation Equals Economic Development: The Main Street Program's Success. Available: http://www.mainst.org/AboutMainStreet/numbers.htm. Accessed: 5/22/02.

New York City (NYC) (2002), Getting Around New York City. Available: http://www.nyc.gov/html/dot/html/get_around/emergencyinfo.html#restrictions. Accessed: 5/27/02.

Newman, Morris (2001), In Bay Area, Mass Transit Inspires Project, *The New York Times*, June 17, p. 38.

Newman, Peter and Jeffrey Kenworthy (1999), *Sustainability and Cities: Overcoming Automobile Dependence,* Washington, DC: Island Press.

Noland, Robert B. and Lewison L. Lem (2002), A review of the evidence for induced travel and changes in transportation and environmental policy in the US and the UK, *Transportation Research Part B*, Vol. 7, pp. 1-26.

Norfolk, City of (2002), Neighbourhood Commercial Areas. Available: http://www.norfolk.va.us/now/commercial.htm. Accessed: 5/21/02.

Nua (2001), How Many Online? Available: http://www.nua.ie/surveys/how_many_online/index.html. Accessed: 5/24/02.

Owens, Mitchell (1994), Saving Neighbourhoods One Gate at a Time, *The New York Times*, August 25, pp. B1-B2.

Oxford English Dictionary (2002), *OED Online,* Oxford: Oxford University Press. Available: http://dictionary.oed.com/entrance.dtl. Accessed 5/9/02.

Pagan, Y.L.L., H.S. Mahmassani and M. Kraan (2000), *Trip Planning Behavior of Tourists: San Antonio Case Study,* Report No. SWUTC/00/472840-00073-1, Southwest Region University Transportation Center, Center for Transportation Research, University of Texas at Austin, January.

Paul, Katherine J. (2002), Advocating Mileage-Based Auto Insurance, *Conservation Matters*, Vol. VIII, No. 3 (Spring), pp. 31-33.

Pew Research Center (2001), More Online, Doing More. Press Release, February 18. Available: http://www.pewinternet.org/releases/release.asp?id=15. Accessed: 5/24/02.

Pickett, Joseph, P. *et al*. (eds.) (2000), *The American Heritage® Dictionary of the English Language: Fourth Edition,* Boston: Houghton Mifflin. Available: http://bartleby.com/61/. Accessed 5/9/02.

Pushkarev, Boris S. and Jeffrey M. Zupan (1977), *Public Transportation and Land Use Policy*. Bloomington: Indiana University Press.

Rathbone, Daniel B. (1992), Telecommuting in the United States, *ITE Journal*, December, pp. 40-45.

Salomon, Ilan and Patricia L. Mokhtarian (1998), What Happens When Mobility-Inclined Market Segments Face Accessibility-Enhancing Policies?, *Transportation Research D*, Vol. 3, No. 3, pp. 129-140.

Schreibman, Lisa (2001), On a Tear, *Planning*, January, pp. 10-13.

Shah, Vishali P., Karl Wunderlich and James Larkin (2001), Time Management Impacts of Pretrip Advanced Traveler Information Systems: Findings from a Washington, DC, Case Study, *Transportation Research Record,* No. 1774, pp. 36-43.

Shaheen, Susan and Daniel Sperling (2001), *Center for New Mobility Research,* Institute of Transportation Studies, University of California at Davis, Spring.

Shoup, Donald (2002), Roughly Right or Precisely Wrong, *Access*, No. 2 (Spring), pp. 20-25.

Steinhauer, Jennifer (1996), When Shoppers Walk Away From Pedestrian Malls; Downtown Retailing Trend Again Favors a Car Culture, *The New York Times*, November 5, p. D1.

Stern, Eliahu (1999), Reactions to Congestion Under Time Pressure, *Transportation Research Part C*, Vol. 7, pp. 75-90.

Telework Collaborative (2002), Our Mission. Available: http://www.teleworkcollaborative.com/. Accessed: 5/23/02.

Texas Transportation Institute (TTI) (2001), 2001 Urban Mobility Study, Available: http://mobility.tamu.edu/ums/. Accessed: 2/4/02.

Transit Cooperative Research Program (TCRP) (1995), An Evaluation of the Relationships Between Transit and Urban Form, *Research Results Digest*, No. 7, June.

Transportation Research Board (TRB) (1998), *Highway Capacity Expansion and Induced Travel: Evidence and Implications*. *Transportation Research Circular,* No. 481, February.

US Department of Transportation (US DOT) (1993), *Transportation Implications of Telecommuting,* Washington, DC, April.

US Department of Transportation (1996a), *Operation TimeSaver: Taking Transportation into the 21st Century,* Washington, DC.

US Department of Transportation (1996b), *Intelligent Transportation Infrastructure Benefits: Expected and Experienced*. Prepared by the MITRE Corporation, Washington, DC, January.

US Department of Transportation (1996c), *Building Livable Communities Through Transportation,* Washington, DC, October 1.

US Department of Transportation (2000a), *Highway Statistics 2000*, Washington, DC.

US Department of Transportation (2000b), Strategic Plan. Washington, DC. Available: http://stratplan.dot.gov/. Accessed: 5/29/02.

US Department of Transportation (2001), *1995 NPTS Databook*, Federal Highway Administration, Washington, DC, October.

University of Minnesota (UMN) (2002a), Road Pricing. Available: http://www.hhh.umn.edu/centers/slp/conpric/learn/types_a.htm. Accessed: 5/25/02.

University of Minnesota (UMN) (2002b), Vehicle Use Pricing. Available: http://www.hhh.umn.edu/centers/slp/conpric/learn/types_b.htm. Accessed: 5/25/02.

University of Minnesota (UMN) (2002c), Parking Pricing. Available: http://www.hhh.umn.edu/centers/slp/conpric/learn/types_c.htm. Accessed: 5/25/02.

Victoria Transport Policy Institute (2002), Transport Elasticities. Available: http://www.vtpi.org/tdm/tdm11.htm#_Toc5666150. Accessed: 5/25/02.

Vishwanathan, Krishnan, Konstandinos G. Goulias, Paul P. Jovanis (2000), Use of Traveler Information in the Puget Sound Region: A Preliminary Multivariate Analysis. Paper 00-1368, presented at the 79th Annual Meeting of the Transportation Research Board, Washington, DC, January.

Washburn, Dan (1997), Hardware Store Chains: New Interest in Old Format. *Home Improvement Market*, Vol. 234, No. 8 (August), p. 196.

Washington Department of Transportation (WashDOT) (1996), *Washington's Interstate Highways: 40 Years of Service,* October.

Washington, S., R. Guenseler and D. Sperling (1994), Emission Impacts of Intelligent Vehicle Highway Systems, *Transportation Planning and Air Quality II*.

Weingroff, Richard F. (1996), Engineering Marvels, *Public Roads*, Vol. 6, No. 1 (Summer). Available: http://www.tfhrc.gov/pubrds/summer96/p96su.htm. Accessed: 5/17/02.

Wenzel, Tom (1995), *Analysis of National Pay-as-You-Drive Insurance and Other Variable Driving Charges,* Report No. LBL-37321, Lawrence-Berkeley Laboratory, Berkeley, CA, July.

Williams, John (1994), Probe of street closings examines racial issues, *The Houston Chronicle*, 15 December, p. 1.

Carlo SESSA
President of ISIS
Institute of Studies for the Integration of Systems
Rome
Italy

SUMMARY

Rome, June 2002

1. INTRODUCTION

The ECMT's 124th Round Table on transport economics addresses an ambitious topic -- the role of regulatory and fiscal incentives to shape a more sustainable future for our cities and regions. The topic is not limited to transport but, as it will be the main subject of this paper, entails a broader perspective, including the following:

- The present trends and key issues of government of urban systems, and the quest for better governance;
- How the overall regulatory and fiscal framework, more than single measures and incentives *per se*, should be adapted to improve the functioning of our urban systems;
- The core role which integrated spatial and transport policies, aiming towards sustainable development and mobility, can play;
- Finally, some recommendations about policy instruments which could be implemented -- briefly, coupling evaluation and monitoring of policy outcomes with fiscal incentives and distribution of equalisation funds across municipalities, to boost a "value for money" attitude in rewarding government action and public service provision and providing coherent urban accounting systems to support the operation of integrated and regionwide fiscal and regulatory frameworks.

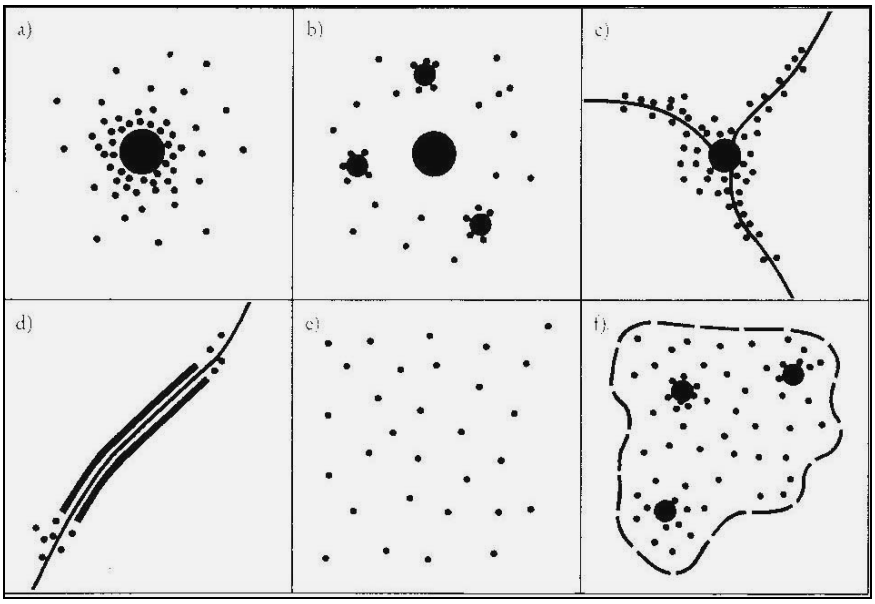
2. WHY WE NEED A BROADER PERSPECTIVE ON URBAN TRANSPORT POLICIES

The archetypal image of a city is a cross within a circle[1]. The circle consists of the walls, the boundaries of the city, whereas the cross represents two main transport axes -- North-South and East-West. Thus, from the very beginnings of civilisation, humans identified the city mainly as a place to live safely, protected by city walls, and as a meeting point for people living within or coming from outside the city. Land use and transport have always been seen as two intertwined aspects of urban life, while being distinct from (and in relation with) the outside environment.

The evolution of urban settlements from ancient times has been impressive, and it is now accelerating. Populations are growing worldwide. In the next three or four generations, the world's population is expected to reach a peak of around 10 billion. By 2020, two billion people are expected to be added to the developing world's population. Only 150 million will be added to OECD countries, with over half of that increase in population located in the USA. In Europe, nearly 80 per cent of the

population live in cities (20 per cent in cities with more than 250 000 inhabitants, 20 per cent in medium-sized cities from 50 000-250 000 inhabitants and 40 per cent in small towns from 10 000 to 50 000 inhabitants). The network of cities in Europe is the most dense in the world (5 717 urban areas located over 4.8 million km^2) and it shows the lowest average distance between two cities (16 km against 29 in Asia, 53 km in America and 55 km in Africa and the ex-Soviet Union).

Except for some smaller historical towns mostly located in Europe, cities resemble the archetype less and less. Instead, six urban forms have emerged to accommodate the Earth's growing population, and are deemed as possible alternative patterns of development for the cities of tomorrow. These urban forms, illustrated in the figure below, consist of: a) nuclear/compact cities; b) polynuclear development; c) radial cities; d) linear cities; e) scattered cities; f) urban regions/ networks.



A visitor from Mars might take some time to understand our habits and material ways of living, but would probably quickly form a more realistic image of our cities than the idea still prevailing in human minds. Often peoples' mentalities evolve more slowly than the environments in which they live, while both political and administrative institutions change at an even slower pace. We contend that this is especially the case for our vision of cities and the institutions used to govern them.

Nowadays, the walls which delimited ancient cities have, in most cases, been torn down (e.g. in order to give way to ring roads, as in Vienna) and several waves of urbanisation have moved far away from the centre to the borderline of the city. This has been blurred in several cases by fragmented urban development of the urban fringe. Moreover, economic, social and cultural interactions between people living in separate areas of larger towns are very often weaker than exchanges between cities, at the same level as the national or more global (European, worldwide) urban hierarchy, as shown by increasingly long-distance transport business and leisure transport flows.

But the administrative boundaries of municipalities and regions established through tradition, in some cases since the 19^{th} century[2], are left unchanged, including the basic structure of public authorities. As a consequence, policy thinking at the local level hardly enlarges its scope beyond the

limit of jurisdictional competence, and efforts are almost exclusively concentrated on policy measures whose effects can be nullified or, worst, provoke adverse impacts at a wider regional level. A well-known example of this is the case of transport policies aimed at alleviating congestion in inner cities by limiting the access of private cars, and thus creating incentives for households and businesses to move to the suburbs and increase suburb-to-suburb commuter flows, average travel distance, gasoline consumption, use of land, etc.

As briefly illustrated in the next chapter, the diagnosis is quite clear and the general prognosis is a quest for better governance. It is the detailed prognosis which is difficult to seize, because simple solutions are not available. We will discuss this further, after addressing key issues of urban governance.

3. IMPROVING THE GOVERNANCE OF CITIES AND METROPOLITAN AREAS

Issues of public governance have taken on a new importance and visibility. Thereafter, we will summarize key issues as presented in a recent report from the OECD, *Cities for Citizens*, 2001.

Government is the exercise of authority over an organisation, institution, state, district, etc. Governance is defined more widely as the exercise of authority, control, management or power of government. The increasing complexity of issues at stake, which often surpass the limits of single jurisdictions or sectoral policies, is reducing the capability of any single authority to find and implement effective solutions alone. Indeed, the barriers opposing good solutions and practices are found most frequently to be lack of integration and communication between city, region and national authorities. This is often due to a mismatch -- or lack of institutional fit -- between political and executive institutions, exercising their powers over different territories or sectors (transport, land use, etc.). More "governance" -- usually taking the form of co-operation between public and private institutions around a common aim and policy -- is required.

Moreover, the situation is far from being static. As globalisation progresses, urban regions are emerging as key players in the world economy, making an important contribution to national economies. The pursuit of competitiveness in urban regions has become a major local and national policy objective. However, problems of social cohesion are also increasing. Competitiveness and liveability are increasingly perceived as two sides of the same coin. To be good places to live, cities need to be competitive; a city's quality of life is a key factor of competitiveness. As stated in the Draft 1999 Work Programme of the OECD Territorial Development Policy Committee [DT/TDPC(99)1], "*the challenge of enhancing the adaptability of societies to change lies in finding ways that blend a liberal approach to economic change with the social and environmental concerns and hopes of people in the places where they live. When public opinion believes that territories are the passive victims of circumstances they cannot control, protectionist tendencies are reinforced*."

Virtually all countries now embrace market-oriented policies. More than five billion people live in market-based economies today as against only one billion a decade ago. Entrepreneurship and the private sector are widely recognised as the dynamic factors of growth. Urban regions are becoming central, and a sort of "metropolisation" of the world economy is taking place. For example, Tokyo's production is comparable to that of the United Kingdom and is twice that of Brazil. The health of core

urban regions is therefore critical for national economies. Central and metropolitan level governments are increasingly under pressure to improve governance to enhance the positive, and offset the negative, impacts of globalisation in urban regions.

In this context, it is important to note that in many EU and OECD countries decentralisation, devolution and privatisation are forcing a reassessment of the roles of government at the national, regional and local levels. The common challenge is:

- to devolve public functions from central government to a lower level of government which has the right dimension to intervene, i.e. where there is an optimal balance between economies of scale in service provision and accountability before citizens and users of the services;

- to outsource production of public services to the private market, while maintaining the universal service obligations (USO) for those basic services of general interest -- such as telecommunications, energy supply and most municipal services, including water delivery, waste collection, public transport, etc. -- to ensure minimum quality requirements and accessibility for all in urban and rural regions.

"*Which territorial level is the most appropriate to implement specific policies or provide specific services? Which functions can be privatised?*" These are complex issues and they vary from country to country and from city to city. One of the key questions is how to give more concrete expression to decentralisation in the form of resilient local government which can solve public policy problems of the kind nowadays displayed by urban regions. Higher levels of government need to explore more fully the specific issue of how to set a framework within which cities can be empowered to respond, on an individual basis and more vigorously than in the past, to the complex economic, environmental and societal problems they face.

This new framework should help to overcome the difficulties and hurdles inherited from the past. As noted above, as major cities of OECD countries expanded geographically outward, old administrative boundaries usually remained in place, creating a patchwork of municipalities within the urban area, each with its own political colour and vested interests to defend. These networks are generally overlaid by higher levels of government, usually with sectoral responsibilities and by special-purpose agencies, for example transport and water agencies, operating over large parts of the built-up area.

With the aim to overcome this fragmentation of powers and provide a new framework for policymaking, interest towards "metropolitan governance" issues has been recently renewed. From a theoretical standpoint, two models of metropolitan government have been debated since the 1960s: the "metropolitan model" and the "public choice" approach (Lefèvre, C., OECD, Stockholm Workshop).

The metropolitan model in its purest form has four main characteristics: i) strong political legitimacy, obtained by the direct election of its political representatives; 2) meaningful autonomy from both higher level government and basic jurisdictions (municipalities); 3) wide-ranging jurisdiction, usually including competence over area-wide services such as water treatment and delivery, public transport, local energy supply, etc.; 4) relevant territory, although it is not an easy task to delimit the metropolitan area in practice[3].

Supporters of the metropolitan model highlight the need of:

- satisfying the need to seek a correspondence between the functional territory (the metropolitan area) and the administrative boundaries, not only to organise service provision but also to accomplish, in a unitary fashion, institutional and organisational tasks;
- providing benefits in terms of economies of scale in the production of services;
- allowing the equalisation of service costs across the urban region and better distribution of resources;
- providing for a better and more comprehensive planning capacity.

On the other hand, the public choice school maintains that:

- It is possible to achieve substantially the same benefits through co-ordination of existing local authorities without recourse to a heavy (new) institutional form, whereas voluntary co-operation between public authorities can meet the legitimate needs of the population which one town alone may not be able to satisfy;
- Variety and smallness of institutions over the territory are essential elements in maintaining competition and in allowing individual choice. This subject is traditionally put forward in the USA, since the seminal paper of Teibout (1956) introduced the concept of "voting with their feet" to represent the residents' choice of moving out if they are unhappy with the ratio basket of services/tax levies offered by one municipality. In the European context, where the propensity of people to move out from their place of residence is lower than in the USA, the subject is less appealing anyway;
- The search for a functional territory to delimit the metropolitan area is futile, inasmuch as there is no single functional territory at all. On the contrary, there is a multiplicity of functional territories, depending on the good or service taken into account;
- The monopoly of metropolitan governments in many services does not favour innovation or reduction of production costs. On the contrary, to provide public goods which justify economies of scale, an alternative pathway is to separate production and provision, since the former can be carried out by the local authority, other government structures or private companies, as appropriate;
- Finally, the metropolitan model is undemocratic, since it increases the distance between local authorities and citizens, resulting in lack of control over elected representatives.

The latter is an important drawback in the practice of stronger forms of metropolitan authorities. Legitimacy of a new metropolitan government is, on the whole, based upon its functionality (efficiency, economies of scale, etc.). However, this requires recognition from the ensemble of stakeholders who must identify with the institutional structure. They typically include: a) existing local governments; b) pressure groups; c) citizens.

Existing local governments have usually regarded unfavourably the appearance of new, autonomous and powerful political structures in a given territory, inasmuch as this involves both the authority and legitimacy of the existing system, and because it is difficult to incorporate an additional level of government when the basic structure remains in place (for instance, fitting a metropolitan institutional structure between the municipalities and a province is likely to cause an overlap of roles and responsibilities).

Pressure groups and lobbies (e.g. political parties, associations, etc.) have often considered unfavourably territorial reorganisation into a new, metropolitan layer of government, since it might weaken their position. Pressure against the creation of a strong metropolitan government might also

come from the state/regional layers of government, which are responsible for the poorer surrounding areas, whereas the majority of the population and economic activity is situated within the jurisdiction of the new metropolitan authority.

Last but not least, the population of a metropolitan area sometimes does not recognise the legitimacy of the constituted metropolitan government, because:

- Urban populations are not always convinced that metropolitan governments will be able to fulfil all of the particular needs of their municipality or neighbourhood. On the contrary, the fear is that local interests will be subordinated to the metropolitan objective, which may be regional or national rather than local;
- Enhancing the role of metropolitan areas in the world economy may be perceived as not being to the profit of inhabitants of the urban region, but rather as creating wealth for other non-local, private and public sector interests;
- Populations located in the central city or suburbs may have different objectives and not favour intermunicipal co-operation (for example, wealthier municipalities may not wish to share resources);
- A lack of a "feeling of belonging" at the metropolitan level; lack of solidarity with other citizens of the same region, especially when populations are of increasingly diverse origin and socioeconomic status;
- A desire for "small democracy" and more attention to the everyday life requirements of the population, as opposed to national and regional objectives and investments which do not necessarily benefit the local population and their living environment.

A recent example of how citizens can feel that the interests of metropolitan governments are far removed from their own, comes from the referendum for the approval of the new Greater London Authority, held in May 1998, which had a participation of only 34.6 per cent of Londoners (of which 72 per cent voted in favour of the new authority).

The above issues are partially reduced if, following the public choice approach, instead of the pure metropolitan model, a metropolitan structure is constituted by voluntary agreements to create an intermunicipal organisation. Generally, intermunicipality is a less complete form of metropolitan government because:

- political legitimacy rests with the number of basic authorities who are represented in the metropolitan councils;
- intermunicipal structures seldom have financial autonomy, and their resources are generally drawn from the member authorities and from subsidies granted by higher levels[4];
- they may be limited to specific purposes and competence.

Although agreements in metropolitan areas to enhance intermunicipal co-operation and consultation with special-purpose agencies are widespread, progress in improving metropolitan governance is slow -- due to deep-rooted differences of opinion about the nature and extent of the institutional and financial reforms required.

Some (few) countries favour the amalgamation of local authorities with stronger metropolitan governments; others reject the introduction of yet another level of government and favour more fragmented systems, tempered by technical planning structures (often required by national laws) to achieve area-wide objectives.

More recently, institutional innovations have been introduced to strengthen metropolitan governments within the framework of national and regional territorial reforms which are redefining the role of different levels of government. This has been the case in particular in unitary countries such as the United Kingdom, Greece, France and recently Italy. During this process, new definitions of "territory" are sometimes being introduced which seek to take into account the social, cultural and environmental aspects of metropolitan areas as well as their geographical or economic/functional characteristics.

Despite the open debate about the modalities of institutional arrangements, and their uneven implementation in practice, it can be said that there is an increasing consensus between experts and policymakers that metropolitan governance today requires at least an enhanced ability to plan in a jointly responsible way, and the formulation of a collective framework of actions based on solidarity and strategic thinking, whatever shape this may take in practice.

A core part of this new collective framework should, however, be accomplished to adapt urban public finance, to better espouse new institutions and/or co-operative processes and the financial responsibilities of different levels of government, within an overall context of constraints on local authority budgets. The latter are increasingly turning from the strong tendency of national governments to achieve fiscal consolidation by reducing levels of grants and revenue allocations to subnational government.

The urban fiscal framework may involve a variety of changes, for example, in vertical and horizontal allocation of public finance; better financial and fiscal integration of metropolitan areas with their regions; intra-metropolitan tax sharing; innovations to tap new sources of revenue or reduce public expenditure; co-operation with the private sector, for example in the financing and provision of urban infrastructure and urban services, etc. These core issues will be discussed in the next chapter.

4. THE FRAMEWORK OF URBAN PUBLIC FINANCE

The dominant view appears to be that urban settlement patterns reflect the location choice of individual firms and households and that their choices are partly influenced by both the level of taxes and charges they face and the quality of services they receive from government. If we accept it, then we must also accept that fiscal equalisation, with its effect upon the ability of subnational government to provide services, has some effect on the attractiveness of particular areas to individuals and thus, on the spatial allocation of resources.

Therefore, we contend that fiscal equalisation might become an important policy lever to orient spatial development, and consequently future transport patterns, towards desired sustainability goals. However, before discussing what fiscal equalisation is and why it should become a widespread practice, we have to spend some time in this chapter to justify the new emphasis given to fiscal regulation and to introduce the main characteristics of urban public finance. In the next chapter, we will then address more directly fiscal co-ordination and equalisation issues.

Is there a real motivation for the emphasis on fiscal incentives? Indeed, the claim that local government taxes and services influence investment decisions is heavily debated in the literature. Other, external factors, such as labour market and building costs, are said to be more influential (Wasylenko, 1981). Even if this is true, it is equally true that the importance of taxes and the "quality of life" which can be bought with them is increasing for at least two reasons:

- In the new information economy, material inputs are less important than intangible ones. A pool of high-quality human resources, internal or external to the firm, lower transaction costs and agglomeration economies which make face-to-face contact easier are increasingly important factors in business location choices. In this context, the attractiveness of cities and the quality of services provided by the local authority, and especially transport services for commuters and business visitors, is becoming a core element. To use a metaphor, what in the old industrial society was the task of the "unit to control methods and timing of production" within the factories, is perhaps today substituted by the wider, and more challenging, task of controlling mobility "modes and timings" within the city. The indirect productivity gains of a well-functioning transport system are difficult to measure, but it is evident that fast and reliable transport systems can accommodate growing businesses, consumers and social interaction in a limited space;

- The importance of local taxes and charges and their visibility is increasing. The second half of the 20th century has seen the predominance of labour and income taxes. Nowadays, both the evolution of the new economy, which is changing the process of value-added creation and making labour a more volatile tax base, and the increasingly harmful impacts on the environment are moving the "polluter pays" principle and the practice of taxing externalities to the core of taxation systems . Most of these externalities have a limited area of impact, and are therefore suitable for taxation or charging at the regional or even local level.

As concerns the features of urban public finance, the overall financial and fiscal structures of EU and OECD Member countries are well known to be different, and largely dependent on each country's history, entrenched traditions and its level of decentralisation. However, although there is no single EU or OECD "model", some common characteristics of urban public finance systems can be identified. Broadly speaking, the lower levels of government (e.g. municipalities) always draw their revenues from three main sources:

- Taxes (including property taxes, sales tax, income and profit tax, and business tax, in variable proportions depending upon specific countries and cities);

- Grants/transfers from higher levels of government (general or specific);

- Charges (including user fees/charges and private sources, e.g. development charges and contribution for land dedication and off-site infrastructure).

On the whole, the separate resources of municipalities composing a given metropolitan area are variable: some municipalities do not rely much on local taxes, but mostly on transfers from higher levels of government, while others are heavily dependent on a small number of local taxes, such as property taxes, personal income taxation or business taxes. Considering the overall local tax structures and revenue trends in OECD countries (Caulfield, 2001), the income and profit tax is the most important. It can take a number of forms: tax-sharing arrangement with higher levels of government; separate tax rates but a central tax system; separate rate and allowance structures; and separate tax systems.

The advantage of an income tax over the second most important source of tax revenue for local governments -- the property tax -- is deemed to be its relative progressivity. However, the property tax is increasingly applied. This is essentially regressive in nature since it is not related to household income (i.e. higher-income households pay relatively less than lower-income households), but satisfies most of the accepted criteria for local taxation that are not satisfied by local income taxes, including the following (Owens and Norregaard, 1991):

- The tax base should not be very mobile, otherwise taxpayers will reallocate from high to low tax areas and the freedom of authorities to vary rates will be constrained;
- The tax should be visible, thereby encouraging local government accountability;
- It should not be possible to export a large part of the tax, thereby weakening the link between local taxes and benefits;
- It should be relatively easy to administer.

The share of transport and land-use related taxation is notable. The following table represents three basic dimensions of any taxation system: i) tier of government levying the tax; ii) type of activity taxed (transport, land use, other); iii) direct -- i.e. directly linked to the usage of land, infrastructure or services delivered by the local authority -- or indirect.

		Transport	**Land Use**		**Other**
			Existing	**New**	
Direct	**Local**	Road pricing	Property tax	Development fees	User charges
	Regional	Parking charges	Betterment levies	Impact fees	
	National	PT fares			
Indirect	**Local**	Gasoline tax	Business tax		Income and profit taxes
	Regional	Vehicle ownership tax			
	National				

Direct local transport taxes typically include road pricing, parking charges and public transport fares; direct land-use taxes can be divided into taxes on existing uses (e.g. property taxes and, eventually, betterment levies raised from existing land uses which benefit from a new infrastructure) and new developments (e.g. development fees, impact fees) and user charges for services such as electricity, water delivery and other urban services. These are all autonomous sources of revenue for the local authorities, and their importance is growing everywhere. The indirect forms of taxation are usually levied by higher levels of government[5], and their burdens are not directly linked to the use of transport infrastructure and services or land, but can have an effect on location or mobility choices.

Cities must finance not only recurrent service needs, but also new infrastructure. Actually, for many OECD countries the central issue is not one of financing major and rapid new development, but rather one of maintaining a vast stock of fixed assets, renewing run-down or obsolete assets and introducing new technologies as they emerge. On a global scale, it is an open question whether the demand for funds to develop urban infrastructures in the expanding cities of the developing world[6] will lead (by increasing competition for finance) to shortages in funds for investment in urban infrastructure in OECD countries.

In any case, identifying the best means for financing urban infrastructure is a central policy issue. Fiscal sources are increasingly insufficient, and mixed public-private financing schemes are becoming ever more popular, even if present difficulties to realise effective Public Private Partnerships (PPP) must not be underestimated. On the whole, private sector involvement is claimed to be more likely and possibly efficient in infrastructure services when several conditions hold, including: i) variable costs largely relative to fixed investment; ii) inclusive PPP (not only financing, but also operation of the service); iii) projects enjoying some monopolistic features and which are highly profitable; iv) projects which have explicit or implicit government guarantees covering various risks; v) projects in which technological developments have reduced the costs of infrastructure provision (this condition relates to the first one). In addition to this, on the side of the public authorities, a big cultural shift is required from the traditional bureaucratic style to a more innovative and goal-oriented attitude. In particular, both organisational changes and training investments are needed to enable civil servants to develop their skills in contract evaluation and management, and in negotiating complex contracts.

The main element which differentiates urban public finance in the individual countries is the degree of fiscal and financial autonomy of subnational governments. There are countries with very strong regional and local governments and countries with very weak subnational governments. One main indicator used to compare the degree of autonomy of subnational governments in individual countries is the share of subnational governments in total government receipts. But revenue raised by subnational governments is only half the story.

The other consideration is what share of total expenditure is accounted for by subnational governments. The share of total expenditure of subnational governments tends to be greater than its share of total revenue, with the difference made up by transfers from national government. When transfers from central to local government form a large part of local revenues, the situation is qualified as one of "vertical fiscal imbalance", whereby local authorities have very little power to control their own revenues and expenditures. It is interesting to note here that, while this vertical fiscal imbalance gives place to general-purpose grants from higher levels of government to subsidise the overall local budget, in some countries public transport in larger cities has been subsidised directly, with specific-purpose transfers from the State or the Regions.

Vertical fiscal imbalances are increasing. When there is pressure on public finance -- which is constantly the case, at least in Europe, e.g. to comply with the Maastricht rules -- national governments have a strong tendency to achieve fiscal consolidation by reducing levels of grants and revenue allocations to subnational governments. Consequently, the latter have to reduce expenditures, alter priorities and raise taxes, or otherwise adjust their patterns of revenue and expenditure to make up the shortfall. The net result is less public expenditure and fewer resources to finance urban infrastructure and services (which makes it more urgent and important for public authorities to involve private finance in their projects with PPPs).

The rationality of this conflict, between the apparently superior interests of macroeconomic stabilization at the national level and the financial needs, wealth and prosperity of cities, and especially large metropolitan areas, is debatable anyway. The conflict itself is built into the current practice of public finance. We have already quoted the economic relevance of a global city like Tokyo (whose economic performance is comparable to that of the UK), and similar comparisons could be made for several global cities in Europe (e.g. London, Paris). But, as matter of fact, the interaction between national economic performance and metropolitan economic performance seems to be poorly understood in the EU and OECD countries. Lack of national government interest in the financing of cities may stem from a lack of analysis of the implications for national economies of variations in the levels of productivity in cities. The new information economy is increasing the role of networking. Also a number of specialised sectors or clusters of high-tech firms, universities, R&D laboratories and

innovative SMEs, usually located within larger cities, are at the forefront of globalisation and technological trends. Consequently, we need to focus greater attention than before and more research into this area.

5. FISCAL CO-ORDINATION AND EQUALISATION OF FISCAL DISPARITIES

Apart from a better knowledge of the interaction with and quest for an enhanced co-ordination between national and metropolitan public finance at macroeconomic level, there is much room for manoeuvre to improve fiscal co-ordination and the equalisation of fiscal disparities within the framework of urban public finance, mostly at regional and local level.

Firstly, fiscal co-ordination between taxes levied from different authorities and in different sectors, with the aim to harmonize the incentives, is hardly ever achieved. An illuminating example is given by the gasoline tax in Germany, which is an eco-tax aiming to reduce the vehicle-kms travelled, but whose effect has been practically nullified by the allowance given to commuters to deduct gasoline tax payments from their income tax base, creating in this way a strong incentive to locate in the suburbs and travel more in order to reduce the personal income tax bracket.

Secondly, fiscal disparities are a natural subject of classical urban economics, and their equalisation is a core policy issue in this field. Fiscal disparities result when some cities (or localities) have fewer taxable resources and higher costs for providing services than other cities (Yinger, 1986). This is caused by conditions beyond the municipal authority's control, which can include: the loss of jobs and middle-income residents which diminishes the size of the city's tax base; a growth in minority and low-income populations dependent on welfare; a growth in financing services which provide benefits to non-residents, such as commuter transport and cultural and recreational facilities; and an ageing infrastructure with high cost replacement. Due to globalisation trends, most of these unfavourable conditions are exacerbating the situation of cities. In addition, the widespread trend in EU and OECD countries towards a higher proportion of elderly persons, often living in the inner cities, and a low-active/non-active population ratio will require substantial investment in housing, infrastructure and services to adapt the city to the needs of older people. Moreover, decentralisation trends in most countries have increased the burden of local authorities but are not always accompanied by corresponding financial resources, and even cuts in transfer from higher levels of government have occurred in many countries, reducing the volume of derived finance available to municipalities to maintain the same bundle of services.

Municipalities are used to putting various measures in place by themselves, which do not require any co-ordination. The former include: i) producing more services with less money, also through outsourcing production to the private sector (increased efficiency at the local level); ii) taxing non-residents or "tax exporting" through, for example, increasing sales tax or -- as in some tourist resorts, not always justified by an additional demand for local services -- taxation of holiday homes; iii) increasing the proportion of user charges in the city's revenue budget (which also has the effect of exporting costs to non-residents, as is the case for road pricing or parking charges levied on commuters).

However, these individual responses can easily have the effect of shifting the problems away from a single municipality and creating adverse impacts for the surrounding municipalities. The overall effect could be a reduction in the quality of life and a diminished economic and social cohesion for the whole urban region.

The solution, not surprisingly, is to enhance co-ordination and adopt coherent and comprehensive institutional, fiscal and policy frameworks at a wider territorial level, to reflect the potential and needs of the entire urban region. In this context, three avenues for co-ordination must be considered in turn:

1. Pooling resources and responsibilities together, introducing some forms of metropolitan level authority or co-ordination arrangement for selected services or functions;

2. Introducing regional equalisation funds (or even national or metropolitan, depending on the context) in order to enhance the economic and social cohesion of the urban region, in particular ensuring the equitable accessibility and attractiveness of places for living and working activities, and minimum public service requirements (USO) in urban and rural areas;

3. Whilst dealing with metropolitan plans for new transport infrastructure and land-use development, encouraging integrated implementation, public-private partnership and capture of value added (betterment charges, impact fees, etc.).

The first two mechanisms are general-purpose and aim at improving the financial resources and allocation of responsibilities required to deliver more attractive and equitable quality of service to the existing commercial and domestic populations; the latter mechanism is more specifically focused on financing and exploiting new infrastructure to enhance the competitiveness of the urban region. We will discuss general co-ordination schemes in the next chapter, while value capture will be considered later, in the context of integration of transport and land-use planning.

6. METROPOLITAN FINANCE AND EQUALISATION FUNDS

In terms of finance and responsibilities, metropolitan authorities can be roughly classified into three types (OECD, 2001):

– *Bodies which ensure co-ordination without enjoying own resources*. These have small budgets and low financial needs. They co-ordinate local authorities, which cover their running costs;

– *Metropolitan authorities,* which are essentially managers of collective, area-wide services, such as public transport, urban planning, etc., and which procure substantial revenues from user charges and contributions from member municipalities. These, on a voluntary or compulsory basis, transfer certain of their responsibilities to the metropolitan authority;

– *Integrated or centralised bodies*, composed of directly elected representatives or delegated representatives from the municipalities; in some cases, following a top-down approach, these can include wider regional bodies (such as the province in Italy) which are actually higher levels of government (intermediate, below the region, but above the municipalities) with their own tax base and which receive special grants from State budgets, including funds for equalisation between municipalities with quite different tax bases.

Among the advantages which the creation of metropolitan government hopes to achieve are: more efficient provision of infrastructure and public services and, thanks to the pooling of revenues and redistribution of services where needed in the territory, better equalisation of finance between the different municipalities making up the metropolitan area. Where metropolitan authorities have been established, however, their financial situation has been characterised by the same trends as those affecting the municipalities described above. There is a clear relation between the amount and source of revenues of metropolitan authorities and the extent and type of their responsibilities. When metropolitan authorities dispose of a specific budget, this is usually derived from the same types of sources as the municipalities: own resources (taxes and charges), grants from higher levels of government or from the municipalities of the metropolitan area, and loans (in the countries where these are authorised, usually with some constraints to reduce the risk).

In this context, the rationale for intra-metropolitan equalisation funds -- possibly to be managed through the metropolitan authority and usually fed by higher-level government transfers (regional or from the State) -- is quite clear. Intra-metropolitan fiscal disparities (usually between municipalities of the central city and its periphery) create tensions which, apart from equity considerations, have negative impacts on the image of the metropolitan region and which affect its competitiveness and overall quality of life. In some cases, it is the suburbs, which are wealthy and avoid integration with the central city; in others, the opposite situation prevails. Variations in finance and taxation in different urban municipalities can lead to unhealthy intraurban competition for the location of businesses (e.g. the case of a car-dependent shopping mall authorised by fringe municipalities and in competition with retail in a PT-served urban core). Where there is no policy of financial equalisation between municipalities in the metropolitan area, competition between them usually benefits the wealthier areas and can intensify spirals of decline in poorer neighbourhoods. As a result, the effects of dualisation of the urban economy become more pronounced and spatially differentiated.

As a whole, when they exist, metropolitan areas do not implement direct fiscal equalisation schemes between central cities and peripheral municipalities (apart from the notable exception of Stockholm, illustrated in OECD, 2001). However, equalisation can and should be applied not only at intra-metropolitan, but also at wider territorial levels, regional or even national, when there are severe imbalances in the levels of development (e.g. between urban and rural areas in the same region, or between wealthier and poorer regions in the same country) and, therefore, serious intra- and interregional fiscal disparities.

Ideally, whenever needed due to the existence of strong disparities, a full hierarchy of national, regional and intra-metropolitan equalisation funds should be encouraged. A cascade of equalisation grants -- from the central to the regional governments and from the latter to metropolitan authorities -- could be more systematically implemented.

Currently, most EU and OECD countries have some systems of equalising public provision across subregions and metropolitan areas. While the means to achieve the objectives may differ, the objective is the same, that is, to try to reduce disparities between local authorities in their tax capacities and in their spending needs, and to place all of a nation's citizens on the same equitable basis with

regard to basic quality-of-life conditions. In general, fiscal equalisation takes the form of differentiated financial transfers from central to local government, based on a recognised and, in some cases, statutory formula for redistribution.

Current experience with these equalisation funds in local finance shows that their effects will depend on three factors: i) the proportion which grants represent in the total revenue budget of local governments; ii) the form in which the grant is given, that is, specific-purpose (e.g. subsidies for public transport services) or general grant; iii) the formula used for distributing the grant, which will have differential impacts. In recent years there has been a general trend away from specific-purpose grants to general or block grants, with the consequence that fiscal equalisation systems have become more important.

What is most important, however, is the technical quality and coherence of the distribution formulas chosen at the various territorial levels in order to achieve the targets of equalisation. These, typically, should include indicators of revenue potential on one side and urban indicators of structural, territorial, demographic and socioeconomic conditions on the other. They differentiate between service needs and costs from city to city, at least as far as the twofold objective of equalisation is concerned, i.e. income equalisation and equalisation of structurally related cost differences.

The key message to governments is to strengthen the use of indicators as a means to distribute equalisation funds, whose effects are deemed to be positive for economic and social cohesion of cities and regions in Europe, without hampering competitiveness, which should be granted by a concomitantly increasing modernisation of urban services provision and the opening to the market of their production.

Indeed, the use of urban indicators as a means of reducing costs and improving the management of services is presently insufficient. We contend here that there is a structural reason for this: monitoring performance at the level of individual cities is not enough, because there are structural aspects which differentiate between the ability of cities to cope with their citizens' demand and which are beyond their control. These aspects -- revenue bases, structural cost differentials -- if monitored without any real possibility to intervene as a single municipality, can only cause frustration for local policymakers.

Central government should therefore encourage municipalities, in metropolitan areas and beyond, to develop their urban indicators in the context of a wider benchmarking of performance, finalised to the equalisation of fiscal disparities and opportunities for local governments to provide better services to their citizens. The final outcome to be achieved should be more sustainable and balanced spatial patterns, where discrepancies in conditions of quality of life -- at least as far as the endowment of basic services are concerned -- are mitigated.

This key message will be considered again in the last chapter, where a possible urban accounting system, aiming at consolidating the methodology of urban indicators and their practical application in the future, is proposed. However, before moving on to this, in the next chapter we will focus on how to improve co-ordination of fiscal incentives in the context of transport and spatial policies. The focus will be on large-scale infrastructure or land development projects, whose impacts spread over an urban region and beyond and whose realisation typically requires co-ordination and participation in the decision and implementation processes of several public authorities and, increasingly, private actors.

7. INTEGRATION OF LAND USE AND TRANSPORT: HOW TO ENSURE THE RIGHT FISCAL INCENTIVES

The problems of co-ordinating financial and fiscal resources, and their use to provide an equitable distribution of services on the territory, are exacerbated any time a large-scale transport or land-use development is planned. Its realisation promises to create new economic opportunities, but also new challenges for the socioeconomic cohesion and environmental quality of the area concerned. New resources are required to be invested in the project, and a new pattern of transport and induced spatial effects are expected. There are several challenges to be met:

- The realisation of a large-scale project usually involves several higher-order domains in activities which physically transform a limited parcel of land. Problems of unco-ordinated decisionmaking are likely to occur during the infrastructure design, building, operation and maintenance phases (implementation problem);

- Conflicts of interest are likely to occur at the local, regional and national level, both between different public administrations (e.g. the conflicts between cultural heritage preservation office and local planning bodies whenever a new infrastructure threatens a preserved area) and with private stakeholders and/or citizens living in the area, who fear the negative environmental impacts, noise, etc., of the infrastructure;

- There is an output dimension (i.e. successful implementation) as well as an outcome dimension (i.e. successful realisation of city/region development objectives without harmful side-effects) of any project which permanently changes the urban landscape.

Best practice should imply a coherent vision and planning strategy and a permanent monitoring of new infrastructure impacts, at the different spatial levels at which they manifest themselves. This can be more easily achieved when the scale of the project is relatively small, allowing for decisionmaking and project management fully under the responsibility of a local authority. But it is a more challenging aim when, on the contrary, a large infrastructure crosses the territory of a multiplicity of local authorities or, in any case, has a wide impact on regional or even national and cross-border regional development. This is exactly the case where regional and metropolitan forms of governance, as discussed above in this paper, should come into force.

Whatever form metropolitan governance will take, final responsibilities should be allotted according to the well-known subsidiarity rule. A straightforward application of this rule within the context of transport and spatial policies is that *the power to decide about a land use or transport infrastructure in a given territory should be given to the lower level of government which represents at least the greater majority of the impact population.*

In modern democratic systems, decisional powers are well known to be distributed between national, regional and local governments, each with their electoral bases and tax bases, which assures financing of government activities (see Figure 1 below). Decisional powers typically concern decisions regarding legal and planning acts, regulations, investment and service provision, tax and charges to be levied at the national, regional and local levels. Local government projects and services are financed with resources coming from the local tax base, or specific and (increasingly so) general-purpose grants from the higher-level governments (regions, state) which are, in turn, financed by raising regional and national taxes[7].

Based on the more or less wide scope of a public intervention -- regulation, service, infrastructure -- the *impact population* can be identified in a local, regional or even a nation-wide area. The full application of the subsidiarity principle should therefore ensure that the electoral bases and impact populations mostly overlap. For instance, some responsibility for authorisation and control of large-scale developments (e.g. shopping malls) should be allotted to a level of government higher than the municipal one, because this large-scale infrastructure has a regional impact. A too-decentralised structure of powers, with decision in the hands of municipal governments, will create the wrong incentives, while a too-centralised power (e.g. decisions taken by a central government agency) will usually lack the needed flexibility and timeliness.

Actually, the subsidiarity principle is called for in many political debates, at least as many times as it is ill-applied in practice. Often, whenever the power of land-use regulation and control is fully delegated to municipal governments, the wrong incentives are built within the urban planning and land control system, even when relating to large-scale developments. It is a common experience nowadays to see jurisdictional competition between bordering municipal authorities, which compete in various ways to attract business activities, commercial developments, etc., even if they cause social cost and spillover effects in terms of congestion, pollution and so on. This is mainly caused by the wish of local authorities to gather new tax payers without charging their electoral base. In various EU Member countries, local tax systems can include companies, tourist activities, owners of holiday houses, etc. In fact, local authorities which succeed in attracting non-resident tax payers -- who vote elsewhere for local elections -- have a sort of political "double dividend", gaining financial resources to spend for local infrastructure and services without increasing the tax burden of their local electoral base.

At the end of the day, excessively promoting an uncontrolled "city marketing" logic could pose a threat to the correct functioning of local democracy, because it contributes to widening the gap between local decisionmakers and their electoral and tax bases, i.e. the wishes of the populace which ultimately should legitimate and control public choices and actions. On the contrary, a coherent and widespread application of the subsidiarity rule to allocate the right decision powers at the right place, should increase the overlap among three population categories -- those who are directly affected by the political decision to build the infrastructure, those who delegate the power of decision to the local politicians by giving them their vote and those who finance the government by paying the local taxes.

In the attached Figure 1, this is represented by the ratio between citizens and impact population (C/I) and the ratio between citizens and taxpayers (C/T)[8]. The key message here is that finding the right fiscal incentives for sustainable transport and spatial policies is primarily an intense political issue, or better, an issue of institutional (re)engineering. Based on the evaluation of the actual spatial scale of the impacts of a planned large-scale development, in a coherent institutional framework decisions should be taken under the responsibility, or at least with the contribution, of those governments elected and financed by the same population base on which the new infrastructure will have an impact. Although it will be impossible in most cases to include all the network and spillover effects (in other words, all the impact population), a balance of the ratios between citizens (the electoral base), tax payers and policies' target populations should be constantly pursued: perhaps Adam Smith's classic prescription "no taxation without representation", could nowadays be expanded to include "no externalities without taxation", strengthening the relationship between being a tax payer, a voter and a receiver of public choice impacts under the same government.

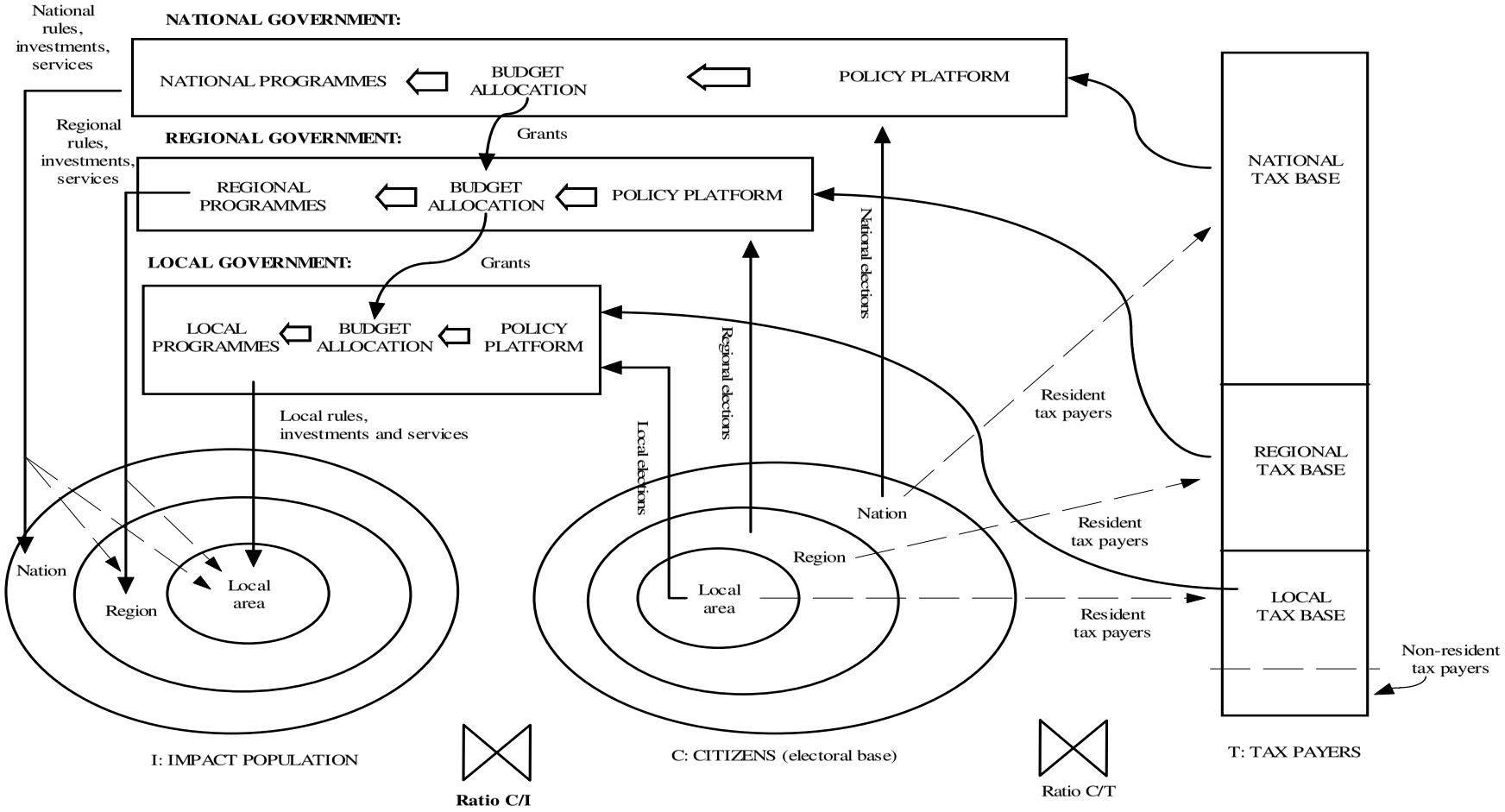


Figure 1. **The public choice process in a modern democratic system**

We can even say, to stress the relevance of this substantially political issue, that to the classical factors of economic and social growth -- inputs of labour, capital and new technology -- it is increasingly important to add a fourth "institutional" factor of growth and prosperity, i.e. the transparency and accountability of public government and the consequent incentive for government and civil servants to be effective.

Perhaps this is nowadays the crucial factor in achieving sustainable development goals. The idea is not new, as can be seen from the following literal quotation from Jean-Jacques Rousseau (*The Social Contract*, Book III, Chapter VIII, p. 1762):

> *"In all governments of the world, the public person consumes, but produces nothing. Whence, then, comes the substance it consumes? From the labour of its members. It is the superfluity of individuals that supplies the necessaries of the public. Hence it follows that the civil State can subsist only so long as men's labour produces more than they need. Now this excess is not the same in all countries of the world. In several it is considerable, in others moderate, in others nothing, in others a minus quantity. This proportion depends on the fertility of the climate, on the kind of labour which the soil requires, on the nature of its products, on the physical strength of its inhabitants, on the greater or lesser consumption that is necessary to them, and on several other like proportions of which it is composed.*
>
> *On the other hand, all governments are not of the same nature; there are some more or less wasteful; and the differences are based on this other principle, that the further the public contributions are removed from their sources, the more burdensome they are. We must not measure this burden by the amount of impost, but by the distance they have to traverse in order to return to the hands from which they have come. When this circulation is prompt and well established, it matters not whether little or much is paid; the people are always rich, and the finances are always prosperous. On the other hand, however little the people may contribute, if this little does not revert to them, they are soon exhausted by constantly giving; the State is never rich and the people are always in beggary. It follows from this that the more the distance between the people and the government is increased, the more burdensome do the tributes become (…)."*

To maintain, as we did above, that building the right incentives for sustainable transport and spatial policies is primarily a political issue does not mean denying that we also need to improve some specific financial and fiscal tools, or create new technical tools to support the policy process.

On the contrary, there is a growing need, for instance, to apply relatively new -- at least in the European context -- financial practices as value capture, as well as to develop new decisionmaking tools, especially to improve the accountability of policies and government at the metropolitan level, and strategic assessment techniques.

The two issues are not directly related: in the following, we will briefly illustrate value capture[9], to devote subsequently more attention to a proposal for an urban accounting system, whose ambition is to provide a standard methodology for the monitoring and assessment of urban economies.

8. VALUE CAPTURE

In all cases of infrastructure provision, it is important to overcome the low-profit nature of most infrastructure projects. Therefore, value capture has been seriously considered as a financing mechanism in many countries -- mostly outside Europe -- to integrate revenue sources from the transport and land use sides.

To explain the rationale behind value capture, the effects of investments in infrastructure may be divided into direct effects (lower production and transaction costs, higher land and property values) and indirect effects (economic climate and growth of GDP, positive urban development and better social conditions).

Indirect effects belong, by definition, to the public domain and they cannot be allocated to individuals. But direct effects can, in principle, be individualised and therefore captured. For instance, lower production and transaction costs are a result of gains in travel times and costs by firms and individuals, and could be captured by means of higher user fees. The same reasoning applies to higher land and property values in the proximity of infrastructures, when these prices increase due to improvements in accessibility. Self-reinforcing feedback between transport infrastructure development and that of surrounding land is often observed.

In the OECD report (2000), value capture is defined as "*a mechanism by which the agency responsible for the development of urban transport infrastructure transfers part of the financial benefit gained by land developers or the community at large* (Tsukada and Kuranami)." In practice, this basic mechanism can take various forms which can be categorised into three groups according to the beneficiaries to be asked for the payment: i) the provider of the infrastructure itself; ii) the developer of the infrastructure's surrounding area; and iii) the owner of the property area:

- *Value capture from infrastructure providers.* The first category of value capture is the internalisation of the external economy by linking different projects by a single provider, from either the private or public sectors. In this way, for instance, low-profit infrastructure projects and high-profit commercial projects can be provided by the same developers, making total projects profitable, through internalisation of external economy and self cross-subsidy. This type of value capturing is especially used by private railway companies who develop the land along the railway. The most interesting examples can be found in Japan, where in 1991 a national law on "Special Measures of Promotion of Housing and Railway Development in Urban Areas" was enacted, and where the private sector plays a major role in urban railway transport. Another variant of value capture from infrastructure provision may occur when a municipality or other public authority is an interim owner of property in the development process. In this case, the public authority might recover part of infrastructure costs via disposition prices -- that is, the price it sells land or property on the market. In so doing, the public sector can easily capture the added value to the property and use it for project financing of transport infrastructure. This latter form is usually associated with expropriation schemes and right of pre-emption, in order to control land value increases in anticipation of public actions and to capture the added value appropriately;

- *Value capture from developers.* The second category implies asking developers to contribute either in kind -- in the form of direct provision of part of the infrastructure -- or paying monetary fees. Presumably, the amount of these fees will be passed on to consumers who

purchase land, goods or services from the developers. In several countries, various kinds of developers' fees are currently in use. Another less common option is to use Transfer of Development Rights (TDR) as a measure of value capture;

– *Value capture from property owners (other than developers).* The capture of value via a special property tax theoretically constitutes the ideal means of capture, in terms of both fairness and the internalisation of external effects. However, this type of taxation, which has been tested in a number of countries, has not been successful, with some notable exceptions (e.g. the US system of tax increment financing). Forms of value capture from property owners include:

  i) Traffic impact fees exacted from traffic-inducing developments, which are intended to compensate for public infrastructure improvements warranted by the additional traffic demand;

  ii) Betterment levy, a widely-used method to request a piece of land from landowners who benefit from land replotting, urban redevelopment or provision of infrastructure, but generally used for area-based public facilities, such as local roads or parking facilities, not for the provision of major transport infrastructure (e.g. regional roads or urban railways);

  iii) Special financing districts, widely used in the US to ask the beneficiaries to finance projects, consisting in designated areas where a special tax is levied on owners of properties, in addition to the usual property tax and based on the increased value of property;

  iv) Tax Increment Financing (TIF), which is again widely used in the US. The latter system assesses the total property tax levy in an area designated by the local government, and issues bonds to be paid off with the projected increase tax revenues generated by infrastructure improvement and related developments, including railway station redevelopments, new office and residential buildings, etc. Another type of TIF is based on the taxation of income generated by increased sales.

Apart from the above-mentioned methods, an obvious impact of transport improvements and better accessibility is to enhance the capital gains of land value as well as other kinds of capital gains. Thus, property tax and capital gains tax, the most widespread taxing methods, are without doubt a kind of tool to capture the value, because they are related to property value. However, they are not earmarked to project financing, and for this reason cannot be classified as specific value-capture methods.

There are relatively few examples of the application of this integrated mechanism of financing urban transport infrastructure and land-use development, especially in Europe, and even less successful experiences. Some of the most renowned examples of value-capture practice include railway development in Greater Tokyo (R. Cervero, 1998), the Hiroshima tram line and the Los Angeles Metro line (OECD, 2000).

These and other experiences analysed in international studies have shown that the main merit of value capture is to provide additional funding for infrastructure projects, thus increasing their feasibility and reducing public spending. In large cities, land and property effects can contribute about 10 per cent (Los Angeles) or even 21 per cent (Hiroshima) of total investment costs. Differential patterns of density can partially explain the different potentialities for value capture, because land

values tend to be obviously greater in the most densely-populated areas as, for example, in the Asian countries. Benefits from value capture are also greatest in vigorous economies with expanding property markets.

However, value capture can only be applied in the context of a broader, integrated policy framework, where transport and land-use co-ordination is actively pursued. Therefore, we return to the importance of building a correct system of regulatory and fiscal powers as the fundamental prerequisite for any innovative practice in the field. Another serious barrier to the widespread adoption of value capture stems from the fact that value-capture mechanisms need to be designed and implemented with great care, as they may become complex and add risks. Tools to make value capture work are still crude and limited, while the implementation of value-capture methods requires sophisticated skills in the fields of urban planning, transport planning, the property market and finance alike, which are difficult to find in most European cities (perhaps with the exclusion of some global cities such as London, Paris, etc.).

9. A TOOL TO ASSIST METROPOLITAN GOVERNANCE: THE URBAN ACCOUNTING SYSTEM

Value capture is inherently episodic. It could and should be applied to enhance the financial viability of large infrastructure and development projects which promise to differently shape transport and land-use patterns, not only over a restricted area, that over which the new project is realised, but also widely in the urban region.

However, a more permanent co-ordination of fiscal incentives and the decisionmaking process is required, according to the subsidiarity principles illustrated in chapter 6 above. In this context, whatever form metropolitan governance will take, there is no doubt that redistribution of fiscal resources is best carried out through pooled regional resources and by creating federations of localities willing to share taxes and mitigate competition. In this context, equalisation funds can be used to implement redistribution on an equitable basis, taking into account not only structural differences in fiscal capacity but also in the needs and costs of basic services to be delivered to the citizen. To establish the right fiscal incentives in this way is a prerequisite for co-operation between public authorities, aiming to build strategies of sustainable development for the urban region as a whole.

Combining strategies which enhance competitiveness in a given metropolitan area with strategies for a liveable urban environment requires considerable foresight, based on a good understanding, on the part of all concerned (public sector, business and the community), of the economic and social forces at work in the urban area and their local impact on people and places, as well as taking into account broader regional, national and international parameters.

To undertake this task and guide them in their policy choices, city and regional leadership together will increasingly require sound information to enable them to monitor how economic and social trends, as well as public policies, interact to create either a dynamic environment for sustainable development or a spiral of decline and unsustainable development in a given neighbourhood or city-wide.

Establishing an area-wide strategic framework based on a vision of the future of the urban area surely requires a strong political leadership and commitment, but also adequate technical inputs, including access to sound data about the region, such as territorially-linked indicators of economic performance and quality of life and forecasts of future trends based on different scenarios. On this basis, regular evaluation of progress can be made.

The challenge here is to provide an urban-area accounting system which should, at the same time, be compatible with the existing statistical procedures and national accounting methods, in order to allow comparison of urban trends with national and international parameters. It is also important to establish general methodological standards for these accounting systems, to avoid the proliferation of non-comparable data and information from cities.

A proposal and first pilot experiment of an urban accounting system has been made in the context of the ACT-VILL studies, financed by the European Commission with the scope to research and design new tools and approaches for enhancing metropolitan governance in Europe. ACT-VILL Study 4 -- Simulation models for cities, carried out by ISIS with the assistance of international experts of urban planning, has finally produced a new integrated urban accounting approach[10].

Briefly, the basic proposal of this study is to build, for a given reference year and referring to the chosen urban region, a complete system of economic and social accounting matrices and extensions, composed of:

- An input-output table of the urban economy;
- A complete social accounting matrix of the urban region (which includes, as a consistent part, the I-O table of above);
- A social demography matrix, in which the movements of population stocks are recorded, adopting several classifications. These may be designed to mainly answer the policy needs of urban government, for example, considering population subgroups by educational levels, health needs, employment requirements, mobility attitudes, migratory flows, etc.;
- A land-use matrix, in which the movements of land and housing are recorded, distinguishing categories of land ownership and/or land uses. This last matrix can be implemented only if the relevant data are collected and updated in a systematic way, e.g. in official cadastral archives;
- Finally, a set of stock matrices for those consumer durable goods that are relevant in the urban context, such as, above all, cars and trucks or domestic energy devices, and for which reliable data exist (both in official registers or in industrial associations' data banks).

Once one is able to build this system of accounts for a reference year -- admittedly a hard but not impossible task, as is often claimed with regard to SAMs development -- it is possible to use the urban accounting framework as the empirical base for modelling and forecasting exercises.

A similar exercise was tried quite successfully for three large European cities -- Rome, Paris, Hamburg -- in order to apply and compare the approach in different cases. The study incorporated four mathematical models in order to provide a diversified approach to forecasting future urban evolutions and define the most appropriate planning policies. Basic features of this exercise were:

i) The application of logistic substitution and systems-dynamic models to encompass a number of variables far greater than attempted so far (population, workforce, buildings, companies, energy, communication, transportation, environment, culture), whilst producing long-term scenarios of urban development;

ii) The adoption of the functional urban region's concept to delimit the geographical area of interest, and the use of preliminary cellular analysis to divide this area into macro-zones, characterised by homogeneous socioeconomic variables;

iii) The construction of an urban input-output matrix for a given base year, where the economic activities of the urban region have been classified under three main categories: global activities, local activities and city industries[11];

iv) Demonstration of how far some of the more credible and proven mathematical models can be integrated by providing a mutual cross-analysis and assessment.

As a final recommendation, ACT-VILL Study 4 advocated a programme to be proposed and implemented in major European cities to standardize formats and statistical analyses, record time series and make them available systematically and publicise quantitative policy plans to enable researchers and analysts to compare interventions and policies in different cities. As a part of this programme, it has been proposed to adopt standard definitions and the social accounting framework as instruments for collection and analysis of data at the urban level, to be implemented for the major metropolitan areas in Europe. As a first stage, the pertinence of economic indicators and classifications available at local unit level could be tested against an international sample of towns.

This programme is still quite relevant today.

NOTES

1. This was, in fact, the ancient Egyptian hieroglyph for "city".

2. For instance, in Italy, the definition of province boundaries, established after Italian unification, is still based on an average one-day's horse ride by military troops.

3. Generally speaking, when a definition of a metropolitan area exists, as in the Netherlands, Germany and Finland, it relates to functionally integrated territories, based on the criterion of defining a catchment area as a daily commuting zone. However, some consider that metropolitan boundaries cannot be definitively fixed in this way because they vary continuously, according to the related function or goal.

4. For instance, in Italy, the recent reform of the local authority code introduced more flexibility to form municipal associations aimed at providing mutual, specific services, and a strong incentive towards association for small municipalities, consisting of a 10 per cent increase in state grants over a limited number of years.

5. This depends on the national fiscal systems, which are different from country to country. For this reason, examples of indirect taxes shown in the table are not allocated to specific tiers of government.

6. In 2010, the Asian middle class, roughly defined as people matching Portugal's GDP per capita today, is expected to number 750 million individuals (OECD, 2001).

7. In this simplified model of multi-layer government we do not consider a third possible source, public debt, which is a possibility usually limited to state finance or, if allowed for lower levels of government, severely constrained.

8. Ideally, these two ratios should converge towards unity, to reflect a perfect overlapping between the three characteristics of being a citizen/voter (C), being affected by the policy (I) and being a tax payer (T) under the same jurisdiction. This ideal situation is hardly achieved in practice, especially for large-scale projects with region-wide impacts (the concept of desired convergence is represented in the figure with converging arrows).

9. A deeper analysis of this technique is beyond the scope of this paper.

10. A quite detailed description of this integrated urban accounting approach is included in ISIS, 1996, available at www.isis-it.com

11. "Global activities" are those economic activities located in the city area which produce goods and services in a global context, i.e. requiring frequent interactions not only with people living within the city area, but also abroad (besides traditional export industries, they include several categories of services); "local activities" are divided into neighbourhood services -- i.e. daily services

normally accessible within walking distance -- and district-wide services; "city industries" are a special category of local activities, which concur to build and maintain the fabric of the city and ensure basic services to citizens, and whose output grows when cities grow (construction, energy, water, sewage, refuse).

BIBLIOGRAPHY

Caulfield, J. (2001), "Study 1 -- Taxation and Equity within Metropolitan Areas". Contribution to the OECD Stockholm Workshop, in: *Cities for Citizens*, OECD, Paris.

Cervero, R. (1998), *The Transit Metropolis. A Global Inquiry*, Island Press, Washington, DC.

European Commission (1998), *Transport and Land-use Policies. Resistance and Hopes for Co-ordination*, Proceedings of the Launching Seminar of the Action COST 332, 24-25 October 1996, Barcelona, Spain, Directorate General Transport, Brussels.

European Commission (1997), *The EU Compendium of Spatial Planning Systems and Policies*, *Regional Development Studies*, Directorate General for Regional Policy and Cohesion, Brussels.

Institute of Studies for the Integration of Systems (ISIS) (1996), "Development of simulation models for particular cities which will be selected in order to evaluate, in an effective way, alternative solutions to problems", Commission of the European Communities, Directorate General XII, September.

Jones, E. (1993), *Metropoli. Le più grandi città del mondo*, Donzelli Editore, Roma.

Levèfre, C. (1997), "Institutional Reforms in Metropolitan Areas: Building Metropolitan Government by Developing Metropolitan Governance", OECD Stockholm Workshop.

Musgrave, R.A. (1973), *Public Finance in Theory and Practice*, New York, McGraw Hill.

OECD (2000), *Integrating Transport in the City. Reconciling the economic, social and environmental dimensions*, OECD, Paris.

OECD (2001), *Cities for Citizens. Improving Metropolitan Governance*, OECD, Paris.

Owens, J. and J. Norregaard (1991), "The Role of Lower Levels of Government: The Experience of Selected OECD Countries", in: Owens, J. and Panella (eds.), *Local Government: an International Perspective,* North Holland-Amsterdam.

Teibout, C.M. (1956), "A pure theory of local government expenditures", in: *Journal of Political Economy*, Vol. 64.

Wasylenko, M. (1981), "The Location of Firms: the Role of Taxes and Fiscal Incentives", in: Bahl, R. (ed.), *Urban Government Finance: Emerging Trends*, Vol. 20, Urban Affairs Annual Reviews, Beverly Hills, Sage Publications.

Yinger, J. (1986), "On Fiscal Disparities across Cities", in: *Journal of Urban Economics*, No. 19, pp. 316-337.

David BANISTER
The Bartlett School of Planning
University College London
United Kingdom

SUMMARY

London, May 2002

1. INTRODUCTION

At the beginning of the 21st century, it is time to reflect on much of the history and development of transport and spatial policies, and then to map out the way forward. Two strong messages have dominated the recent debates on transport, namely, the requirement to integrate transport with spatial policies in a much more coherent way and, secondly, to move towards sustainable urban development. Transport demand arises out of the spatial organisation of the economy, and although transport solutions can help, the real challenge is to address the land-use and development patterns which create the demand. But that integration needs to go beyond transport and spatial policy to include links with other sectors such as health, education, leisure and employment. All elements of society are linked together. The second message is the concern over sustainable urban development and the role that transport must have in achieving the balance between economic, social and environmental objectives. It is accepted that most people in Europe will continue to live in cities and that the quality of life in those cities is instrumental in maintaining (and improving) their economic, social and environmental well-being. Again, transport plays an important (perhaps crucial) role in contributing to that quality of life. To actually make sense of the linkages between transport and spatial policy, there must be some overarching objective to that relationship, and the one chosen for this paper is sustainable urban development.

However, cities are also changing and they will continue to do so as society switches from its manufacturing base to more knowledge-based and leisure-based activities, and as globalisation and technology continue to have a dramatic effect on all aspects of life. The outcome of these economic and technological factors will be more travel with longer distances and perhaps a much looser city form as networks expand. These changes have consequences for spatial patterns of development, with continuing decentralisation and people living more remotely from their work and social networks. New forms of distribution networks will evolve as the Internet is increasingly used for all types of activities (e.g. work, shopping and leisure) – access will be remote and delivery to the door. There are also strong implications of the new lifestyles for resource use and emissions, as all forms of activity (including travel) have environmental consequences. These factors also need to be included within the discussion.

This paper does not attempt to answer all these daunting tasks. Within the context of transport and spatial policy, it will present the range of different incentives available to achieve a more sustainable transport system. Rather than just concentrating on the lists of alternative measures that are available and reasonably well known (ECMT, 1995 and 2002), it will be more selective. Its focus is on the importance of combining policies together into mutually supporting packages, which help achieve clearly defined policy objectives. For real progress to be made towards sustainable urban development, effective policy implementation must be seen in such creative and innovative ways.

The second part of the paper explores the barriers to effective implementation in greater depth. There needs to be an understanding of the reasons why some measures get introduced successfully, but others produce unexpected or controversial results, or are not introduced at all. Six different types of barriers will be covered, together with an assessment of how the difficulties raised by each can be overcome.

In the third part of the paper, the means by which the barriers to implementation can be overcome will be investigated. Many of the obstacles to sustainable transport policy are institutionalised into the economic and social systems. Included here are the allocation of powers and responsibilities to decisionmakers, the unsupportive legal and regulatory framework within which many agencies work and the weakness of the pricing and fiscal frameworks. Apart from the co-ordination and integration requirements of transport and spatial policy, there is much greater need for public participation and involvement in the decisionmaking process. It is through partnership and acceptance of both the need to reduce travel demand and to use public transport or more local facilities, and the preparedness to actually make those changes as individuals and organisations, that transport and spatial policy will converge towards sustainable urban development.

2. THE PRINCIPLES OF SUSTAINABLE URBAN DEVELOPMENT

Current trends in transport and the growing dependence on the car (and air) constitute one of the main challenges to sustainable urban development. Conventionally, there are seven key issues to be addressed if transport is to conform to the principles of sustainable urban development (EFTE, 1994; Banister, 1997).

1. *Growing congestion* in many urban areas has been increasing in its duration and intensity. On average, speeds in cities have been declining by about 5 per cent per decade (EFTE, 1994), and the severity of congestion increases with city size (Dasgupta, 1993). But congestion itself is an extremely difficult and slippery concept to measure (Banister, 2002a; ECMT, 1999).

2. *Increasing air pollution* has resulted in national air quality standards and those recommended by the World Health Organisation being exceeded in many cities. Air pollution affects health, impairs visibility and damages buildings and local ecology - it reduces the quality of urban life.

3. *Traffic noise* affects all city life and it is estimated by the ECMT (1995) that about 15 per cent of the population in developed countries are exposed to high levels of noise, mainly generated by traffic. Disturbance is also caused by vibration, particularly from heavy lorries and night-time deliveries.

4. *Road safety* is a major concern in cities and elsewhere. World-wide, traffic accidents result in 250 000 deaths and about 10 million injuries each year (Downey, 1995). In the EU there are about 40 000 road deaths each year (2000) and some 1.7 million injuries (CEC, 2001).

The accident rates are now declining in some countries (with high levels of motorisation), but increasing in others (with low levels of motorisation). This is a very high cost "accepted" by society.

5. *Degradation of urban landscapes* results from the construction of new roads and transport facilities, the demolition of historic buildings and reductions in open space. Transport contributes to the decaying urban fabric and neglect of central city areas, as well as urban sprawl (Ewing, 1997).

6. *Use of space by traffic* facilitates the movement of the motorist but reduces the accessibility of others, as transport routes become barriers, as parked vehicles form obstacles for pedestrians, cyclists and those with disabilities. Car dependency results in traffic domination in urban areas, sometimes splitting communities.

7. *Global warming* results from the use of fossils fuels. Transport now accounts for 25 per cent of CO_2 emissions and this level is rising in relative terms as well as in absolute quantities. Transport is almost wholly dependent on oil, and this is a non-renewable energy source.

In addition, transport has facilitated changes in the city, and three spatial, land-use and development factors need to be added to the list above.

8. *Decentralisation of cities* has been in part caused by the car in combination with efficient public transport. This has resulted in a substantial growth in trip lengths and patterns that are dispersed rather than concentrated on the city centre. This in turn increases car dependence and reduces the possibilities of promoting efficient public transport.

9. *Development pressures* have taken place around car-accessible locations which are not accessible to all people (including the city-edge developments). The spatial segregation of activities in urban areas again increases trip lengths and has strong distributional consequences. High land and property prices are symbolic of a buoyant economy, but they are also socially exclusive, particularly in terms of access to low-cost, city-centre housing.

10. *Globalisation* and the relocation of industry (including the information economy) have resulted in new patterns of distribution and the transport intensity of freight has increased globally, regionally and locally.

Sustainable urban development is dependent upon the city being a centre of vitality, opportunity and wealth, and transport has a major role to play in this process. It is only in the city that high levels of proximity and accessibility can be maintained, and where these ten principles of sustainable development can be addressed, and it is here that about three-quarters of the population will continue to live (ECMT, 2002).

3. CONSTRAINTS AND OPTIONS FOR CHANGE

Transport policy priorities have changed substantially over the last 20 years with the realisation that the road building option is no longer the solution to congestion and, even if it were, the environmental and social costs are too high. In advanced economies with extensive road networks, additional links only have a marginal effect on accessibility (Banister and Berechman, 2000). Demand management, combined with strong policies to promote public transport and the concentration of development will both reduce congestion and have environmental and social benefits. This is the key to sustainable development.

To establish a policy that addresses the ten principles of sustainable urban development listed in chapter 2, there are seven basic elements that need to be considered (Banister, 1998a):

1. Reduce the need to travel;
2. Reduce the absolute levels of car use and road freight in urban areas;
3. Promote more energy-efficient modes of travel for both passenger and freight;
4. Reduce noise and vehicle emissions at source;
5. Encourage a more efficient and environmentally sensitive use of the vehicle stock;
6. Improve safety of pedestrians and all road users;
7. Improve the attractiveness of cities for residents, workers, shoppers and visitors.

This list (based on ECMT, 1995, pp. 133-134) would tackle the problems of congestion, air pollution, noise, safety, degradation of urban landscapes, the use of space and global warming. In addition, Objective 1 would help reduce city decentralisation, whilst Objective 7 would, in part, address the question of development pressures. The more general economic context of globalisation is really external to the objectives set here. The land-use and planning strategies have a clear potential to reduce the need to travel, and both transport and land-use policies will help reduce the absolute levels of car use and promote the use of more environmentally friendly transport. Targets and standards are important tools to tackle noise and emissions at source. Road safety and the attractiveness of cities can again be addressed by transport and land-use policies, as well as by the application of targets and standards (ECMT, 1995).

The potential for change is clearly there, at least in theory. But any review of the trends and actions would suggest that, in practice, the achievement of sustainable development objectives listed above has been very limited. The need to travel has not been reduced, nor has there been any evidence of reductions in the use of cars and lorries. Promotion of public transport has taken place in many cities with high-quality services being provided and patronage levels have increased. But, even here, the costs have been high, as subsidy levels have risen and the new patronage has come from cycling and walking. Noise levels have remained unchanged as reductions at source have been balanced by increases in traffic. Emission levels have been substantially reduced through the use of catalytic converters, but CO_2 levels have increased, as this is related directly to the carbon content of the fuel. There are no examples of road pricing to reduce the use of the car[1]. Many countries have high levels of fuel taxation, which reduces consumption, but this is primarily seen as a means to raise revenues for the national treasuries. Load factors in cars and lorries have declined, whilst high-occupancy vehicle lanes have proved to have only a limited success. Road safety is one area of success, but the number of pedestrian casualties related to other accidents involving road users has also been increasing. Policies are being implemented to promote city centres and to produce multi-centre structures within a metropolitan region. This may reduce levels of out-migration as regeneration and new development take place within the city region.

This brief (and general) assessment makes disappointing reading but, with the exception of a limited number of cities, little progress has been made towards sustainable urban development and transport. Any improvement has been more than outweighed by the underlying growth in car-based mobility. There are a series of constraints which need to be addressed if a clear strategy on transport and sustainable urban development is to be established.

1. Policies have often been introduced as single, stand-alone elements, with no clear perspective on how they link together to form a strategy. To achieve sustainable development requires a clear statement of policy, together with achievable objectives (and targets) over a period of time. The EU has accepted the challenge of reducing its CO_2 emissions by 8 per cent (1990 to 2008-2012, Table 1), and transport is expected to make some contribution towards meeting that target (chapter 4).

2. Most progress has (naturally) been made on policies which have promoted public transport and those which have allocated new investment and development. To achieve sustainable development requires difficult as well as easy decisions to be made. The hardest decision is the role that the car should play in its current "polluting form" and in its future "non-polluting form" in our cities.

3. There are substantial barriers to implementation that need to be addressed if the potential for change can be translated into reality. Policy implementation in achieving sustainable urban development and the balance between the different incentives (and disincentives) must be recognised and resolved (chapter 5).

4. New organisational and institutional structures may need to be established so that the appropriate powers and responsibilities can be allocated. This involves both the public and private sectors, and approaches that are multi sector based. It also means that the support of the general public, industry (including the motor industry), commerce, business and government is present (chapter 6).

5. More generally, we need to develop a set of visions as to how we see cities in the future. Within the changing global economy, we must visualise the sustainable city of the future in terms of qualities such as density, mixed use, intensity of development, open space, safety and security, environmental priorities, the costs of living, housing type, function and vitality. Within that vision, a role for transport can be established (Banister *et al*., 2000).

Table 1. **Redistributed ceilings for CO_2 emissions reductions in the EU to meet the Kyoto Protocol target of 8% reduction**

Member State (increase or no change)	% Difference between 1990 and 2008-2012	Member State (decrease)	% Difference between 1990 and 2008-2012
Portugal	+27	The Netherlands	-6
Greece	+25	Italy	-6.5
Spain	+15	Belgium	-7.5
Ireland	+13	United Kingdom	-12.5
Sweden	+4	Austria	-13
France	0	Germany	-21
Finland	0	Denmark	-21
		Luxembourg	-28

Source: Ministry of Trade and Industry, Finland (2001).

3.1. The role of fiscal incentives

Congestion causes substantial externalities, principally where demand for road space exceeds supply. It is often said that transport is too cheap and that this is the reason why demand has increased. All that needs to be done is to increase the costs of travel and demand will be reduced. The economic arguments are clear, as the social costs of transport (principally relating to congestion and the environment) can be internalised through the pricing mechanism. Most governments raise substantial amounts of revenue from tax on fuels (Table 2), typically between 63 per cent and 74 per cent of the pump price for petrol and slightly less for diesel.

Table 2. **Retail fuel prices in the EU and tax levels (1999)**

Country	Unleaded petrol	Diesel
Austria	87 (68%)	(62%)
Belgium	(74%)	(63%)
Denmark	(73%)	(61%)
Germany	(74%)	(67%)
Finland	(74%)	(63%)
France	(79%)	(73%)
Greece	(63%)	(64%)
Ireland	(68%)	75 (64%)
Italy	(73%)	(70%)
Luxembourg	(64%)	58 (60%)
Netherlands	(73%)	(65%)
Portugal	86 (68%)	58 (63%)
Spain	(67%)	(62%)
Sweden	(73%)	81 (60%)
United Kingdom	113 (81%)	117 (81%)

Note: Prices given in US Dollars per 100 litres and percentage tax levels in brackets.
Source: Department of the Environment, Transport and the Regions (2001).

The UK Government has already been increasing the costs of driving through raising fuel duty by at least 5 per cent in real terms each year. In the transport sector, this is the main policy being pursued to meet the stabilization target for CO_2 emissions (Table 1). Over the past six years, this has increased the price of a litre of fuel from 45 pence to 85 pence (1994-2000), of which 70 pence is tax and duty. Without the fuel price escalator, the pump price would only be about 60 pence and there is now considerable public resentment, particularly from industry, that petrol prices in the UK are uncompetitive. UK fuel prices are the most expensive in Europe and over four times as high as prices in the USA (Table 2). The escalator has been removed (2000) after pressure from industry and other interests, particularly those in rural areas.

Acutt and Dodgson (1998) have suggested that increases in fuel duty of this level would not stabilize CO_2 emissions in 2000 at their 1990 levels (the Rio targets). Even if the more draconian measures proposed by the Royal Commission on Environmental Pollution (RCEP, 1994) were introduced, in which fuel prices are doubled in real terms by 2005 (equivalent to a 9 per cent annual increase in real fuel duty), the stabilization target would only be reached in 2004. Doubling real fuel prices would reduce distances travelled by all forms of transport by 16 per cent and car distances by 20 per cent. The time necessary for stabilization depends on the assumed rate of increase in road

traffic, the turnover of the vehicle stock and the sensitivity of demand with respect to real increases in fuel prices. It seems that pricing strategies at the national level have only a limited impact, as elasticities of demand with respect to price are low (at least in the short term), and as the expected levels of increase in demand quickly outweigh reductions in use. In the longer term, there would probably be a switch to more fuel-efficient vehicles. Targets should not be set without actually considering the costs involved of reaching them.

At the urban level, *road pricing* has been advocated by many influential organisations (e.g. CEC, 2001; ECMT, 1999) as the best means to tackle both the congestion and the environmental problems. London may provide the first real example of cordon pricing in a major European city, and this scheme has now been formally approved (Summer 2002). Each vehicle is charged a fixed amount for crossing the cordon into the city centre. At present, it is estimated that about 15 per cent of commuters to central London come by car (about 50 000 vehicles in the peak hour), and these vehicles spend about half their time in queues (stationary or slow moving) with an average speed of about 15 km per hour. The *Road Charging Options for London* report (ROCOL, 2000) estimated that a £5 per car charge would reduce traffic by 12 per cent, raise speeds by 3 km/h and give a net annual benefit of about £130 million (Table 3).

Table 3. **Estimated traffic impacts and economic benefits of a £5 area licence for Central London**

Impact	**Central London**	**Inner London**
Change in traffic levels a.m. peak (07.00-10.00) 14-hour (06.00 – 20.00)	Base vehicle-kms - 0.8m (-10%) - 3.6m (-12%)	Base vehicle-kms - 5.9m (-3%) - 25.5m (-3%)
Change in average traffic speeds a.m. peak (07.00-10.00) 14-hour (06.00-20.00)	Including junction delays from 15–18 km/h from 16–18 km/h	Including junction delays from 21–22 km/h from 22–23 km/h
Economic benefits per year	£125m to £210m	
Area licensing annual operating cost	£30m to £50m	
Overall annual benefit	£95m to £160m	

Source: ROCOL (2000) and www.open.gov.uk/glondon/transport/rocol.htm

It is argued that cordon pricing is acceptable to Londoners if a large part of the estimated £200m revenues is spent on improving the capital's transport system. The main beneficiaries would be the cars and commercial vehicles still coming into the central area, as their travel time would be reduced and reliability increased. There would also be time savings benefits to bus passengers and road accident savings. The disadvantages would be for those transferring to public transport from car, the increased levels of congestion on the underground, and the costs of the scheme itself (including enforcement).

The cordon pricing scheme would provide a major source of funding for the Mayor of London. It is one of the few possibilities for the Mayor to supplement the Greater London Authority's revenue base. There does seem to be public support, provided that the revenues are invested in transport improvements (67 per cent of Londoners, but only 45 per cent of car drivers, support this option). These transport improvements would include upgrading underground and surface rail services, improving bus services and lowering bus fares, and in building a series of new links across the River Thames to the east of the city centre.

There is no doubt that road pricing will raise substantial amounts of revenue, but it is unclear what the exact benefits will be in terms of reductions in demand, switching to public transport or improvements in environmental quality. There are also substantial problems with the implementation of road pricing. The question of public acceptability of road pricing has not been fully addressed, particularly if the revenues raised are not reinvested (at least in a major part) in the transport system. Similarly, the impact on the attractiveness of quality of life in the city is unclear, as is the effect on business confidence, rents and land prices. Although society as a whole will be better off, low-income, car-owning households will be faced with a substantial increase in the costs of using the car. These are all public policy issues that will only be understood when road pricing is widely implemented over a period of time.

3.2. The role of regulatory incentives

It is in this group of public policy measures that most action has taken place with cities adopting a range of strategies most appropriate to their particular situation. Some of the main measures can be summarised under three headings -- land-use policy, technology policy and transport policy (Table 4). However, the discussion is now moving on in two important respects. Firstly, policy interventions have traditionally been seen as the prime responsibility of the public sector. The new agenda suggests that it is necessary to involve all actors in the public and private sectors in achieving policy objectives related to sustainability. At the international level, that is now taking place through the current series of Global Conventions [e.g. at Rio (1992), Kyoto (1997), Buenos Aires (1998) and Johannesburg (2002)]. However, the motor manufacturers have not yet been fully involved in developing a global strategy that matches up the economic and financial interests of the car industry with the broader environmental concerns of society.

Responsibility involves government and the motor vehicle manufacturers as the two principal agents. But it also includes the oil industry to provide clean alternative fuels based on renewable energy sources, and the necessary infrastructure to allow for the distribution and use of that energy. The supply chains in the transport industry are varied and extended, so that at each stage the environmental costs and consequences need to be balanced against the economic gains. Other actors include the various interest groups for the transport industry, the operators, the environmental and other pressure groups, and others (e.g. developers, financial institutions). All have different vested interests in transport, as do the general public who are the direct beneficiaries of the available transport system (as users) and as the indirect beneficiaries (as consumers of transported goods), but who may also suffer the consequences. To achieve effective action in sustainable transport, responsibility must be attached to all interested parties and each must be prepared to take action (chapter 6).

Secondly, many of the actions implemented relate to a single sector rather than to more general policy objectives or to cross-sector implementation. Actions taken individually have much less impact than those measures that are packaged together (Marshall and Banister, 2000), but it is also necessary to ensure complementarity in actions. Counterintuitive outcomes may result from the implementation of actions as users of the system find creative means to continue to do what they have done in the past. This involves the close links between transport and city planning authorities, as well as the new links with other actors. Local Agenda 21 attempts to forge this more comprehensive approach involving all actors, but it has not achieved success as institutional barriers and the lack of appropriate powers has made effective implementation difficult. But having more localised powers does not necessarily mean that action will follow, as has been found in Germany. The noble objective of consensus and partnership, central to the UK Government's Integrated Transport Policy White Paper (DETR, 1998), may not exist, as individuals and organisations have conflicts of interest, objectives and time-scales and do not even communicate effectively with each other (chapter 5).

Table 4. **The public policy options for more sustainable transport**

Policy context	Policy measure	Policy objective: to increase	Scope of implementation
1. Land-use Policy	• Car free development	Sustainable accessibility	Site
	• Design of new development	Sustainable accessibility	Site
	• Development at public transport nodes	Sustainable accessibility	District
	• Mixed use developments	Sustainable accessibility	Site
	• Urban concentration	Sustainable accessibility	Region
2. Technology Policy	• Demand-responsive transport	Public transport use	Route
	• Home delivery of goods and services	Reduce car use	Region
	• Informatics	Mobility efficiency	Region
	• Teleactivities	Electronic substitution	Aspatial
	• Teleworking	Electronic substitution	Aspatial
	• Transport optimisation	Mobility efficiency	Region
3. Transport Policy	• Area access control	Reduce car use	District
	• Peak congestion avoidance	Mobility efficiency	Region
	• Car pooling	Reduce car use	Region
	• Car sharing	Reduce car use	Region
	• Company work hours policy	Mobility efficiency	Region
	• Cycle priority and roadspace	Cycle use	Route
	• HOV priority and roadspace	Public transport use	Route
	• Public transport priority and roadspace	Public transport use	Route
	• Media campaigns	Reduce car use	Aspatial
	• Commuted payments	Public transport use	Region
	• Park-and-ride	Public transport use	Region
	• Parking charges	Reduce car use	District
	• Parking restrictions and capacity reduction	Reduce car use	District
	• Road capacity restraint and reductions	Reduce car use	Route
	• Road pricing	Reduce car use	Region
	• Traffic calming	Reduce car use	District
	• Cycle subsidy	Cycle use	Region
	• Public transport capacity investment	Public transport use	Region
	• Public transport subsidy	Public transport use	Region

Notes: *Policy objectives*: Each policy measure has been allocated to a main objective category, but some can appear in more than one. For example, car pooling reduces car use and increases mobility efficiency; commuted payments, HOV priority and park-and-ride all reduce car use and increase public transport use; car-free development reduces car use and increases sustainable accessibility.
Scope of implementation: Route = along a transport corridor; Site = a specific location or nodal point; District = local level; Region = city or rural level; Aspatial = coverage is flexible; HOV = high occupancy vehicles.

Source: Based on Banister and Marshall (2000).

For example, park-and-ride is seen as a policy to reduce city-centre congestion, as cars are left at peripheral car parks and public transport is used to get people to the centre. On its own, this policy may simply release more traffic space for other road users so that there is little net benefit, and it may also result in longer journeys as car users (and public transport users) are attracted to the park-and-ride site (Goodwin, 1998). If the policy objective is to reduce the use of the car in the city centre, the park-and-ride scheme should be combined with priority to public transport on the routes into the city (reallocation of road space) and strict city-centre parking control (to reduce the attractiveness of the city centre for car users). Imaginative schemes could be developed along the corridor to encourage developments that generate/attract high levels of activity -- similar to the Dutch ABC policy, but on a corridor basis. Information could also be given to drivers about the conditions (e.g. congestion and air quality) in the city centre to convince them of the social and environmental benefits of leaving the car at the peripheral site. Such an holistic approach would give choices to drivers and allocate responsibilities for positive actions at the appropriate level (true subsidiarity). It is only when individuals make "sustainable choices" that real progress is made.

In terms of achieving sustainable transport, a range of policy objectives is addressed in Table 4 (Column 3). Some policies are directed at increasing cycle and public transport use, whilst others are intended to reduce car use. Other policies increase sustainable accessibility, so that by the location of land uses and activities new travel patterns can emerge, whilst a further group looks towards improving mobility efficiency so that intensity of use is increased. The role of technology is ambivalent, as it enhances sustainable transport if trip patterns are modified or even reduced but it may also encourage new activities. There is substantial potential for implementing sustainable transport policies, but progress has been slow.

In their comprehensive report on urban travel and sustainable development, the ECMT (1995 and 2002) proposes a three-strand approach to policy implementation:

Strand 1: To make the *best practice* of available measures through a combination of land-use measures and traffic management, including parking control and the provision and use of public transport to reach the highest levels in other cities. Standards and targets are also set for road safety, environmental quality and social welfare. The conclusion reached in the ECMT reports was that the best use of these measures on their own or in combination will not achieve sustainable development. Accessibility in city centres would improve, but the process of car-based decentralisation and suburbanisation would continue. Even though public transport and green modes would gain patronage, this increase would still be outweighed by growth in car ownership and use. Emissions of local pollutants would decrease with stricter standards, but CO_2 emissions would continue to increase. Gradually, the reductions would again turn to increases as the growth in traffic volumes outweighs the gains from exhaust catalysts.

Strand 2: *Innovative policies* in land use, transport and travel management would be used to supplement the best practice above. Policies would have to shape urban development into less car-dependent forms and congestion pricing would be used to bring car use into balance with road capacity. Measures here relate to mixed-use policies, transit-oriented developments, car-free zones, home zones, lower speed limits, commuter and school travel plans, a greater use of telecommunications technology, promotion of new vehicle technologies, road pricing and smart card technology. Priority would be given to buses, cycles and walkers, park-and-ride schemes and new public transport investment. There may be a greater use of the car for leisure travel but, in cities, congestion and pollution (apart from CO_2 emissions) would be substantially reduced and the qualitative elements of the city improved. But traffic levels would continue to grow.

Strand 3: *Sustainable urban development* directly tackles the CO_2 reduction target. It is designed to influence life-styles, vehicle design, location decisions, driver behaviour, choice of travel mode and the length of car journeys. Its aim is to reduce car use, fuel consumption and emissions. This final stage combines all three strands with a change in the taxation system to tax all fossil fuels (a carbon tax). It is suggested that a four-times real increase in fuel prices (1995-2020 or a 7 per cent per annum increase in real fuel prices) would reach the CO_2 emissions targets (ECMT, 1995, p. 155). The impact would be to produce fuel-efficient vehicles, to reduce car usage and to bring about greater efficiency in freight. Again, the quality impacts on cities in terms of congestion, environment, clean air and peace and quiet would all be substantial. The market processes would in turn bring about higher densities, more mixed land uses and more local activities. The three strands of the policy package are necessary to reduce car travel and to achieve sustainable urban development.

4. PACKAGING OF POLICIES

When considering the range of different policy measures, it is becoming increasingly apparent that they need to be packaged together in mutually supporting ways to increase their overall effectiveness[2]. Individual policy measures as illustrated above are unlikely to be effective. To achieve the objectives of sustainable development, there are four basic groups of policy measures to be considered:

a) *Lifestyle-oriented policies*. Policy intervention is only a subsidiary help for the ongoing growth of "post-material" lifestyles. A basic element of such lifestyles is a changed attitude towards mobility and material consumption. Quality of life aspects play a central role. Part of this is an increasing acceptance of the claims that sustainable development has on lifestyles (which changes the balance between material consumption and resource use and environmental degradation). Public policy intervention is primarily an anti-discrimination policy in favour of such post-material lifestyles, as the dynamics would be bottom-up. Information policies are an important element of this approach. Knowing the transport component contained in a product or the transport consequences of a policy decision may help to reorient behaviour (chapter 7).

b) *Market-oriented policies*. This approach assumes that people are willing to change their behaviour or lifestyles if others do the same and if they have no material disadvantages. So a system of market incentives, such as fiscal reform or changed property rights, will change the incentive structure. This approach will have some top-down elements, but it will also have to rely on the general acceptance of pricing as a fair mechanism to allocate goods and services (chapter 3).

c) *Regulation-oriented policies*. This approach relies upon technical standards and norms (for instance, speed limits, maximum weight of vehicles) on innovative planning methodology (especially spatial planning and transport impact assessment) and government reform. The general approach is rationalistic, target- and criteria-led, and top-down (chapter 3).

d) *Public infrastructure/public transport*. The provision of infrastructure and public transport services is a policy approach that is strongly associated with regulation-oriented polices. The State normally provides infrastructure such as roads, rail, telecommunications, water supply and services such as research, police and air traffic control. The performances offered are not directly linked to cost-covering payments. The actual delivery of infrastructure and public transport services may be contracted to private companies (chapter 6).

In this chapter, we give some examples of what measures could be implemented today as a first step that paves the way for later decisions and eventual goal attainment of sustainable urban development. If governments and the EU commit themselves to the long-term goal of sustainable mobility in Europe, then a persistent set of policy packages should be directed at this goal. This policy will have to evolve step by step and continuously be adapted to external factors which are more or less impossible to predict and control. It should be possible to take some measures immediately and to prepare for later steps. We suggest four guiding principles for choice of initial measures to be included in the starter package:

1. The measure should not be too controversial today (Principle of Acceptability); it has to be assumed that measures which are intended to change peoples' behaviour must be accepted or at least tolerated by a majority. In the long run, a governmental policy generally requires the support of a majority of the general public. Admittedly though, there are contrary examples (e.g. on speed limits in some countries). In such cases, the actual question has generally not been a real issue in political election campaigns, either because it is a minor question or because the political establishment has a common view across party lines. In some cases, such as the requirement to use safety belts in cars, political decisions have actually had an influence on attitudes. Politics is not just about reflecting prevailing preferences but also about forming opinions.

   Judging from actual travel behaviour, one may be led to underestimate the support for change. Thus, some commentators have taken a rather pessimistic view of people's willingness to accept restrictions or higher costs on the use of private cars in urban areas. In cases of a conflict between the common good and the interests of the individual (in social dilemmas for example), the latter will win, according to this view. The group of idealists will always be small, while the great majority is assumed to act with purely economic interests, always seeking to optimise their own benefits. These analysts tend to overlook the possible intermediate positions between that of the true idealist, always acting for the common good regardless of what other people do, and that of the selfish, economic man who does not care about the common good. People's need to adopt the attitude that they want to act according to the common good (if most of the other people do the same) is key to a solution. If this group and the idealists together form a majority, then political initiatives promoting behaviour in accordance with the common good will be tolerated. There are studies indicating that a majority of commuters in some big cities would welcome restrictions on private car use. This attitude is also increasingly prevalent among those who commute by car today. The discrepancy between attitudes and actual behaviour may be explained by the logic of social dilemmas (Banister *et al.,* 2000).

   The support or acceptance of a sufficient number of industrial and other interest groups and institutional actors is also required. Linked with acceptability is the responsibility of all stakeholders to play a role in achieving the targets through implementing and supporting change. This is particularly important in situations where it is assumed that individuals and

firms are prepared to change the way in which they carry out their activities, or where strong leadership is assumed, with the EU and national governments demonstrating commitment to change through action.

2. Measures that are essential to goal fulfilment but will have a delayed effect should be implemented early (Principle of Inertia or Long Lead-Times). As the greenhouse effect is perceived as an emerging threat to society, actions should be taken now, even if the consequences of those actions may take many years to have a positive outcome. We cannot wait until the problem is manifest. Because of the long time between decision and desired effect, the policy is also exposed to changing circumstances which are to some extent impossible to foresee. Some measures may also have unexpected effects. This calls for a strategy of flexibility and adaptability (see principle 4). For example, a major change of the built form (land use) has an enormous potential to influence travel patterns and mobility, but it will take some time to actually happen. Several studies indicate that a spatial pattern of "decentralised concentration" should minimise travel. This means a concentration of settlement, services and work places to centres that are nodes in a public transport system. Similarly, decisions taken now on the basis of the locations of new housing, services and facilities will substantially influence travel patterns in the future (Banister, 1997; Stead, 1999).

3. Measures that will set dynamic processes in motion should be implemented early (Principle of Dynamic Effects). The most efficient way to achieve a change in, say, settlement patterns may be to trigger a new set of system dynamics. One example is the introduction of telecottages in urban subcentres, thereby facilitating telecommuting. When more people stay in the suburb during daytime, the market for local services such as lunch restaurants and shops will grow. This in turn will attract more telecommuters and perhaps also new workplaces. The initial policy measure may act as a catalyst which, in turn, may lead to more self-contained subcentres and less travel.

   An important element of the dynamic process is the trigger mechanism, such as that proposed for a variety of teleservices. The same type of argument could be used with respect to road pricing where the final outcome is known (i.e. a full electronic road pricing scheme). The means to reach this objective requires creative thinking as to the process of implementation. Initially, road space could be reallocated to public transport services and parking charges in the city raised substantially, but new park-and-ride facilities would also be provided to give the motorist a choice. In stage two, cars would be allowed in the bus lanes if they pay and, gradually, more of the road space would be allocated to the paying motorist and public transport. As public transport is now more reliable, patronage would rise and further investments would be initiated to again increase capacity. Eventually, parking charges would be reduced, and all the road space would be paid for by those continuing to drive their car. Such a dynamic facilitates implementation, gains public acceptability and gradually familiarises users with road pricing, whilst at the same time providing choice through high-quality public transport.

4. Measures which tend to retain freedom of action in the future are often to be preferred to measures leading to lock-in solutions (Principle of Adaptability). Decisions today should not unnecessarily restrict the scope for future decisions. When the impact of strong measures is hard to predict, a good strategy may be to make piecemeal changes and to test several solutions in small-scale experiments. As with all of these conditions, there is no prescription or blueprint for the correct procedures to follow. Each situation requires separate analysis and implementation, including flexibility to change policy measures if intentions and

outcomes do not match up. However, the goal of sustainable mobility must remain with support from all political, business and public decisionmakers. But adaptability is not an excuse for inaction or weak action. It is an argument for clear decisionmaking and leadership, supported by analysis and monitoring, to check on the effectiveness of policy action.

Only the first principle is (close to) a necessary condition. Measures fulfilling the first principle may be qualified for inclusion in a starter package by combining with any of the other principles. Having set out some of the principles of policy packaging, it is appropriate to give some examples -- ten different policy packages are presented in Table 5. It must be recognised that, for effective incentives to be given, the nature and scale of the measures included in any policy package should be substantial. This limitation has been evident in the past where measures applied individually have only really had a marginal impact on the problems of traffic, congestion and environmental quality.

Most policy packages allow for considerable flexibility in their application, and continuous assessments would be necessary to regularly adjust the strategy and reach the policy targets. A further development of the approach described here is the development of a database management tool that allows new targets and policy options to be set, monitored and evaluated. The policy packages are themselves not mutually exclusive and they would be put together to address the particular problems and priorities of individual cities or regions (Banister *et al*., 2000). It is clear that there are different ways to achieve sustainable urban development. Different political constituencies with preferences for different policy orientations may all find their way forward through imaginative mixing of the various alternatives with differing degrees of severity, according to their own requirements. Important lessons must be learnt from this process of policy packaging and the development of Policy Paths (the mixing of the policy packages into mutually supporting actions). Some of the lessons relate back to the four principles of acceptability, inertia and lead times, dynamics and adaptability. It is noticeable that there are some common elements to several Policy Paths (e.g. in the individual components of the different incentives or in the composite packages). These common elements should perhaps be given special attention, as they are likely to be components in all strategies that might help achieve sustainable urban development. These common elements should be implemented early, as they will also have the greatest impact and need to be carefully structured so that their expected impacts match their actual outcomes.

Table 5. **Examples of policy packaging**

1)	**Policy Package: Ecological Tax Reform.** The transport market and our economy in general is distorted by externalities such as resource depletion and environmental damage that are not adequately reflected in overall costs, and taxation on labour has to compensate for a large share of externalities. An ecological tax reform is a way of internalising these external costs of transport by switching taxes to consumption. This may result in the double dividend where there are improvements in both the environment and efficiency of the tax system (Ekins, 1999). This is a macroeconomic means to internalise transport costs.
2)	**Policy Package: Liveable Cities.** This package aims at making cities more attractive by reducing the dependence on the car. Strategic measures include better conditions for walking, cycling and public transport, decreased space for cars and parking, land-use planning favouring mixed-use areas, local services and amenities and decentralised concentration. Intensified Information Technology (IT) may play an important role. This is a combination of fiscal and regulatory incentives set mainly at the city level -- a fuller list is given in Table 4.
3)	**Policy Package: Low-impact City Vehicles.** This policy package aims at a better match between transport demand and the type of vehicle used. This could significantly increase resource efficiency through alternative fuels and electric vehicles. This is a combination of incentives and requires a range of public- and private-sector interests to be involved in vehicle design, manufacture and marketing.
4)	**Policy Package: Long-distance Links -- Substituting for Air Travel.** This package is directed at reducing long-distance passenger travel by substituting highly energy-intensive modes with less energy-intensive modes and other forms of communication. It also involves the reduction of travel distances. This requires fiscal incentives and investment in alternatives to air, such as high-speed rail and telecommunications infrastructure.
5)	**Policy Package: Fair and Efficient Distribution of Mobility -- Tradeable Mobility Credits.** Increasing transport costs creates social and geographical distribution problems. Differentiated approaches are required which avoid these problems. This policy package provides a flexible solution combining simple market incentives with new information technology, so that social and spatial equity concerns can be addressed.
6)	**Policy Package: Promoting Subsidiarity in Freight Flows.** Policies for decoupling freight transport from economic growth cannot limit themselves to traditional transport policy. Structural approaches are required to reduce the travel distance of goods through regulatory and fiscal incentives, and through clear guidance to industry -- mainly set at the national level.
7)	**Policy Package: Promoting Dematerialisation of the Economy.** A basic strategy for reducing the need for freight transport is to reduce the material throughput of the economy. This requires approaches that go far beyond traditional transport policy and would include incentives to business and industry to produce locally and reorganise distribution networks.
8)	**Policy Package: Minimising Specific Emissions.** This package aims at a significant reduction of specific emissions from road and air transport. Although it would mainly consist of regulatory incentives introduced over a period of time (e.g. on catalytic converters and oxidisers), there may also be a strong case for fiscal incentives (e.g. scrappage of polluting vehicles).
9)	**Policy Package: Resource-efficient Freight Transport.** This policy package aims to increase the resource efficiency of freight transport and reduce haul distance. Again, the incentives would be mainly regulatory and gradually introduced over time, but these would be supported by fiscal incentives (e.g. to increase load factors) and make better use of multimodal options.
10)	**Policy Package: Customer-friendly Transport Services.** This package aims at making public transport and intermodal travel more convenient through the intensive use of IT. Technological options should be introduced by the market, with little need for incentives, but support may be necessary to ensure compatibility of systems.

Source: Based on Banister *et al*., 2000, Ch. 10.

5. BARRIERS TO IMPLEMENTATION

At one level, public policymaking on sustainable transport is straightforward, as it is more or less taken for granted that once a policy decision has been made, the policy will be implemented and the people will respond with the expected changes in behaviour. When the results of a policy fall short of their expectations, the people are blamed. Individuals regularly refuse to behave in ways that the policymakers would prefer. This gap between the assumptions underlying policy measures, on the one hand, and the behavioural responses by individuals, on the other, is normally referred to as the policy behaviour gap. In reference to the gap between policy measures and behavioural responses to congestion, Salomon and Mokhtarian (1997) point to the large set of alternative strategies that individuals have at their disposal to avoid the expected behaviour.

But "non-rational" behaviour by the public may also be reinforced by poor implementation where a measure does not accomplish what was intended. During policymaking, there are not only expectations about the behaviour of the public but also about the way a measure can be implemented. According to Smith (1973, p. 199), "*problems of policy implementation may be more widespread than commonly acknowledged*". If the programs are of a new, non-incremental nature, difficulties with implementation may occur. One can imagine that this is the case with measures which try to introduce a sustainable transport policy. The normal way to respond to increased car use has been through providing more infrastructure, but this in turn results in increased accessibility and capacity with higher levels of traffic demand.

There are several forces that prevent a measure from being implemented in its most ideal form. They could either reduce the potential of a measure once implemented or even make implementation impossible. Barriers[3] can be divided into six main categories:

1) *Resource Barriers* are in essence very simple. To implement a measure, an adequate amount of financial and physical resources have to be available. If these resources are not available in time and in the right amount, implementation will be delayed. Lack of money for implementation is closely linked to institutional barriers, as local, regional and governmental authorities are unlikely to provide money for schemes that do not concur with policy.

2) *Institutional and Policy Barriers* relate to problems with co-ordinated actions between different organisations or levels of government, and to conflicts with other policies. A large number of public and private bodies are involved in transport provision and this means it is often difficult to achieve co-ordinated action by the implementing agency. Sometimes, this is due to differences in cultures between departments (e.g. bureaucratic versus market-orientated). In other cases, the distribution of legal powers between governmental bodies affects the implementation of measures and schemes. Also, the implementing organisation itself has to be well-equipped to accomplish the implementation job properly. An unstable administrative organisation and unqualified personnel may reduce the capacity to implement (Smith, 1973).

3) *Social and Cultural Barriers* concern the public acceptability of measures. While some measures may theoretically be effective at promoting sustainable transport, their effectiveness is minimal if people do not accept their introduction or implementation. Social acceptability may often depend on whether the proposed strategy compromises "push" or "pull" measures (i.e. whether it is a strategy of discouragement or encouragement). On the whole, pull measures tend to be popular and may encourage, for example, an increase in the use of more sustainable modes of transport. On the other hand, many people are reluctant to give up the perceived freedom associated with owning and using a car and these push policies tend to be unpopular. Social acceptability involves both the travelling public and local businesses and other organisations which will be affected by the implementation of a new measure.

4) *Legal Barriers.* Many transport policies and measures need adjustment of laws and regulations, within or outside the realm of transport. If implementation is complicated by legal requirements or even made impossible by law, legal barriers are raised. They can occur at several levels. For example, the design and signposting of transport schemes in almost all countries are circumscribed by government regulations and directives. While many of these are beneficial in ensuring reasonable standards, others can impose restraints on innovative solutions. When good implementation requires changes in rules or regulations outside the transport domain, one can expect that more effort must be made to facilitate these changes.

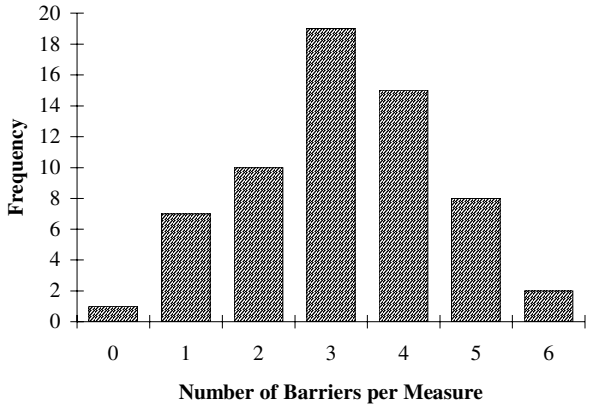
5) *Side Effects.* Almost every measure has one or more side effects. If implementation of a measure has serious side effects, this may hinder other activities to such an extent that implementation becomes too complicated, even though these side effects may only have limited effects on the success of the measure itself. For instance, traffic calming does not only reduce the speed of cars but also causes inconvenience to public transport, and it may bring about a change in the nature of traffic accidents. It is often difficult to anticipate both the positive and negative side effects, for example, of road pricing. But these side effects and the demonstration effects play a crucial role in promoting widespread implementation of policies.

6) *Other (Physical) Barriers* could take the form of space restrictions or are related to the topography of an area. For example, there may not be adequate space on the outskirts of an urban area for the introduction of park-and-ride facilities and the large parking areas they require. Hilly terrain may be impractical in case of promoting travel by bicycle.

An empirical investigation of a wide range of policy measures has been undertaken (Banister and Marshall, 2000) to assess the scale of the barriers to implementation for public policies aimed at making transport more sustainable. Barriers, which occurred during policymaking and prevented measures from being implemented, are excluded from this analysis. Information was gathered by interviews with decisionmakers and implementing agents. In a few cases, studies about the implementation process were available. Either these studies were pilot projects to gather information about how the measures were implemented and their results, or they were successful measures which can be demonstrated as examples of good practice to other cities.

It was found that only one of the 61 measures reviewed was implemented without any form of barrier (Figure 1). This is the measure for bus stops for the handicapped in Aalborg (Denmark) -- a good example of a very cheap "pull" measure. The other measures had to cope with one or more barriers. There are two measures which encountered all barrier types. These were the development at public transport nodes in Bucharest (Romania) and traffic calming in Zürich (Switzerland).

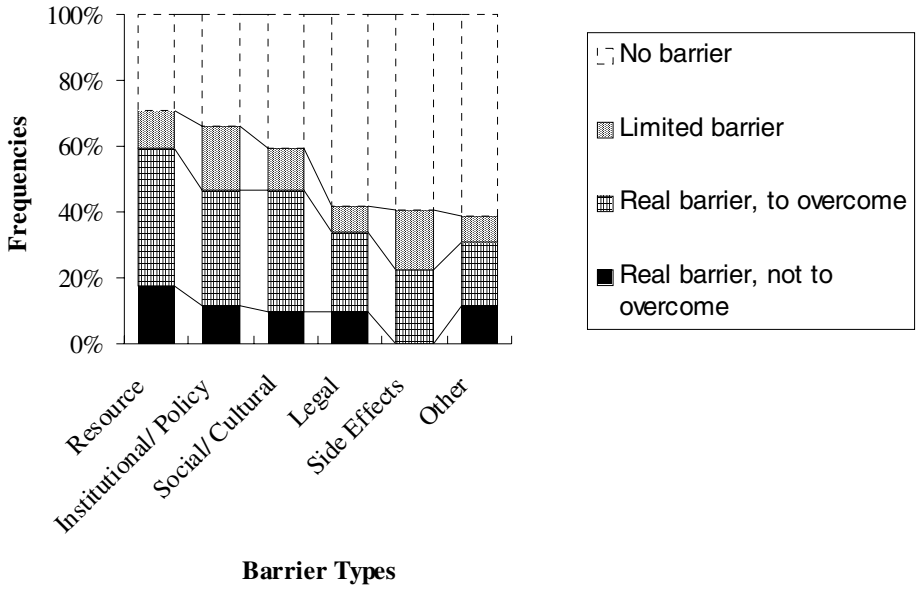
Figure 1. **Frequency of the number of barrier types per measure**



Source: Banister and Marshall (2000).

Barriers may occur in various forms. Sometimes they are of limited importance, but in other situations they can seriously hinder implementation. For each measure and barrier type, the influence of the barriers on the implementation process was assessed as to whether barriers have occurred or not and, if so, why (Figure 2). The histogram presents the frequencies by the level of seriousness for each barrier type. This kind of visualising shows us the seriousness of barriers to implementation.

Figure 2. **Level of barrier seriousness per barrier type**



Source: Banister and Marshall (2000).

The results show that resource barriers occurred most frequently, followed by institutional/policy and social/cultural barriers. Side effects and physical/other barriers were the categories with the fewest entries. Looking at the seriousness of the barriers, it appears that most of them are real but were overcome. Within the resource category, in 18 per cent of the measures the seriousness of the barrier hindered good implementation. Side effects hardly affected the implementation process.

It is easy to make an extensive list of barriers which occurred during implementation, but politicians have to balance various interests and spend money in the "public interest". A scheme is part of a wider policy or a package of measures which is aimed at a particular goal, such as sustainable development, and transport is only one element in that policy. To achieve sustainable development, methods of analysis have to be extend beyond single sector analysis to explicitly include the effects of policy decisions. This lack of interaction between sectors is seen by Banister (1998b) as one of the main barriers to achieving urban sustainability. A second set of barriers mentioned by Banister relates to the responsibilities of the decisionmakers themselves. They do not seem to have a real political commitment to introducing measures to address the key issues in a comprehensive and consistent approach. In the next chapter, we elaborate on some of these issues as they relate to the means by which barriers to implementation can be overcome.

6. OVERCOMING BARRIERS TO IMPLEMENTATION

The achievement of successful policy implementation requires leadership and a commitment to change. This thinking is particularly important where there are so many potentially conflicting interests, and where there is extreme complexity together with uncertain outcomes. Transport and spatial policies well illustrate all these concerns. Five framework conditions need to be addressed so that successful and consistent policy implementation can take place.

1. *A National Policy Framework on Spatial Development* should be established, which takes a long-term perspective and provides consistency within which individual decisions can be placed. This policy framework should be related to international and pan-European perspectives where a similar complementary statement should have been stated. Such a requirement gets away from much of the fragmentation of decisions seen at the national level, and it would provide stability through a vertical integration within government and a horizontal integration across sectors.

2. *A Sustainable Transport Strategy* would form an important element within this national policy framework. As stated in the recent ECMT (2002) report, the key elements of such a strategy are now reasonably well-known -- maximise the use of public transport and green modes of transport; manage the private car through integrated transport and mobility management; minimise urban sprawl; and improve air quality through less fuel use and reductions in the emissions of pollutants -- this is a similar set of elements to those stated in chapter 3.

3. *Decentralisation of Powers and Responsibilities for Transport* to the most appropriate level for implementation, together with the necessary resources or revenue-raising powers. To some extent, this change has taken place in many countries with governments providing

national planning guidance for local authorities and other agencies to use in determining their own priorities. However, such a flexible and supportive national framework has been compromised with the limitations on the powers for those local agencies to raise funds for investment. The centre still controls the revenue-raising mechanisms and the means by which the funds are distributed. Such action concentrates power at the centre and gives little incentive to innovate locally.

4. *Consistency in Policy Direction* is needed to prevent "perverse effects" from taking place. Even though there may be strict limitations on where development can take place, peripheral greenfield development is still permitted, as there is a need for local authorities to increase their revenue base from local taxation on businesses and properties. As options are limited, local authorities are often keen to encourage development to improve local employment. These decisions have implications for the generation of traffic, and in the longer term on housing and other services and facilities. The land market may operate very effectively in determining different land-use values, but it needs to be placed within the clear framework of the national policy for spatial development and the sustainable transport strategy.

5. *Public and Private Acceptability of Policy* underlies successful implementation. If controversial transport and spatial policies are to be introduced with outcomes that lead to behavioural change, then the issues of communication and involvement become a key concern. It is only when the implementation of a sustainable transport strategy within the national policy framework on spatial policy is presented to the public (in a general sense) and accepted (at least in principle), that success is likely (but not guaranteed). This means that participation must move from the low levels of information and manipulation to the higher levels of information and empowerment so that decisions relating to transport and spatial policy become accountable to the users (Putnam, 2001).

The implications of these five framework conditions are profound. They must be seen as a coherent whole or a package in themselves. Unless such an approach to implementation is taken, a range of outcomes will emerge that do not match up to the policy intentions. Such a conclusion can be illustrated with respect to travel reduction strategies that may lead to counter-intuitive outcomes (Banister and Marshall, 2000).

1. *Non-complementary policies*: cases where measures have been unsuccessful because of a lack of complementary policies or the presence of directly conflicting policies. For example, limitations on the use of the car in the city centre are more than outweighed by peripheral car-dependent development.

2. *Direct incentives to travel more*: cases in which a particular measure directly encourages more travel of some sort (while implicitly relying on other mechanisms to reduce travel overall). For example, subsidies may be devised to increase travel by particular modes but, unless there are any disincentives to travel by other modes, travel will simply increase.

3. *Improving system efficiency*: cases where travel reduction is activated to some extent, but the very act of removing traffic or journeys frees up more roadspace or vehicles to be used by others. Thus, the initial travel reduction feeds back to generate a net increase in travel.

4. *Contradictory outcomes*: cases where more travel was generated despite the intention of the measure to reduce travel. For example, encouragement to switch to bicycles may lead to others making more car-based trips.

5. *Change without improvement*: cases where measures have achieved some change, but where no improvement in terms of travel reduction has been achieved, for example, mode switching from bicycle to walking, destination switching that does not reduce trip distance.

6. *Absence of evidence or negligible impact*: cases where the travel reduction impact of a measure is negligible or the evidence is weak or inconclusive and effects cannot be attributed explicitly to the measure. For example, the effects of small-scale experiments with car-free housing are difficult to measure.

7. *Non-acceptance or lack of uptake by users*: cases where the measures have not been accepted or used by the public. For example, the non-use of cycle lanes in many cities and the poor uptake of car-pooling schemes.

More generally, these types of outcome can be grouped together and linked back to the barriers identified in chapter 5, and these limitations are illustrated in Table 6.

Table 6. **Classic tactics for ineffective implementation**

Indecision	**Outcomes**	**Example**
1. Inadequate funding – fiscal constraints.	No implementation, or delayed or partial action.	Package of measures for a city accepted, but only partially introduced for financial reasons. Important to provide investment in public transport as an alternative mode prior to restrictions on the use of the car being imposed.
2. Ill-defined legal and regulatory rules -- legal constraints.	Legal challenges and delays in implementation.	Road pricing could be introduced, but challenged in the courts on the basis of lack of consultation, or human rights concerns over privacy and use of information.
3. Sectorisation of policy making – no coherence.	Lack of awareness of indirect effects of policy actions.	City centre strategy of car restraint works well, but growth allowed in peripheral areas so net effect is more travel.
4. Opaqueness of responsibilities for decisions between agencies – conflict.	Partial implementation and no clear rationale for action.	Construction of new housing in peripheral locations leads to longer car-based work journeys. Closure of local schools and hospitals leads to longer journeys.
5. Partial implementation – no commitment.	Unclear or inconsistent messages.	Package of measures for a city accepted, but only partially implemented for political (or other) reasons, thus reducing its effectiveness.
6. Lack of debate and involvement – no consultation	No change in behaviour and public resentment.	Plans introduced to encourage modal shift from car to public transport or cycle, but little change takes place due to inappropriate implementation or non acceptance by users.

As with much of the research in this difficult area, it is relatively easy to identify implementation failures, but progress can only be made if good practice is combined with the five framework conditions outlined above. The five conditions all really relate to structural problems, and the allocation of responsibilities to the key decisionmakers. It is here that there are also problems relating to inertia, professionalism and a general resistance to change, as particular stakeholders might perceive that they would be in a loss situation. There are further questions relating to the capabilities of decisionmakers in terms of technical skills and resources available, and in terms of their motivations. The net result of these constraints would suggest that it is remarkable that any policy change is actually ever implemented. But the structural problems must be seen in their social and cultural context. To progress the debate means that positive messages must be presented. Here, it is argued that in addition to being explicit about the five framework conditions, the *process of implementation* must be examined from its formulation, through its enactment, to the monitoring of outcomes so that we can learn from the demonstration effects -- this is the approach adopted in TRANSPLUS (2002). In addition, the *checklist approach* might help to anticipate potential implementation barriers (Table 7).

Table 7. **Checklist of issues to be addressed to overcome barriers**

1. Responsibilities	Overlapping responsibilities – spatial, organisational, planning.
2. Co-ordination	Underlapping responsibilities – gaps. Need for clear allocation of tasks.
3. Technical	Vertical and horizontal co-ordination – within government at all levels, across sectors and modes, between agencies and professionals – must involve all relevant actors.
4. Traditions	To cover analysis, complexity, forecasting, monitoring and evaluation. Agreement on technical case for package of measures, not just individual measures.
5. Financial	Technical quantitative and discursive qualitative approaches to be reconciled. Compatibility between long-term and short-term policy objectives. Centralised control with distribution to localities and locally raised resources. Availability and control of budgets, and phasing of investment and accountability.
6. Innovation	Risk-taking and interest in radical policy or incremental change. Commitment to real change and achievement of national spatial policies and the sustainable transport strategy.

As part of the evaluation carried out on a package of measures to be introduced, there would be two types of *barrier analysis* carried out. One would identify the type of barrier (chapter 5) and the other would consist of a checklist of issues to be addressed (Table 7). Not all of these issues would be relevant in each case, but they would help identify where possible difficulties might arise and anticipate where there is a possibility of ineffective action (Table 6). The way the checklist could be used would be in a *policy forum* where the proposals are discussed with all relevant stakeholders and

the barriers to effective implementation are discussed in turn. This is a continuing process that involves a partnership between the public and private sectors and the users.

Such an approach has been adopted in London with respect to the most controversial policy package to make the centre of London a liveable city (Policy Package 2 in Table 5). The core of that strategy is congestion charging (chapter 3 and Table 3), which is a fairly straightforward (if radical) policy intervention, yet it provides an excellent example of the numerous barriers to implementation and how they have been overcome through extensive consultation on the transport strategy (GLA, 2000a), the scrutiny committee's review (GLA, 2000b) and an extensive programme of public consultation (Tables 8 and 9).

Table 8. **Overcoming barriers to successful implementation – the London congestion charging example**

Congestion charging – Single-sector policy, but a key part of a complex range of strategies for transport in London and the desire to make London a liveable city.	
Rationale – Mainly to address the problem of congestion in Central London, but also to raise revenue for investment in transport and to achieve environmental objectives on air quality.	
Barriers –	1. Resource barrier – level of charges: Effectiveness of charging and use of funds. 2. Social and cultural barrier – equity: Reinvestment of revenues in public transport, but adverse impacts on shift workers and low-income car users. 3. Social and cultural barrier – business impacts: Greater efficiency and reliability, and can pass on costs. 4. Social and cultural barrier – public acceptance: Hypothecation of revenues and extensive consultations to gain acceptability. 5. Legal barrier – requirement for vehicles to display licence: Legislation changed. 6. Side effects – boundary pressures: Eventually to be overcome by a full road pricing scheme and a flexible boundary, but at present traffic management to ease increase in traffic at boundary and to accommodate diverted traffic.
Implementation issues –	Entrance to charging area: Limit number of entry and exit points and turning movements. Residents: Reduced rate of charging at 10% of full rate. Cleaner vehicles - exempt; cycles and motorcycles - exempt. Taxis and buses: Exempt. Enforcement: Fine of £80. Timing: To be introduced in Spring 2003.
Longer-term issues -	Property market effects, including land values, rent levels and returns inside and outside the charging area. Development effects, including pressures inside and immediately outside charging area. Employment effects inside and outside charging area. London-wide impact on image of city

Notes: This table summarises the main implementation issues with respect to congestion charging in Central London -- it itemizes the barriers, the nature of the problem and the means by which they were overcome. It also identifies detailed implementation issues and longer-term concerns with respect to the spatial impacts of the policy.

Table 9: **A summary of the means by which barriers to implementation have been overcome**

Barrier	Original proposal July 2001	Consultation – Issues raised	Final proposal March 2002
Principle of congestion charging – **the rationale**	Central part of London's Transport Strategy	Widespread support – alternatives suggested included massive improvement of public transport or workplace parking levies – still a funding shortfall.	No change, but the scheme "go-live" date will be reviewed in Autumn 2002 if improvements in public transport not continued.
Area of charging – **physical barriers**	Zone is 21 km^2 or 1.3% of Greater London – Inner Ring Road with 174 entry/exit points	Scheme should have wider boundaries (e.g. the North and South Circular roads) or be restricted to the area North of the Thames – in the longer-term, extensions may be made.	No changes made – one minor modification to allow access to a petrol station in Park Lane.
Boundary effects – physical barriers	On Inner Ring Road where no charge will be levied	Increased flows on Inner Ring Road from diverted traffic and local roads affected. Modelling suggests that there is the capacity available, even around the hotspot of Tower Bridge.	No change, but the traffic changes will be monitored.
Charges and time of operation – **resource barriers**	£5 for cars and van, £15 for lorries 07.00-19.00 on weekdays	Hostility to higher charges for lorries as many of their journeys are unavoidable. A standard charge may be regressive. But technical problems of introducing a full road pricing scheme as in Singapore. This may happen later. No discounts for weekly, monthly or annual passes.	£5 for all vehicles. Charges apply to each vehicle for each day, so allowing more than one trip by the same vehicle within the day. 07.00 – 18.30 on weekdays
Exemptions and discounts – social and cultural barriers: equity	Some 16 categories of exemptions and discounts	Caused huge difficulties. Some wanted no exemptions and others many more categories. Essential journeys cannot be defined individually. Some changes to help schools, voluntary bodies, some NHS patients and staff, firefighters and disabled people.	Some changes in the categories and residents (90% reduction) discount area extended to three small areas outside the charging zone. Private hire vehicles of licensed operators on hire will also be exempt
Monitoring and enforcement – **legal barriers**	Penalty charge of £80, reduced to £40 if paid within two weeks	Enforcement cameras at boundary points. Also monitoring cameras throughout the charging zone.	No change
Timing of scheme introduction – **legal barriers**	To be introduced by early 2003	Assured that the technology will work and that the scheme will be effective. Extensive trials of the full system in Autumn 2002.	The planned "go-live" date now 17th February 2003

The pathways to successful implementation are outlined in this table, but even after this extensive process has taken place, there are still potential barriers to overcome prior to implementation in Spring 2003 (for example, legal challenges). Interactive planning (in the Netherlands) or community participation (in the UK) combines the decisionmaking and implementation processes through the involvement of both politicians and other stakeholders, including the general public. This is done not by a formal public inquiry procedure, but by creating awareness and debate with all parties involved. The goal of interactive planning is to bridge the gap between politics and citizens, to democratise decisionmaking and to create public support.

7. CONCLUSIONS

In this extensive paper, we have tried to unravel the real complexity of decisive action within the context of transport and spatial policymaking. The argument is really straightforward and can be summarized in a series of stages:

1. A clear set of overall policy objectives are needed within which transport and spatial policy can be set. In this paper, we have adopted the paradigm of sustainable urban development, and we have proposed ten principles to cover the elements of sustainable urban development together with seven key elements that need to be addressed. These are similar to the three strands (Best Practice, Innovative Policies and Sustainable Urban Development) outlined by the ECMT (1995).

2. From this contextual perspective, a series of issues emerges which need further investigation:

   - Packaging of policy measures to meet the scale of the change required and to begin to mix together a wide range of complementary measures;
   - Debate on the role of the car in the city -- this has not been taken further in this paper;
   - Implementation barriers to effective action and explanation of why outcomes are often different to expectations;
   - Organisational and institutional structures appropriate to introducing transport and spatial policies that lead to sustainable urban development. This includes the necessary powers and responsibilities;
   - Need for a consistent, longer-term vision of the city -- this has not been taken further in this paper.

3. Policy packaging is now seen as the way to introduce radical and effective measures to achieve sustainable urban development. Here we have presented some of these packages and a series of four guiding principles that are important to include if effective action is to be achieved -- acceptability, inertia, dynamic effects and adaptability.

4. Packaging on its own will not achieve sustainable urban development, and the barriers to implementation need to be identified and addressed. Here we have presented six key barriers to implementation, but recognise that they are mainly directed at detailed measures as well as packaged measures. Barriers also relate to the institutional and organisational structures within which implementation takes place.

5. The broader concerns are addressed as five framework conditions that are also necessary to achieve effective implementation. These structures are needed to provide the context within which change can take place, and they should be flexible, not fixed.

6. Once the framework conditions are set and the options for packaging understood, then the process of effective implementation can take place. It is proposed that a checklist of issues is developed to anticipate problems and that a barrier analysis is carried out to identify potential difficulties, and to initiate a policy forum to resolve them. This process is illustrated with respect to the proposed congestion charging scheme in Central London.

Three important conclusions emerge from this paper, which are of relevance to the use of fiscal and regulatory incentives in achieving a sustainable transport system:

1. *Macro level policies* (often outside the transport sector) can have substantial impacts on transport. Transport is a unique sector in that it links together activities carried out by individuals and firms. This means that it should not be dealt with in isolation, but as part of any composite evaluation. Decisions made in each sector have transport implications -- these include the housing sector, the location of businesses, recreational facilities, shops, schools, health services and a multitude of other factors. It is also an argument for taking a holistic approach to evaluation and not just looking at the costs and benefits to the funding agency, but to include the broader implications on transport and other sectors.

   A clear set of relationships are required which link the policies to those directly and indirectly affected by them. At present, too much policymaking is taken at a level that is remote from those affected by it. This means involving not just the general public in the debates about transport, but those other decisionmakers who have an influence on it. Many decisions are taken within one particular sector without any serious attention being given on the impacts across sectors. In some cases, these decisions have major effects on the transport system, not just in the immediate term but also in the longer term. It could be argued that many of the transport solutions are really only "fire fighting", as the cause of the problem lies in decisions over which those in the transport sector have no control. It also suggests that there is a need for new thinking on how policymaking can be made more complementary between sectors as well as mutually reinforcing within sectors.

   Most analysis hypothesises rather simple linkages, but the reality is much more subtle in its effects. Pricing strategies, for example, may result in little apparent change in travel, leading to the conclusion that travel demand is inelastic. Yet, in the longer term, people may use more efficient cars and make many other adjustments to their travel patterns. Similarly, land-use strategies may result in shorter journeys for those living in higher density urban locations, but this effect may be overwhelmed by the movement of other people out of cities to lower density locations with longer trip lengths (Banister, 2002b).

   Policy impacts are much more complex than simple models can address. Where empirical evidence is available (Banister and Marshall, 2000), the impacts may seem small, as many changes take time to impact and the adjustments are in several directions. Some people may travel less, but others more. Much analysis tries to assess the net effects rather than identifying and measuring the different types of linkages. Analysis must therefore begin to move away from cause and effect as a simple representation of reality to developing the full range of effects (or chains) that actually takes place.

2. When discussing sustainable transport and public policy, it is easy to become pessimistic about the outcomes. Even if successful and strong implementation takes place, would it really achieve a sustainable transport system? In essence, the issue being tackled has been presented the wrong way round. As stated earlier in this paper, we should be concerned about developing high-quality, environmentally attractive and safe cities in which people want to live -- this is the vision of the sustainable city. We should then see the role that transport can play in achieving that vision. If we only concentrate on transport solutions to the problems of cities, we are not tackling the causes of the problems, only the manifestations of the problems. There are many opportunities here for sustainable cities, and several European cities have succeeded in offering the vision with a sustainable transport system to support it. Zurich (Switzerland) is one example where people are now giving up the ownership of their cars in the city, as they do not need it because levels of accessibility are high and public transport is excellent (Mägerle and Maggi, 1999). But this solution is expensive and not appropriate to all situations. The options for sustainable transport in the suburbs and the rural areas, even in Switzerland, are more limited.

3. Public policy should enhance the reasoning ability of the population through enlarging the scope of public discourse. This in turn will enhance and reinforce democratic processes. All through this paper, the importance of the involvement and commitment of all actors has been emphasized to raise their awareness, to gain their support and to empower them to take action. Within transport, there is an acceptance that not all decisions are market-based, and that even if the market did operate efficiently in transport, it would not be democratic. Markets operate well in certain well-specified situations, but they are subject to many distortions from powerful corporate and governmental institutions. Institutional approaches to public policymaking encourage community and corporate involvement and empowerment.

   Overcoming barriers to effective implementation requires interactive and participatory processes, so that intentions and outcomes of policy interventions on sustainable transport coincide. This means that individualism needs to be moderated and there must be an increased acceptance of collective responsibility in decisions related to transport. This would result in modal shifts to public transport and green modes, less use of the car, higher vehicle occupancy levels, targeted programmes for companies, shops and schools, car-free areas in cities and strong media and governmental support.

   As part of the change in values and attitudes, there should be a clear and open debate on the issues, linked with positive actions to create choices. The broader issues related to sustainability and the environment need to be linked to individual travel decisions and lifestyles. There must be an awareness of the benefits and a willingness to change. If these vital elements are not present, then it is very difficult in a democratic society to pursue a policy of sustainable transport, and decisionmakers should recognise what is possible and what is not possible to achieve.

NOTES

1. The Norwegian examples of cordon pricing are used to raise revenue for road construction and investment in public transport. Singapore is the first city to introduce road pricing in a pure form, but cordon pricing is likely in London (2003) -- see Tables 3 and 8 -- and in Rome and Bologna now that legal challenges have been overcome.

2. Much of the original thinking and research on policy packaging was undertaken as part of the EU DGVII POSSUM project – Banister *et al.* (2000).

3. This research was carried out by the EU DGVI DANTE Consortium in six European cities – Aalborg (Denmark), Bristol (UK), Bucharest (Romania), Enschede (Netherlands), Rome (Italy) and Zurich (Switzerland) – and is published in Banister and Marshall (2000).

BIBLIOGRAPHY

Acutt, M. and J. Dodgson (1998), Transport and global warming: Modelling the impacts of alternative policies, in: Banister, D. (ed.), *Transport Policy and the Environment*, London: E&FN Spon, pp. 20–38.

Banister, D. (1997), Reducing the need to travel, *Environment and Planning B* 24(3), pp. 437-449.

Banister, D. (1998a), Sustainable Development and Transport, Final Report for the Bundesforschungs-anstalt für Landeskunde und Raumordnung (BfLR) – The URBAN21 Project, August, p. 85.

Banister, D. (1998b), Barriers to implementation of urban sustainability, *International Journal of Environment and Pollution* 10(1), pp. 65-83.

Banister, D. (2002a), Integration of Road Pricing and Land Use Planning – Longer Term Issues, Paper presented at the IMPRINT Thematic Network, Brussels, May.

Banister, D. (2002b), *Transport Planning*, Second Edition, London: Spon.

Banister, D. and J. Berechman (2000), Transport Infrastructure Investment and Economic Development, London: UCL Press.

Banister, D. and S. Marshall (2000), *Encouraging Transport Alternatives: Good Practice in Reducing Travel*, London: The Stationery Office.

Banister, D., D. Stead, P. Steen, K. Dreborg, J. Åkerman, P. Nijkamp and R. Schleicher-Tappeser (2000), *European Transport Policy and Sustainable Development,* Routledge, London.

Commission of the European Communities (2001), *European Transport Policy for 2010: Time to Decide*, CEC, Brussels, September.

Dasgupta, M. (1993), Urban problems and urban policies: ECMT/OECD study of 132 cities, Paper presented at the International Conference on Travel and the City - Making it Sustainable, Dusseldorf, June, and published by ECMT/OECD, Paris.

Department of the Environment, Transport and the Regions (1998), A New Deal for Transport – Better for Everyone, London: The Stationery Office, www.dtlr.gov.uk/itwp .

Department of the Environment, Transport and the Regions (2001), *Transport Statistics – Great Britain 2000*, London: The Stationery Office.

Downey, M.L. (1995), Transportation Trends, Paper presented at the Symposium on Challenges and Opportunities for Global Transportation in the 21st Century, Cambridge, MA.

ECMT (1995), Urban Travel and Sustainable Development, OECD, Paris.

ECMT (2002), Implementing Sustainable Urban Travel Policies, OECD, Paris.

Ekins, P. (1999), European environmental taxes and charges: recent experience, issues and trends, *Ecological Economics* 31 (1) 39-62.

ECMT (1999), *Traffic Congestion in Europe,* OECD, Paris.

European Federation for Transport and the Environment (EFTE) (1994), Green Urban Transport: A survey, Preliminary Report 94/2, January. Available from EFTE, Rue de la Victoire 26, 1060 Bruxelles.

Ewing, R. (1995), Beyond density, mode choice, and single trips, *Transportation Quarterly* 49(4), pp. 15-24.

Ewing, R. (1997), Is Los Angeles-style sprawl desirable? *Journal of the American Planning Association* 63(1), pp. 107-126.

Goodwin, P. (1998), Unintended effects of transport policies, in: Banister, D. (ed.), *Transport Policy and the Environment*, London, E and FN Spon, pp. 114-130.

Greater London Authority (2000a), Transport Strategy for London, London: GLA, www.london.gov.uk .

Greater London Authority (2000b), Congestion Charging, The London Assembly Scrutiny Report Number 1, London, GLA, November.

Mägerle, J. and R. Maggi (1999), Zurich Transport Policy: Or the importance of being rich, *Built Environment* 25(2), pp. 129-138.

Marshall, S. and D. Banister (2000), Travel reduction strategies: Intentions and outcomes, *Transportation Research A*, 34(4), pp. 321-338.

Ministry of Trade and Industry, Finland (2001), *National Climate Strategy Finland,* Government Report to Parliament, Publication 5/2001, Helsinki.

Mokhtarian, P.L. and I. Salomon (1996), Modeling the choice of telecommuting 3: Identifying the choice set and estimating binary choice models for technology-based alternatives, *Environment and Planning A* 28(10), pp. 1877-1894.

Putnam, R. (2001), Social Capital Measurement and Consequences.

Royal Commission on Environmental Pollution (1994), *Eighteenth Report. Transport and the Environment,* HMSO, London.

ROCOL (2000), Road Charging Options for London: A Technical Assessment, Report for the Government Office for London, March, www.go-london.gov.uk/ and published by The Stationery Office.

Salomon, I. and P. Mokhtarian (1997), Coping with congestion: Reconciling behavioural responses and policy analysis, *Transportation Research D* 2(2), pp. 107-123.

Smith, T.B. (1973), The policy implementation process, *Policy Sciences* 4(2), pp. 197-209.

Stead, D. (1999), Planning for less travel – identifying land-use characteristics associated with more sustainable travel patterns. Unpublished PhD Thesis, Bartlett School of Planning, University College London, London.

Stead, D. and D. Banister (2001), Influencing mobility outside transport policy, *Innovation* 14(4), pp. 315-330.

TRANSPLUS (2002), Assessment of Barriers. Deliverable 4.1 from the DG TREN Project on Transport Planning, Land Use and Sustainability, June, Restricted.

SUMMARY OF DISCUSSIONS

SUMMARY

1. INTRODUCTION

It is an almost universal phenomenon that demands for transport services are increasing, and are often stronger than the per capita incomes of users. While some of the major direct costs of transport seem to be secularly declining, the indirect social costs of transport, in particular the costs of congestion, environmental costs and noise, are increasing to an extent that, at least locally, the productivity of the overall transport system is decreasing. The majority of the social costs of transport are the unintended consequences of individual transport decisions, as well as location and housing decisions by households and firms. Transport policy and spatial policies, having distinct objectives and policy problems, jointly contribute to, or contain, the social costs of transport. In this context, the Round Table addressed the following problems: What lies behind the interrelationship between transport and spatial policies? Do answers to this question inform us about how the interrelationship should be organised? What are the comparative merits of regulatory and fiscal measures to achieve possible joint objectives or to solve trade-offs between these policy areas? The background papers and the discussion aimed at answers to these questions which would lead to proposals for coherent and effective policies.

The tension between transport policies and spatial policies concerns, above all, the interrelationship between urban form or urban development and transport. Urban transport demand is the result of the separation of households' residential locations from the locations of employment, shopping opportunities and leisure facilities. Isolating this nexus and focusing on the social cost of transport, the joint objective of transport and spatial policies should be to minimize mobility for a given level of accessibility (cf. Handy, 2004, this issue). If the autonomous location decisions of households and firms lead to homogeneous, highly localised patterns of business and household locations, the demand for passenger and freight transport will be minimal. The obvious fact that the spatial structure is highly heterogeneous implies that it is not just driven by avoiding transport costs; rather, the existence of cities and suburban structures is a consequence of the existence of agglomeration economies. That is, firms experience an increase in productivity by locating close to other firms, or households prefer to live in close community with other households of the same social characteristics. The agglomerative forces on the production side derive from a large number of determinants, the most prominent being increasing returns to scale in production, the exclusively local availability of a specialised labour force or the need for face-to-face communication between business partners.

If the economic "advantage of nearness" is stronger for the producers than for households, a "central business district" will form. According to the basic urban studies model, households choose residential locations around such a centre, weighing relatively high rents and low transport costs close to the city centre against the lower rents and higher transport costs associated with greater distance from employment and shopping opportunities.

Urban transport planners held an extensive discussion on the external costs of private car use. Principles have been set up which provide a framework for the objectives of urban transport policy. Banister (2004, this issue) shows how these principles of urban transport policy have been translated

into taxation and pricing policies on the one hand and regulatory policies on the other, which aim at increasing the density or compactness of cities, coupled with measures to increase technical capacity in order to reduce the environmental costs of private car use.

On the spatial policy side is the role model of the compact and multi-functional city, emphasizing regulatory instruments to guide households' and firms' location decisions in order to reduce transport demand, and private car use in particular, which is determined by location and settlement patterns (Priebs and Dittrich-Wesbuer 2004a, this issue). While these concepts appear to be straightforward, they are contested on the grounds of their internal inconsistency and with respect to the usefulness of the emphasis on the reduction of private car use. The former criticism is based on the argument that it neglects the income effects of higher transport costs and the resulting higher inner city rents. These may have the unintended consequence of employment and shopping opportunities being relocated from city centres to the outskirts of cities or to green field locations. If these land-market driven feedback effects occur, an induced increase in transport demand could follow. Not least, higher urban density is regarded as being associated with higher leisure travel, in many geographic areas the fastest growing type of transport activity (ECMT, 2000).

Other determinants of the tensions between transport and spatial policies follow from the lack of co-ordination between transport and spatial policy decisionmakers. This lack of co-ordination may arise from a strong division of labour, the departmentalisation of policymaking within individual jurisdictions or from missing incentives to co-ordinate between jurisdictions in a system of decentralised transport and spatial policy. A fourth part of the Round Table addressed the question of how federalist fiscal systems may be designed such that problems of co-ordination between policy portfolios and jurisdictions can be avoided (Sessa 2004b, this issue).

2. CONCEPTUAL BACKGROUND OF THE INTERDEPENDENCE BETWEEN TRANSPORT AND SPATIAL POLICY

It is difficult to conceive of a situation where transport and spatial policies are not interdependent: if all production processes were linearly homogeneous, if there were no externalities, if all (also public) goods were perfectly divisible, all natural resources were equally distributed in geographic space and individuals had no preferences for certain geographic locations, independent of their attributes, then all transport costs would be avoidable. Firms and households would then be indifferent as to potential locations and would choose those that minimize transport costs.

In fact, at all times the spatial structure of cities and regions has been influenced by transport and communications technologies, whether influenced by transport and spatial *policies* or not (cf. Anas *et al*., 1998). Prior to the 19th Century, most urban centres were tied to waterways, rivers, canals or access to the sea. In the 19th Century, railways competed with waterways. Rail terminals, often situated at nodes of the rail network, created new urban centres or reinforced existing location patterns. In both cases the indivisibility of transport infrastructure in the form of harbours and rail terminals, and the consequence that the average cost of freight processing fell drastically with the quantities processed, implied agglomerative forces which were often based on natural geographic advantages.

Intra-urban freight transport, at that time by horse and wagon, was associated with very high costs, due to the high time requirements and its dependence on weather conditions. This, in turn, favoured the emergence of one or more manufacturing districts close to the nodal transport infrastructure. As long as intra-city passenger transport was mainly by foot and horse-drawn carriage, households had a strong incentive to live close to the central business district, which had emerged from natural geographic transport advantages and the internal economies of scale for freight transport facilities. For the most part, high-income households outbid the poor for the most central and hence most convenient sites, such that household income declined markedly according to distance from the Central Business District (CBD).

A reduction in the density of urban settlements was made possible by the advent of electric street cars, enabling larger numbers of upper- and middle-class households to move out of their central locations. New residential suburbs emerged, which were often enclaves organised around a station on a radial public transport line. The typical urban spatial structure at the end of the 19th Century consisted of a compact core producing goods and services, surrounded by residential areas which were concentrated around mass transport spokes.

The horse and wagon being replaced by small urban trucks, with the advent of the internal combustion engine and the arrival of new communications technologies, allowed the CBD to expand, making use of lower land values while maintaining links to the transport infrastructure nodes. Personal motorised transport induced settlements between the areas located around public transport system nodes. Private car use was accommodated by active local government programmes for building and upgrading public roads. With these programmes, the private car's speed, privacy and convenience allowed it to compete successfully with mass transit, despite transit fares remaining flat in nominal terms from the beginning of the 20th Century until World War II.

Changes in manufacturing production technologies, accompanied by a tendency towards higher land-capital ratios, further increased the attractiveness of locating firms where land was cheap. Initially, even for producers outside the core, the link to the central harbours and rail terminals remained important. Only gradually was this importance reduced by the creation of suburban rail terminals and by the steeply declining cost of intercity trucking. The latter was based on the expansion of long-distance highway systems.

Despite the changing importance of the different modes in overall transport activity, the durability of the urban capital stock and urban infrastructure created irreversibility in the intra-urban structure. Only recently has the emergence of urban centres, located in the outermost reaches of cities and in green fields, become a major policy issue both for transport and spatial policy. These centres are often characterised by large concentrations of retail and office space, sometimes in conjunction with transport infrastructure developments which allow for residential location as well. This kind of "edge city" appears to be made possible by the omnipresence of automobile access, even if connected to the public transport system, as occasionally happens.

There is an ongoing debate as to whether the tendency towards urban spatial structure with decreasing population densities has been reversed, at least in the US. From the 1950s to the 70s, almost every north-eastern or mid-western city with more than 500 000 inhabitants shrank in each decade. In the 90s, a majority of such cities grew. At the same time, the share of the population living in these big cities increased. Similarly, the share of the US population living in cities with more than 7 500 inhabitants per square mile rose from 7.1 per cent to 7.8 per cent during the last decade of the 20th Century. For some observers, these developments have been interpreted as a manifestation of a reverse of the slide in the largest US cities, breaking with a past characterised by an increasing demand for the sun and a lower population density (Katz, 1994). Moreover, they have been considered to

show an increasing demand for high-density, walking-distance cities. Others have pointed out that the growth rates of New York and Chicago were not representative of other dense cities, where they generally declined. Excluding New York and Chicago as exceptional cases, the only densely populated cities with more than 200 000 inhabitants which expanded were located in California or Florida, or were unusually endowed with college graduates. These characteristics point to determinants of their growth other than an increase in demand for a high-density, walking-distance urban environment (Glaeser and Shapiro, 2003b; Glaeser and Kahn, 2003a).

2.1. The monocentric city

Despite the changing weight of the determinants of spatial structure over time and, despite the corresponding changes in the interdependence between transport and spatial policy, conceptual discussions continue to be strongly influenced by the monocentric model of urban structure. As an adaptation of von Thünen's (1826) model of agricultural land use, its appeal derives from the fact that it provides a rigorous framework for analysing the spatial aspects of the general equilibrium adjustments which take place in cities, and for empirically measuring and comparing the degree of centralisation across cities and time periods[1].

In the model, the city is envisaged as a circular residential area surrounding a CBD of a certain radius, in which all jobs are located. A household located at a certain distance from the CBD has to bear annual transport costs as a function of this distance, normally interpreted as commuting costs to the CBD. Each household has to decide on how to spend its income on transport services, land rent and consumption. If rents were equal throughout the residential area, all households would want to locate in the immediate vicinity of the central district. This would drive up land rents close to the centre such that the additional expenditures for housing there would be higher or equal to the sum of higher transport costs and lower land rents at locations at a greater distance from the centre. At the boundary of the city, the residential land rent equals the rent for non-urban use, often called the "agricultural rent". In this basic model, all land-use decisions are based entirely on tradeoffs between the desire for space and the recognition of commuting costs. This link provides the basis of the interdependence between transport and spatial policies.

If transport policy succeeds in increasing urban accessibility by increasing mobility, commuting costs will decrease and more households will want to reduce expenditure on housing by relocating further away from the CBD. As a consequence, the urban land area will expand, the population density will decrease and households will tend to have larger residences.

Traditional empirical research has made use of this intuitive, if simplified, depiction of the urban structure. It has identified one or more employment centres and estimated how these centres affect employment and the surrounding population densities. Giuliano and Small (1991), for example, define a "centre" -- either a main centre containing the CBD or a subcentre -- as a cluster of contiguous zones, all with gross employment density exceeding a particular minimum threshold value and together containing total employment exceeding a minimum total employment level. The (empirical) relationships implied by the monocentric model have then been estimated by population density functions[2]. More precisely, the "density gradient", the proportional rate at which population density falls according to distance from the centre, is estimated as an index of population centralisation. Two results have been obtained, covering many countries and contexts:

a. Density declines with distance from the employment and business centre, i.e. the gradient is positive;
b. Almost all cities in the developed world, and most others elsewhere, have decentralised over the last century. That is, the gradient has declined over time.

The standard explanation for the expansion of urban areas coupled with a decrease in urban density identifies increasing incomes combined with declining transport costs as the driving forces behind these universal trends. Both would cause the density gradient to decline according to the monocentric model. Given the substantive level of congestion in many cities, the influence of the second determinant is less straightforward than suggested by the monocentric model: the largest portion of transport cost is user time, whose value is expected to rise with wages. If these expectations were correct and incomes were not correlated with other influences, increasing wages should imply increasing value of time and an increase in transport costs[3].

2.2. The polycentric city

While the Round Table discussion showed that the identification of the interdependencies between transport and spatial policies is strongly informed by the monocentric urban model, there is the danger that the important and, in some countries, dominant phenomenon of urban structural development does deserve more attention when identifying the interaction between these policy sectors. The process of decentralisation has increasingly taken a polycentric form, with a number of concentrated business or employment centres making their mark on both employment and population distributions over geographic space. Most of these centres are subsidiary to an older CBD. At times, such subcentres became gradually incorporated into an expanded but coherent urban area. Others newly emerge, strongly influenced by developments in the transport infrastructure system far from the urban centre, and are often referred to as "edge cities". The sprawl of metropolitan areas has been so fast and irregular in some cases as to be interpreted as being "beyond polycentricity" (1996).

Models of polycentricity

Providing a theoretical basis for the identification of the interdependence between transport and spatial policies in the context of polycentric urban structures without an historically predetermined centre, is less straightforward than what is offered by the monocentric model. While models which explain the endogenous emergence of urban centres have existed for some time, a theoretical basis for the explanation of polycentric urban structures has been developed only recently.

An extension of the monocentric model, by simply *assuming* that there is more than one centre (Wieand, 1987; Helsley and Sullivan, 1991), obviously does not help very much to explain the impact of transport policy on polycentric development. A first variant of monocentric models with an endogenously forming centre was provided by household interaction models, which assumed that all households had a desire to interact with each other and therefore a demand for as much proximity to a number of households as possible (Karlqvist and Lundqvist, 1972; Beckmann, 1976). Similar models started out from interaction between firms (Borukhov and Hochman, 1977) and between firms and households (Papageorgiou and Thisse, 1985), where interaction and the formation of a centre arose from households' need to travel for shopping and employment purposes.

As it turned out, any conceptual basis for clarifying polycentric urban structures endogenously depended on the inclusion of agglomeration externalities into the analysis. Fujita and Ogawa (1982) and Fujita (1988) showed how non-market (technological) externalities and market (pecuniary) externalities due to imperfect competition can lead to non-monocentric urban structures. A more

detailed analysis of transport policy influence on the development of polycentric urban structures has been carried out only recently (Anas and Kim, 1996'; Anas and Xu, 1999; Anas and Xiong, 2003). The impact of transport policy on a polycentric urban structure is mediated via three mechanisms:

a. Inter-industry trade directly links the locations where the various commodities are produced;
b. Consumers' shopping trips connect the locations where commodities are produced and sold;
c. Traffic congestion determines the cost of travel which results from commuting, shopping and inter-industry freight transport.

Also, in this more detailed variant of modelling polycentric urban structures, the above mechanisms depend on the inclusion of some external effects into the analysis. In a basic version, without externalities and without inter-industry trade, production and residence are dispersed throughout the entire space with a peak of land rents, wages and commodity prices at the centre. The price distribution, in turn, is caused by the levels of land-use intensities, traffic values and allocations of land to roads.

Adding the extra benefits of multi-purpose shopping trips, economies of scope in shopping, and inter-industry trade to the basic model leads to multiple equilibria. Depending on the strength of the scale economies in shopping relative to the external costs of congestion, the dispersed production pattern becomes unstable and monocentric, or polycentric patterns emerge under the same parameter values. The number of centres trade off the benefits of agglomeration against benefits from accessibility to centres.

Empirics of polycentricity

While, in many countries, urban sprawl has been documented and its containment is considered to be one of the most important tasks of transport policy, the empirical analysis of suburbanisation is most highly advanced in the US. A major reason for this lead is the availability of census data on the Consolidated Metropolitan Statistical Areas (CMSA) in the US. The existing studies suggest the following tentative generalisations about the role and nature of subcentres in metropolitan areas, which are all of great importance for urban transport policies (cf. the review in Anas *et al*., 1998).

i. Subcentres are emerging in old and new urban areas. For essentially all metropolitan areas, subcentres have been identified based on the criteria of job density and minimum total employment, as discussed in section 2.1.
ii. In view of the methodological problems mentioned therein, it is not surprising that the findings are sensitive to the definition of the cutoff values. Higher cutoff values produce smaller subcenters within what would appear to be a large subcenter with lower cutoff values -- a finding which might indicate a high level of spatial specialisation, even within subcenters which will strongly depend on the local transport systems.
iii. Subcentres are sometimes arrayed in corridors. In these cases, the emergence of subcentres followed older-established transport infrastructure facilities. On a regional scale, large metropolitan areas have sometimes grown together following older interregional travel corridors, again confirming the strong, often unintended influence which transport infrastructure has on the development of urban structures.
iv. Employment centres help to explain the surrounding economic activity and population distribution. The empirical analysis requires the generalisation of the concept of population density functions to a polycentric context, which is sensitive to the substitutability or complementarity of the centres studied. Where the empirical analysis has allowed for polycentricity, the special case of monocentricity has been firmly rejected.

v. When a downtown centre and one or more subcentres have been defined using the same criteria, downtown has a higher total employment level, a higher employment density and, typically, a higher statistical effect on surrounding densities and land prices than do any of the subcentres. That is, the empirical analysis suggests that the formation of subcentres has not eliminated or substantially reduced the economic importance of the traditional CBD. For urban transport policy this implies a dramatic increase in the complexity and scale of the transport system, as new transport subsystems have to be added and traditional systems maintained.

vi. Employment is even more dispersed than the spatial distribution of centres and subcentres suggests. In the major US metropolitan areas, more than half of the jobs were outside the centres, pointing to the complexity of commuting travel.

vii. Related to the dispersed employment pattern is the finding that commuting is not well explained by either of the standard urban model, be it monocentric or polycentric. The suggestion by both of these models that workers commute up the land rent gradient is at variance with the findings of empirical analyses for the US and Japan. Hamilton (1982) found that predictions based on a monocentric model would understate average commutes by a factor of seven. Allowing density patterns to be polycentric does not eliminate the discrepancy. Taking into account the existence of subcentres still implies that predicted lengths of commutes are only a third of the actual ones (Small and Song, 1992).

2.3. Centre formation and the interdependence between spatial and transport policy

The interdependence between transport policy and spatial policy is derived from the dependence of the land market on transport policy actions. Spatial policies, in turn, are a crucial determinant of transport demand. The relationship between the land market and the transport sector is complex and changes over time, the changes being largely driven by developments in transport and communications technologies. Moreover, agglomeration economies and diseconomies condition transport policy's influence on the spatial structure. The character and force of the agglomeration economies change with the sectoral composition of production and depend, for example, upon whether scale economies in manufacturing or the need for face-to-face communication are the more important for the formation of centres and subcentres. The most important spatial diseconomies result from congestion costs, which are a driving force in the development of polycentric urban structures. Closely related to this point, the development of polycentric urban structures has been made possible by a massive reduction in fixed transportation costs which has accompanied the increase in private car use. All of this is complicated by the durability of transport infrastructure and housing stock, which may imply long phases of gradual change in settlement and transport patterns, with abrupt intermittent transitions.

3. POLICY DISCUSSION

The spatial development reported in section 2 suggests that spatial policies could decrease the costs of the transport sector substantially if they were able to contain the extension of urban size and the internal differentiation and specialisation of cities. While this view was widely shared by the Round Table participants, the question was raised whether a correction of endogenous spatial developments was desirable at all.

In defence of a low-density development of urban areas, it is argued that the urban spatial structure generated by market forces reflects the will of the people and that it therefore reflects a natural and desirable adaptation to the forces of urban growth and congestion (Gordon and Richardson, 1997). Moreover, it has been argued that, in contrast to conventional wisdom, a reduction in job density within metropolitan areas might not lead to a reduction in productivity (Glaeser and Kahn, 2003a). The cross-section comparison of metropolitan areas strongly suggests that the higher the job density the higher the productivity of the area, a result which has also been found at the US state level (Ciccone and Hall, 1996). However, estimating the relationship between per capita incomes and the share of jobs more than three miles from the city centre as a measure of job sprawl, Glaeser and Kahn found that a 10 per cent increase in sprawl increases the per capita income of the average Metropolitan Statistical Area by 2.7 per cent. That is, the aggregate density at the MSA level may matter for productivity, but the degree of decentralisation within that area may not.

As a consequence, spatial and transport policies to contain urban sprawl could do much to strengthen agglomeration economies which would, in turn, result in an increase in productivity and per capita incomes.

Does all this justify opposing the corrective role of spatial policy to current spatial developments? As the discussion of the interdependence between transport and spatial policy shows, all relevant developments concerning this relationship are based on external effects, most importantly agglomeration economies, on the one hand and environmental and congestion costs on the other. In principle, both policies should therefore have a role to play to correct the market distortions which result from the existence of these externalities.

3.1. Spatial policies and their impact on transport policy

Some of the external effects are, however, difficult to identify and target. Political decisionmaking may add other transaction costs which make it appear unlikely that government intervention will result in a final net benefit:

- If agglomeration economies are based on scale economies that are internal to firms, we have to expect monopolistic production sectors, with the associated efficiency losses, for the urban economy. In fact, where spatial policies try to attract the agglomeration economies resulting from internal returns to scale in a decentralised system of jurisdictions, serious co-ordination problems arise, as will be discussed in the next section.
- If the scale economies are external to firms, the producers will underprovide the external benefits because they are motivated by individual, private benefits, not by social benefits. To subsidize production in order to increase it would require detailed information on the production processes, for which in many cases independent information might be difficult to obtain.
- Competition between city developers or local governments is not expected to lead to correction of the problems by internalising local externalities, as cities are not supplied in competitive markets. Rather, the competition between local governments to attract and reinforce agglomeration economies has problems of its own, as reflected in the background paper of Carlo Sessa and reported in the next section.

Any success by spatial policy to increase the degree of exploitation of agglomeration economies would lead to more compact settlement patterns and a reduction in transport demand. Therefore, the transaction costs which might prevent spatial policies from fully exploiting agglomeration economies imply that they can have only limited success in helping transport policy to deal with the problems of congestion and environmental damage.

There is, however, a potentially antonymous relationship between spatial policies to achieve an improvement in polycentric urban structures: with a growing population, spatial policy may have reason to support the emergence of secondary centres. If agglomeration economies are strong, the increased crowding at a primary centre may require that, at a certain time, a mass of population moves to a secondary centre. Since, due to the agglomeration economies and atomistic migration, the private benefit from migration will be smaller than the social returns, the emergence of the secondary centre will occur later than is socially desirable. To guide the process of centre formation, government action is needed to establish a new centre and to protect it until it becomes stable and self-sustaining. Governments might have a role to play therefore in supporting the (re-)location of firms and households. While saving congestion costs, such a policy increases the demand for transport.

It may be that, due to the transaction costs mentioned, spatial policies have made relatively strong use, not of the fiscal measures considered so far but of regulatory measures in the form of land-use controls.

- Land-use planning tries to reduce a host of localised externalities, such as noise, smells and local pollution by zoning. Some of these zoning policies have certainly reduced accessibility and increased demand for mobility, for example, in the case of a complete separation of retail and residential land uses.
- Secondly, land-use planning sometimes fulfils the function of directly providing local public goods, the most prominent being the preservation of open spaces. Apart from the fact that the provision of greenbelts and urban parks will lead to an increase in transport demand, it is important to recognise that an increase in land rents is the implicit price to pay by firms and households locating in the vicinity, with the further consequence of smaller residential lots.
- In some suburban municipalities, land-use planning includes minimum lot size restrictions to enforce exclusionary zoning. Exclusionary zoning is less aimed at the correction of land market imperfections than at excluding undesirable socioeconomic groups, often low-income residents who would pay less in property taxes while receiving the full benefits of local public goods. Rather than correcting market imperfections, these policies might add to existing market frictions by increasing transport demand, making excessive decentralisation more likely and contributing to a spatial mismatch in labour markets.

3.2. Transport policy and its impact on spatial structure

Against the conceptual backdrop of the interdependence between transport and spatial policy, two areas of intervention for transport policy are, or are potentially, of particular relevance to the development of urban structures.

The first one is the task for transport policy to reduce the environmental costs of transport activities. The internalisation of environmental costs in the transport sector has two aspects: containing overall transport activities and increasing the share of public transport in urban travel and the share of transport by railways in general. In accordance with the background papers, the Round Table discussion focused on the increase in environmental costs in the context of urban travel.

A first category of non-internalisation of environmental costs is the extensive use of land, following from the private costs of transport services being lower than the social costs of transport. It is these direct costs of the destruction of natural landscapes which give much impetus to the "compact city" model, as set out in the paper of Priebs and Dittrich-Wesbuer (2004a). According to the monocentric model of urban development, it is clear that the lower the private costs of urban travel the greater will be the distance at which households will want to locate. The long-run tendency of decentralisation in the monocentric model can be traced back to the long-run decline of private transport costs. To the extent that spatial policies have aimed at a reduction of urban sprawl, the increase in mobility -- whether due to the success of transport policy to make the transport sector more efficient or due to the failure of transport policy to internalise the negative external costs of transport -- has be counterproductive from a spatial policy point of view. Spatial policy measures to increase the density of urban areas will, however, result in a rise in urban land rents. The higher the land rents close to traditional urban centres, the stronger are the incentives to relocate to areas with lower land rents. The widespread phenomenon of the polycentric decentralisation of cities may reflect these attempts. How sensitively traditional urban structures respond to increasing land prices by an increase in polycentricity depends on the strength of the agglomerative forces, whether they operate within a single sector or across sectors, and on the size and composition of the collection of firms which is required to form a new centre. The changing spatial pattern of trips, whether for commuting, shopping or leisure, which is associated with a higher degree of polycentricity is, in most cases, more difficult to serve by public transport, in comparison to a monocentric structure with transport flows mainly occurring along a relatively small number of radial axes (Glaeser and Shapiro, 2003b).

The major environmental externalities associated with driving are greenhouse gas production, noise and local smog. As can be seen from the background paper of Banister (2004), transport policies to achieve *sustainable* urban transport are similar to those to contain urban sprawl. Private car use is a major contributor to greenhouse gas production. In the US, for example, CO_2 emissions per capita increased by about 5 per cent between 1990 and 2000, even though CO_2 emissions per unit of GDP fell by more than 15 per cent. Both international cross-city evidence and US evidence show that people drive more in cities with a higher degree of decentralisation, even though private car use for commuting has decreased (Kahn, 2000). The increase in the fuel efficiency of private cars has not translated into a major improvement in the average fleet's fuel economy. The increased mileage implies more fuel consumption and subsequent increases in greenhouse gas production. Much of the progress in fuel efficiency seems to have been induced by introducing stricter technical standards rather than pricing measures.

The reduction in emissions per vehicle can rather be traced back to regulatory measures, above all the implementation of emissions standards and obligatory filters, than to fiscal measures, in particular fuel taxation.

It should be kept in mind, however, that all measures increase the costs of urban transport. An increase in urban transport costs will lead to an upward movement of land rents, which is at odds with attempts to make inner cities more attractive as residential areas.

To some extent, the negative feedback from increasing the costs of private car use can be compensated by public transport. Technical opportunities to offer attractive public transport as an alternative to private car use will, however, depend on the strength and complexity of the development towards polycentricity. With the main transport flows diverting from the radial axes from the boundaries of urban areas to the traditional main centre, the more limited will be the opportunities for public transport to substitute for private car use, in particular where light rail systems are concerned. The importance of these problems is corroborated by the diffuse pattern of commuting trips mentioned above.

That transport policy has strong implications for spatial development also holds for the second major field of urban transport policy, i.e. measures to reduce congestion. The absence of congestion pricing, to correct for the individual road user's disregard for his or her contribution to other road users' travel time, means that the private cost of car use falls short of the social cost. This implies a misallocation of transport across modes, times of day and routes as well as an excessive overall level of urban transport.

Even in complex urban structures, the most severe congestion still occurs on radial travel to and from traditional business centres. If urban form is strongly shaped by transport costs to and from the centre, as is suggested by the finding that commuters with job locations in subcentres face lower time costs, the underpricing of congestion causes the city to be spread out beyond the boundaries that would follow from transport service consumers bearing the full social cost of transport. In this sense, transport policy measures to reduce the congestion problem might help spatial policy to contain excessive decentralisation.

Congestion might, however, also indicate underinvestment in road infrastructure. This would be the case if (excessive) congestion persisted even if road users were charged the marginal time costs of other users, induced by one more user. In that case, the willingness to pay of the road users/taxpayers to increase infrastructure capacity would exceed the optimal congestion charge. The congestion would reflect higher private transport costs than social transport costs, due to an underinvestment in infrastructure. Without congestion charges, it is likely that urban planners allocate too much land to infrastructure: planners will follow the rule to expand urban infrastructure until the consequent incremental travel cost saving equals the residential market value of the additional land required. If then the market value of residential land only reflects the private transport cost savings and not the social savings, because of underpriced congestion, too much land will be allocated to roads. This last argument points to the fact that improvements in transport planning methods, in the sense of the inclusion of the consequences of transport sector externalities for land values, could contribute to the achievement of spatial policy objectives.

4. INTER-INSTITUTIONAL COMPETITION AND THE INTERDEPENDENCE BETWEEN SPATIAL AND TRANSPORT POLICY

The interdependencies between spatial and transport policy, as discussed in the preceding section, indicate the high potential of conflicting outcomes if both areas do not co-ordinate planning and implementation on the same jurisdictional level. If different administrations exist, co-operation and co-ordination of planning and implementation have to be supported by monitoring to what extent friction can be avoided and by rewarding co-operation.

Much more serious institutional problems arise from the competition between jurisdictions in both decentralised spatial and transport policies. (The interdependence between spatial and transport policy also depends strongly on the competition between lower-level jurisdictions.) The problems arise from the attempts of cities or regions to achieve a competitive advantage over other cities or regions by offering transport infrastructure facilities which reduce firms' production and distribution costs and/or their workers' commuting costs, as charges and taxes for infrastructure use do not cover

the full cost of the provision of the infrastructure services. As a result, local authorities may hold spending on other public goods below the levels where marginal benefits equal marginal costs, particularly for those (goods?) that do not offer direct benefits to local business[4].

More generally, infrastructure policies may play a role in attracting business and deterring activities that would be intensive in public expenditure. As has been emphasized in the literature by Sinn (2003, Chapter 2), if private markets fail to efficiently provide certain goods, then competition between governments which seek to provide them cannot be expected to be successful either. If there are decreasing average costs of infrastructure use, and (the optimal marginal cost) prices do not cover the full cost of infrastructure services provision, there is the possibility of a "race to the bottom" by charging immobile factors to finance the attraction of firms, disregarding the external costs this might entail for other jurisdictions.

The smaller the number of jurisdictions competing with each other and the weaker the incentives to co-operate in spatial and transport policy, the more likely that infrastructure overcapacity is created to pre-empt moves by competitors to improve their competitive position. Due to the indivisibility of transport infrastructure, a wasteful competition between communities could occur in analogy to attempts to pre-empt competitors in oligopolistic markets (Spence, 1977; Dixit, 1980; Bulow *et al*., 1985).

The resolution of problems in a decentralised system of spatial and transport policies has centred around the question of an optimal degree of centralisation. Whenever externalities between jurisdictions require co-ordination, the externalities could be internalised by centralisation. Standard objections against a higher degree of centralisation are that in a centralised system of government different sub-areas and localities are treated uniformly, due to a central government's limited knowledge of local necessities and conditions. Whether centralisation will lead to an overall improvement then depends on the benefits of internalising the interregional spillovers being greater than the disadvantages of a supposed "one size fits all" approach to policies. The latter disadvantages will, in turn, depend on the extent of heterogeneity of local needs in different districts (Oates, 1972).

These standard arguments against centralisation have recently been contested and reformulated. The above tradeoff is questioned on empirical and theoretical grounds. From a theoretical point of view, it is unclear why it should be more costly for a central government to monitor local demands and projects than for local governments. Empirically, there are many examples of central governments providing public goods unequally. A good illustrative example is federal highway spending in the US. A major portion of funds in the Federal Highway Aid Program is earmarked by legislators for specific projects in their districts. The remaining funds are allocated according to a formula designed to target spending in certain favoured states (Knight, 2002, in Besley/Coate). If public spending under centralisation is determined by a legislature of locally elected representatives, the conflict of interests between competing regional projects will play out in the legislature. More precisely, to what extent local interests are reflected in the political process will depend on how the legislature behaves. The polar cases studied are a legislature which is determined by a minimum winning coalition of representatives (non-co-operative case) and a legislature which maximises the joint benefits of its members (Besley and Coate, 2002).

A first correction mechanism, in the case of interregional externalities, is interregional grants by a central government. The argument of asymmetric information between central and regional governments is then the basis of a principal-agent problem between a welfare-maximising central government and opportunistic regional governments. The basic idea of this literature is that local governments have the advantage of holding information about the basic socioeconomic data of the regions, such as production, individual incomes, the local tax base and local income distribution.

Moreover, central governments are assumed to be unable to verify the actual structure of local policies. From the scope for opportunistic behaviour at the local level, there arises a trade-off between efficiency and distribution (see the review in Lockwood, 1999).

A higher-level question is whether quasi-constitutional rules can be designed which will induce co-operative behaviour in the legislature, or between lower-level jurisdictions whose policy decisions are not guided by the (discretionary) intervention of a higher-level government. In such a case, the implementation of such rules would ensure the realisation of the advantages of a decentralised system of spatial and transport policies while excluding the risks of a co-ordination failure. The theoretical research which turns the explicative statements of non-co-operative game theory into the question of which behavioural restrictions have to be implemented so that non-co-operative behaviour leads to co-operative outcomes, has so far not much to offer for defining rules which exclude co-ordination failures (see, for example, Jackson, 1999).

5. CONCLUDING REMARKS

The Round Table reviewed the interdependencies of spatial and transport policies. While the interdependence also relates to questions of interregional specialisation and resulting longer distance transport flows, the Round Table focused on the consequences of urban spatial policies for transport demand and transport policy as well as the effects of transport policy on the form and function of urban areas.

The basis of the link between spatial and transport policies results from the fact that, by taking location decisions, firms and households try to balance transport costs and land rents. How strongly the transport sector and land markets are interlinked depends on agglomeration economies.

Transport policy has been successful in reducing transport costs, as is reflected in the overall increase of urban areas around centres and the difference in land rents between city boundaries and the centre. These time trends indicate that the accessibility of central facilities has increased through an increase in mobility. On the other hand, the dominant tendencies have contributed to increasing the external costs of transport activities as well as spatial development.

Transport policy measures to reduce the external costs of transport will first of all include prices for private car use which correspond to its full social costs. This mainly entails charging for congestion, costing of parking and charges for pollution or the use of fuels. To the extent that transport policy measures include the use of land, the imputed land rents should be taken into account, including the external agglomeration benefits of the locations in question.

All policies to reduce urban transport and private car use in particular will lead to an increase of urban land rents. It requires further study to find out to what extent more compact cities induce an unintended polycentricity of urban areas and an increase in leisure and commuting travel.

Charging policies which correspond to the external costs of transport will, in many cases, require an increase in the supply of public transport services. The costs of public transport systems will clearly increase with polycentricity.

Spatial policies to reduce transport demand aim at changing the sectoral structure of urban centres and particularly of subcentres. A broad sectoral mix of goods supply and employment opportunities would obviate many of the transport needs. To the extent that such a policy could be successful, even residential locations within cycling or walking distances from business locations appear conceivable. Whether such concepts of urban development and the costs of implementing them are accepted depends on the difficult answer to the question of what determines business location decisions. There are thecompeting hypotheses that firms benefit either from locating near other producers of similar goods and services or rather from locating close to a large variety of other industries. Aggregate empirical studies do not allow for a rejection of any of these hypotheses, pointing to the fact that agglomeration economies are of a different kind for different industries.

On a more general level, the pricing measure against damage to natural landscapes would be a tax on newly-developed land. A similar effect could result from the subsidization of housing around urban centres. Such a policy could also counteract the devaluation of housing stock in inner cities, which is caused by often implicit subsidies granted to the development of new settlements at the outskirts of cities and the erosion of the cultural heritage represented by inner-city architecture.

Non-fiscal measures proposed by normative concepts have aggravated urban transportation problems. Urban planning has expended much effort to avoid what is called "incompatible urban land uses". As pricing measures to correct the negative externalities (e.g. noise, smells, demands on the sewage system) would be very costly to implement, planners have resorted to zoning and location restrictions. In some cases, the zoning prescriptions, for example, by completely separating retail and residential land uses, have considerably contributed to an increase in travel demand.

The same holds for policies to preserve open spaces. While few would deny that green belts provide valuable public goods, they have also contributed to travel demand, to opportunity costs in the form of higher rents and to urban sprawl.

Suburban municipalities have, at times, adopted policies of exclusionary zoning, largely in order to exclude lower-income residents who would pay less in communal taxes while benefiting from the local public infrastructure. It is likely that exclusionary zoning has considerably strengthened the decentralisation of inner cities and increased the problems of spatial mismatch in the labour market. This, in turn, can to some extent explain the long distances of commuting trips and their striking geographic patterns.

The latter argument points to a more general problem concerning the jurisdictional structure of spatial policies: with the spatial extension of urban areas, jurisdictional boundaries which have been inherited from the past become more and more dysfunctional. As jurisdictions which have historically had a high level of independence become interdependent through changes in settlement patterns, the neglect of interdependence due to purely local legitimacy creates major problems, not least with respect to urban transport policies.

A first line of argument concerns the neglect of interregional spillovers in a process of interjurisdictional competition. As local governments respond to the demands of the local population, they are expected to neglect benefits that citizens from other communities might have from local transport and spatial policies. An example of such a bias could be the under-investment in interjurisdictional infrastructure.

A second argument, and this seems to be of greater importance given the typical urban transport problems, emphasizes interjurisdictional competition to attract certain types of household and certain types of industry. Such a process of "cream-skimming" tends to lead to a waste of public funds. As

far as transport policy is concerned, it will entail over-investment in public infrastructure, and lead to a structure of spatial and transport policies which is distorted towards those firms and households that the community wants to attract, normally, those who are expected to ensure high tax receipts relative to expenditure for publicly provided goods.

All kinds of agglomeration economies give grounds for such locational competition. Beyond the economic costs of distorted land and transport prices, larger communities necessarily have a competitive advantage, leading to the neglect of smaller communities. In addition to the negative distributional consequences this might have, it will lead to an overall spatial structure with a high transport demand.

The Round Table reports and the discussion made detailed proposals on how to improve the defects of the jurisdictional fragmentation. As jurisdictional boundaries have historical reasons, and their modification is often restricted by constitutional barriers, they have to be taken as given in almost all cases.

A first step towards dealing with community policymaking could consist of creating supra-jurisdictional planning institutions. As long as political autonomy at the local level is high, the planning carried out by such institutions cannot be but indicative, also informing the political process at the local level. In this way, the dangers of political confinement by local decisionmakers might also be reduced.

The integration of planning across jurisdictions wins more importance if it is combined with fiscal incentive mechanisms which correct the co-ordination failures between jurisdictions. Fiscal redistribution systems, as discussed during the Round Table, must reward policies which aim at improving the economic situation of the overall system of jurisdictions, instead of pursuing the interests of the individual community.

NOTES

1. Following Alonso (1964), the basic model was extended in many directions. For a synthesis of these developments, see Fujita (1989).

2. See the review and methodological discussion in McDonald (1989).

3. On the difficulties of assessing the influence of transport costs on the decrease of population densities in urban areas, cf. Mieszkowski and Mills (1993).

4. This is a variant of the inefficiency of the tax competition argument, which assumes that jurisdictions compete by cutting capital taxes to attract firms. See the discussion in John D. Wilson (1999, #1350.)

BIBLIOGRAPHY

Alonso, W. (1964), *Location and Land Use,* Cambridge, Mass.

Anas, A., R. Arnott and K. Small (1998), Urban spatial structure, *Journal of Economic Literature* 36: 1426-64.

Anas, A. and I. Kim (1996), General equilibrium models of polycentric urban land use with endogenous congestion and job agglomeration, *Journal of Urban Economics* 40: 232-256.

Anas, A. and K. Xiong (2003), Intercity trade and the industrial diversification of cities, *Journal of Urban Economics* 54: 258-276.

Anas, A. and R. Xu (1999), Congestion, land use, and job dispersion: A general equilibrium model, *Journal of Urban Economics* (45): 451-473.

Banister, D. (2004), Sustainable transport and urban development, in: *Transport and Spatial Policies: The Role of Regulatory and Fiscal Incentives, ECMT Round Table 124*, OECD/ECMT, Paris.

Beckmann, M.J. (1976), Spatial equilibrium in a dispersed city, in: G.J. Papageorgiu (ed.), *Mathematical Land Use Theory,* Lexington, Mass.

Borukhov, E. and O. Hochman (1977), Optimum and market equilibrium in a model of a city without a predetermined center, *Environment and Planning A* 9: 849-856.

ECMT (2000), *Transport and Leisure, ECMT Round Table 111*, OECD/ECMT, Paris.

Ciccone, A. and R.E. Hall (1996), Productivity and the density of economic activity, *American Economic Review* 86: 54-70.

Fujita, M. (1988), A monopolistic competition model of spatial agglomeration: Differentiated products approach, *Regional Science and Urban Economics* 18: 87-124.

— (1989), *Urban Economic Theory. Land Use and City Size,* Cambridge, Mass.

Fujita, M. and H. Ogawa (1982), Multiple equilibria and structural transition of non-monocentric urban configurations, *Regional Science and Urban Economics* 12: 161-196.

Giuliano, G. and K.A. Small (1991), Subcenters in the Los Angeles Region, *Regional Science and Urban Economics* 21: 163-82.

Glaeser, E.L. and M.E. Kahn (2003), *Sprawl and urban growth,* NBER Working Paper 9733, Cambridge, Mass.

Glaeser, E.L. and J. Shapiro (2003), Urban growth in the 1990s: is city living back?, *Journal of Regional Science* 43: 139-65.

Gordon, P. and H.W. Richardson (1996), Beyond polycentricity: The dispersed metropolis, Los Angeles, 1970-1990, *Journal of the American Planning Association* 62: 289-95.

— (1997), Are compact cities a desirable planning goal?, *Journal of the American Planning Association* 63: 95-106.

Hamilton, B.W. (1982), Wasteful commuting, *Journal of Political Economy* 90: 1035-53.

Handy, S. (2004), Accessibility versus mobility-enhancing strategies for addressing automobile dependence in the US, in: *Transport and Spatial Policies: The Role of Regulatory and Fiscal Incentives, ECMT Round Table 124*, OECD/ECMT, Paris.

Helsley, R.W. and A.M. Sullivan (1991), Urban subcenter formation, *Regional Science and Urban Economics* 21: 255-275.

Karlqvist, A. and L. Lundqvist (1972), A contact model for spatial allocation, *Regional Studies* 8: 401-416.

Katz, P. (ed.) (1994), *The New Urbanism: Toward an Architecture of Community,* New York.

McDonald, J.F. (1989), Econometric studies of population density: a survey, *Journal of Urban Economics* 26: 201-18.

Mieszkowki, P. and E.E. Mills (1993), The causes of metropolitan suburbanization, *Journal of Economic Perspectives* 7: 135-47.

Papageorgiou, Y.Y. and J.F. Thisse (1985), Agglomeration as spatial interdependence between firms and households, *Journal of Economic Theory* 37: 19-31.

Priebs, A. and A. Dittrich-Wesbuer (2004), The role of regulatory instruments and fiscal incentives and transport policy and spatial development, in: *Transport and Spatial Policies: The Role of Regulatory and Fiscal Incentives, ECMT Round Table 124*, OECD/ECMT, Paris.

Sessa, C. (2004), *Fiscal incentives to integrate transport and land use policy,* in*: Transport and Spatial Policies: The Role of Regulatory and Fiscal Incentives, ECMT Round Table 124*, OECD/ECMT, Paris. Small, K. and S. Song (1992), Wasteful commuting: a resolution, *Journal of Political Economy* 100: 888-98.

von Thünen, J.H. (1826), *Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie,* Hamburg.

Wieand, K. (1987), An extension of the monocentric urban spatial equilibrium model to a multicenter setting: The case of a two-center setting, *Journal of Urban Economics* 21: 259-271.

LIST OF PARTICIPANTS

Prof. Dr. G. Wolfgang HEINZE **Chairman**
Technische Universität Berlin
Institut für Land- und Seeverkehr
Salzufer 17-19, SG 12
D-10587 BERLIN
ALLEMAGNE

Mrs. Andrea DITTRICH-WESBUER **Co-Rapporteur**
Institut für Landes- und Stadtentwicklungsforschung (ILS)
Forschungsbereich Verkehr
Postfach 101764
D-44017 DORTMUND
ALLEMAGNE

Prof. Dr. Axel PRIEBS **Co-Rapporteur**
Erster Regionsrat
Region Hannover
Postfach 147
D-3001 HANNOVER
ALLEMAGNE

Mrs. Susan L. HANDY **Rapporteur**
University of California at Davis
Department of Environmental Science and Policy
2132 Wickson Hall
DAVIS, CA 95616
ETATS-UNIS

Mr. Carlo SESSA **Rapporteur**
Presidente
Istituto di Studi per l'Integrazione dei Sistemi
Via Flaminia 21
I-00196 ROMA
ITALIE

Prof. David BANISTER **Rapporteur**
University College London
The Bartlett School of Planning
Wates House
22 Gordon Street
GB-LONDON, WC1H 0QB
ROYAUME-UNI

Monsieur Jean-Marie BEAUVAIS
Directeur Général
Beauvais Consultants
19, rue Edouard Vaillant
F-37000 TOURS
FRANCE

Dr. Enrico BUGLIONE
ISR-CNR
Via dei Taurini 19
I-00185 ROMA
ITALIE

Mr. Carsten GERTZ
Technical University of Hamburg-Harburg
European Center for Transportation and Logistics
AB 1-10
D-21071 HAMBURG
ALLEMAGNE

Mr Yoshitsugu HAYASHI
Prof. of Sustainable Transport & Spatial Development
Nagoya University
Department of Geotechnical and
Environmental Engineering
Furo-cho, Chikusa-ku
J-NAGOYA 464 8603
JAPON

Mr Kazuyuki KURIYAMA
Nagoya University
Department of Geotechnical and
Environmental Engineering
Furo-cho, Chikusa-ku
J-NAGOYA 464 8603
JAPON

Mr. Peter HEADICAR
School of Planning
Oxford Brookes University
Gipsy Lane
GB-OXFORD OX3 0BP
ROYAUME-UNI

Dr. Herbert KEMMING
ILS
Postfach 10 17 64
D-44017 DORTMUND
ALLEMAGNE

Dr. Jacek MALASEK
General Director
IGPiK (Institute of Physical Planning and Municipal Economy)
9 Krzywickiego Str.
PL-02-078 WARSAW
POLOGNE

Prof. Christian Wichmann MATTHIESSEN
Institute of Geography
University of Copenhagen
Oster Voldgade 10
DK- 1350 KOBENHAVN K
DANEMARK

Mr. Lars Göran MATTSON
Royal Institute of Technology (KTH)
Dept. of Infrastructure & Planning
Valhallawägen, 79
SE-100 44 STOCKHOLM
SUÈDE

Mr. Jan OOSTERHAVEN
University of Groningen
Faculty of Economic Sciences
Landleven 5
PO Box 800
NL-9700 AV GRONINGEN
PAYS-BAS

Monsieur François PLASSARD
Directeur de Recherche CNRS
UMR 5600 "Environnement, Ville, Société"
30 rue des Roches
F-69510 SOUCIEU EN JARREST
FRANCE

Dr. Stephen POTTER
Centre for Technology Strategy
The Open University
Walton Hall
GB- MILTON KEYNES MK7 6AA
ROYAUME-UNI

Mr. Mats RENELAND
Chalmers University of Technology
Department of City & Mobility, School of Architecture
SE-412 96 GOTEBORG
SUÈDE

Mr. Ovidiu ROMOSAN
Director
Impact consulting
Str. Odobesti, Nr. 17
Bloc V16, Sc. 2, Apt.78
Sector 3
RO-74576 BUCAREST
ROUMANIE

Prof. Austin W. SMYTH
Napier University
School of the Built Environment
Transport Research Institute
Redwood House
66 Spylaw Road
GB-EDINBURGH, EH10 5BR
ROYAUME-UNI

Dr. Dominic STEAD
OTB Research Institute
Technical University of Delft
Thijsseweg 11
NL-JA DELFT
PAYS-BAS

Dr. Wendelin STRUBELT
Federal Office for Building and Regional Planning
Deichmanns Aue 31-37
D-53179 BONN
ALLEMAGNE

Prof. Wojciech SUCHORZEWSKI
Warsaw University of Technology
Institute of Roads and Bridges
Al. Armii Ludowej 16
PL-00637 WARSAW
POLOGNE

Mr. Keiichi TAKAKUWA
Deputy Director
International Planning Division
Policy Bureau
Ministry of Land, Infrastructure and Transport
2-1-3 Kasumigaseki, Chiyoda-ku
J-TOKYO 100-8918
JAPON

ECMT SECRETARIAT

Mr. Jack SHORT - Secretary-General

M. Alain RATHERY - Deputy Secretary-General

ECONOMIC RESEARCH AND STATISTICS

Dr. Andreas KOPP - Principal Administrator

Dr. Michel VIOLLAND - Administrator

Mlle Françoise ROULLET - Assistant

Mrs Julie PAILLIEZ - Assistant

TRANSPORT POLICY

Mr. Masatoshi MIYAKE - Visiting Expert

ALSO AVAILABLE

Economic Evaluation of Road Traffic Safety Measures. Series ECMT – Round Table 117 (2001)
(75 2001 14 1 P) ISBN 92-821-1365-5

15th International Symposium on Theory and Practice in Transport Economics. Key Issues for Transport beyond 2000 (2002)
(75 2002 02 1 P) ISBN 92-821-1360-4

Tolls on Interurban Road Infrastructure: An Economic Evaluation. Series ECMT – Round Table 118 (2002)
(75 2002 08 1 P) ISBN 92-821-1374-4

Transport and Economic Development. Series ECMT – Round Table 119 (2002)
(75 2002 10 1 P) ISBN 92-821-1298-5

What Role for the Railways in Eastern Europe? Series ECMT – Round Table 120 (2002)
(75 2002 04 1 P) ISBN 92-821-1371-X

Managing Commuters' Behaviour - a New Role for Companies. Series ECMT – Round Table 121 (2002)
(75 2002 11 1 P) ISBN 92-821-1299-3

Transport and exceptional public events. Series ECMT – Round Table 122 (2003)
(75 2003 04 1 P) ISBN 92-821-1305-1

Vandalism, Terrorism and Security in Urban Passenger Transport. Series ECMT – Round Table 123 (2003)
(75 2003 07 1 P) ISBN 92-821-0301-3

European Integration of Rail Freight Transport. Series ECMT – Round Table 125 (2004)
(75 2004 06 1 P) ISBN 92-821-1319-1

To register for information by email about new OECD publications: www.oecd.org/OECDdirect
For orders on line: www.oecd.org/bookshop
For further information about ECMT: www.oecd.org/cem/

Questionnaire on the quality of OECD publications

We would like to ensure that our publications meet your requirements in terms of presentation and editorial content. We would welcome your feedback and any comments you may have for improvement. Please take a few minutes to complete the following questionnaire. Answers should be given on a scale of 1 to 5 (1 = poor, 5 = excellent).

Fax or post your answer before 31 December 2004, and you will automatically be entered into the prize draw to **win a year's subscription to *OECD's Observer magazine*.***

A. Presentation and layout

1. What do you think about the presentation and layout in terms of the following:

	Poor	Adequate		Excellent	
Readability (font, typeface)	1	2	3	4	5
Organisation of the book	1	2	3	4	5
Statistical tables	1	2	3	4	5
Graphs	1	2	3	4	5

B. Printing and binding

2. What do you think about the quality of the printed edition in terms of the following:

Quality of the printing	1	2	3	4	5
Quality of the paper	1	2	3	4	5
Type of binding	1	2	3	4	5
Not relevant, I am using the e-book	❑				

3. Which delivery format do you prefer for publications in general?

Print ❑ CD ❑ E-book (PDF) via Internet ❑ Combination of formats ❑

C. Content

4. How accurate and up to date do you consider the content of this publication to be?

1	2	3	4	5

5. Are the chapter titles, headings and subheadings…

Clear Yes ❑ No ❑
Meaningful Yes ❑ No ❑

6. How do you rate the written style of the publication (*e.g.* language, syntax, grammar)?

1	2	3	4	5

D. General

7. Do you have any additional comments you would like to add about the publication?

.....

.....

.....

Tell us who you are:

Name: ..... **E-mail:** .....

Fax: .....

Which of the following describes you?

IGO ❑ NGO ❑ Self-employed ❑ Student ❑
Academic ❑ Government official ❑ Politician ❑ Private sector ❑

Thank you for completing the questionnaire. Please fax your answers to:
(33-1) 49 10 42 81 or mail it to the following address:
Questionnaire qualité PAC/PROD, Division des publications de l'OCDE
23, rue du Dôme – 92100 Boulogne Billancourt – France.

Title: ECMT Round Tables No. 124: Transport and Spatial Policies: The Role of Regulatory and Fiscal Incentives

ISBN: 92-821-2321-9 OECD Code (printed version): 75 2004 09 1 P

* Please note: This offer is not open to OECD staff.

OECD PUBLICATIONS, 2, rue André-Pascal, 75775 PARIS CEDEX 16
PRINTED IN FRANCE
(75 2004 09 1 P) ISBN 92-821-2321-9 – No. 53835 2004