CONFERENCE ON IMPLEMENTING SUSTAINABLE URBAN TRAVEL POLICIES IN RUSSIA AND OTHER CIS COUNTRIES

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REGULATORY AND FISCAL TOOLS TO MANAGE DEMAND FOR CAR USE IN CITIES

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1 Aims of the paper

The purpose of this conference is to increase our understanding of how best to implement sustainable urban travel policies in the cities of Russia and other CIS countries. In societies with lower levels of car ownership and greater dependence on public transport (Donchenko, 2003) it is wholly appropriate that the main focus should be on public transport, and on improving the performance of the vehicle fleet, as discussed in earlier sessions in the conference. However, car ownership and use are growing fast, encouraged in part by the deteriorating performance of public transport; Donchenko quotes a 50% growth in car-km between 1993 and 1999 (Donchenko, 2003). Action taken now to control car use will help to protect road space for public transport and commercial vehicles; it will also help to sustain public transport patronage, and may provide a source of revenue from which public transport improvements can be financed.

While the context is different from that in the cities of Western Europe, the tools considered there for controlling car use are potentially applicable in the cities of Russia and other CIS countries. This paper therefore provides a review of the tools in use or proposed for Western European cities, and considers their applicability in other contexts. It draws heavily on a review for an earlier ECMT workshop in Dublin (May, 1999), but updates it in the light of more recent developments.

This paper starts with a brief overview of the reasons for controlling car use. It then addresses in turn the following issues:

- which tools are available for restraining car growth?
- which of these are likely to be the most effective?
- what are the main implementation challenges to limiting car use?

It concludes by considering how the most promising tools might be implemented, on their own and as part of a wider transport strategy.

2 THE REASONS FOR CONTROLLING CAR USE

Many western governments and cities have already taken the view that current levels of car use are too high; almost all would argue that predicted growth in car use of 30% or more over the next 20 years is unacceptable. The reasons for this concern can be related directly to the underlying objectives of transport policy.

The most long standing objective of measures to control car use is the reduction of congestion, and the resulting contribution to enhanced efficiency. The initial justification for road pricing (Smeed, 1964) was that drivers fail to perceive the delays which they impose on others, and that a road pricing charge equivalent to the cost of these delays will reduce car traffic, and remove those drivers who could not justify the full costs of their journeys. Congestion, and its associated impact of unreliability, impose major and growing costs on urban communities, estimated at around 2% to 3% of GDP (ECMT, 1995). The European Commission estimates that urban congestion costs the EU15 €100Bn per year, and that these costs could well double over the next decade (EC, 2001). While it is unrealistic to expect that all of these costs can be avoided, the benefits from reduced congestion are potentially very large.

Subsequently there has been growing concern with the local environmental impacts of traffic, particularly in congested conditions, where noise and pollution levels are higher. Methods of valuing the impacts on health and on quality of life are still being developed, but it has been suggested that the costs equate to 1% of GDP (ECMT, 1995). The principal approach to tackling these problems has been to improve vehicle performance, as discussed earlier in this conference. However, projections suggest that the benefits of such improvements will begin to be overtaken by growth in car use within the next decade. Controls on
car use, by reducing flows and increasing speeds, should reinforce the benefits of these measures in urban areas.

A related concern is the casualties arising from road traffic, which result in 20,000 deaths on urban streets in the EU15 each year (EC, 2001). Here valuation methods have been in use for longer, and recent estimates suggest a cost of around 3% - 4% of GDP (ECMT, 1995). It is rare to see car use controls being advocated as a means of reducing these costs, with most emphasis instead being placed on ways of reducing casualty rates and their severity. However, it is important to note that such measures will be undermined by continuing growth in traffic.

More recently governments have been required to reduce levels of carbon dioxide emissions, following the Rio and Kyoto protocols, in order to reduce the problems of global warming. Indeed, more recent analyses suggest that CO$_2$ emissions need to be reduced by 60% from current levels if CO$_2$ levels in the atmosphere are to be stabilised (Bristow et al, 2004). Since transport contributes around 25% of all CO$_2$ emissions, and its share is growing, it cannot be immune from these requirements. While improvements in vehicle and fuel technology can make a major contribution, they will not be sufficient on their own, and action will be needed to reduce travel generally, and car use in particular. This particular argument is not limited to urban areas, but they provide the best environment in which to provide low energy alternatives to car use.

All of these objectives relate directly to the wider concept of sustainability; that is “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland et al, 1987). What is less clear is the level of car use in any city which will achieve sustainability, or result in a sufficient improvement in safety, efficiency or the local environment. There have been several attempts to set such targets; among the most interesting were those developed by the London Planning Advisory Committee, which advocated reductions of between 40% in Central London and 10% in outer areas by 2005, based on a review of impacts on congestion, public transport reliability, conditions for pedestrians and cyclists, air quality, global warming, safety, quality of life and business opportunities (LPAC, 1998). The Mayor’s transport strategy for London set rather less challenging targets, but still advocated a reduction in car use of between 15% and 20% in central London (GLA, 2001). Coincidentally parallel research has suggested that a 15% to 20% reduction in car use would be optimal in many European cities (May et al, 2000; May et al, 2004).

As noted already, the situation in the cities of Russia and other CIS countries is different. Car use is lower, at around 35% of all urban trips (Donchenko, 2003) as opposed to levels of 50% to 70% in Western Europe. But congestion is already serious, emission and casualty rates per vehicle-km are much higher than in the West, and the rate of growth of car use means that these problems will rapidly worsen. Control of car use now will limit the spread of such problems, help free road space for public transport and other users, and retain public transport patronage. The challenge is to assess what might be the most appropriate level of car use to aim for in the future: almost certainly this will involve growth rather than decline, but the optimal level of growth is unclear.

It is difficult to imagine 15% to 20% reductions in car traffic being achieved solely by measures to control the use of the car. The alternatives to the car will need to be improved, and these improvements will themselves encourage a reduction in car travel. However, such improvements will be expensive, and availability of finance for fare reductions and service improvements is a significant constraint in most Western cities. A further contribution of the fiscal measures for controlling car use is as a source of revenue to finance these improvements. The research on optimal transport strategies has demonstrated the importance of an integrated package of measures, including fiscal controls on car use, changes in public transport frequency and fares, and low cost improvements in infrastructure (May et al, 2000; May et al, 2004). It has also demonstrated that, in the majority of cities, the revenue stream from the fiscal controls on car use can be more than sufficient to finance the remaining elements of the strategy.
Thus controls on car use can be justified as means of achieving three key objectives: improvements in the efficiency of the transport system; enhancements to the environment, safety and sustainability; and, for fiscal controls only, generation of a revenue stream to enable other elements of an integrated strategy to be financed.

3 Alternative tools for managing car use

Any direct disincentive to using the car must impose a penalty of some kind, and three principal types of penalty have been attempted:

- regulatory measures, which restrict those entitled to use cars;
- physical measures which add to travel time and/or distance; and
- fiscal measures, which impose a charge on use.

The first and third of these can be applied also to car ownership. All three can be imposed on vehicles when parked, and on the moving vehicle. We consider these in turn.

Car ownership

Some countries, such as Japan, have limited those entitled to own a car, for example to those who have an off-street parking space. There is relatively little evidence of the impact of such measures. Many more have used car ownership taxes to limit growth in ownership. This was attempted in a well documented trial in Hong Kong, in which a threefold increase in the annual licence fee resulted in a 14% reduction in cars licensed. However, even in the confined area of the then colony, it was found that the resulting reduction in traffic occurred primarily in less congested areas rather than where it was most needed (Dawson and Brown, 1985). Singapore has since extended this approach by introducing permits of entitlement to purchase cars, requiring older cars to be decommissioned, limiting the number of permits to achieve no more than a 3% p.a. rate of growth in the car fleet, and charging for the available permits (Phang and Asher, 1997). The scheme is clearly effective in controlling car ownership, but the costs to new owners are substantial, and there is some evidence that those who do acquire cars use them more intensively than in other countries (May, 2004). Such measures appear, from the Hong Kong experience, to be less well suited to reducing congestion, but they should reduce overall car use and therefore improve the environment. As both Hong Kong and Singapore have shown, they can generate substantial revenues.

Parked vehicles

Parking can be controlled through regulatory measures by limiting duration, or arrival times, or specifying designated people, such as residents, who may park. In the extreme, such controls will prohibit car use by those who fall outside the regulations, but their main effect is to force such car drivers to search for other spaces which are still available to them. Physical measures which reduce the total number of spaces available have a similar effect. There has been relatively little detailed study of the responses of drivers to such controls, except to observe increases in traffic searching for spaces, and transfer to uncontrolled locations and types of parking. Both regulation and physical control impose a greater penalty on those who arrive later to park rather than necessarily on those with the least need to do so. Neither is likely to relieve congestion significantly given their encouragement of searching for available spaces, and their impacts on the environment are uncertain. Regulatory measures will also introduce new costs of administration and enforcement.

Parking can also be charged for, and a range of pricing strategies, including higher rates for longer durations and discounts and exemptions for those with particular needs, have been tried (Feeney, 1989). Pricing is better able to match demand to supply, and to reflect the differing needs of drivers; however, it
does bear more heavily on those with lower incomes. Studies have demonstrated that charging can reduce car use, and hence relieve congestion and the environment; it also provides a source of net revenue (Feeney, 1989). However, elasticities of demand are very sensitive to the availability of alternative cheaper or free parking.

The principal problems with parking control are that private parking, which often represents 50% or more of a city centre’s parking stock, is usually outside local government control, and that even comprehensive control of all parking fails to control through traffic, which often represents a third or more of all traffic entering a city centre. An increasingly common response to the first of these two factors is to limit parking provision in new developments (Still and Simmonds, 2000).

There are few examples of comprehensive control of all parking, because of the difficulty of controlling private parking places, but a desk study in Bristol suggested that, while currently available measures could reduce car trips to the centre by at most 21%, and traffic levels by 8%, comprehensive parking controls could achieve reductions of 77% and 23% respectively (Coombe et al, 1997). Partly based on this evidence, the UK government has enabled local authorities to introduce pilot schemes to charge for ownership of employees’ parking spaces, through a workplace parking levy (DETR, 1998). It is as yet very difficult to judge how effective such charges will be, and no local authority has yet been prepared to introduce them. However, there is some evidence that employers will not be prepared to reduce their parking stock or pass the charges on to drivers, in which case the levy would simply provide a means of raising revenue (Gerrard et al, 2001).

Regulatory controls on moving vehicles

There are two principal forms of regulatory control which deny access to certain vehicles: permit-based schemes which allow access only for designated users, and licence plate-based schemes which permit drivers with certain licence numbers to use their vehicles on certain days. Permit schemes are in operation in several Italian cities, and appear to have been effective in reducing traffic levels. In one scheme in Bologna, 50,000 permits were issued allowing access to the otherwise restricted centre. Traffic levels in the centre were initially halved, but this impact was eroded over time (Topp et al, 1994). However, unless permit schemes are carefully designed, they do not reflect need to use a car, and the more closely they match such needs, the more expensive they are to administer and enforce. Licence plate schemes have operated for some time in Lagos (Ogunisanya, 1984) and Athens, and more recently in Sao Paulo. They have been shown to reduce car traffic by as much as 10% in Sao Paulo (Biezus and Rocha, 1999), but evidence suggests that drivers are increasingly able to overcome the restrictions by acquiring a second vehicle, and that some who would not otherwise have chosen to drive may elect to do so. They make no attempt to match controls to drivers’ need to use their vehicles. Both measures should achieve some relief of congestion, and improvement of the environment, but they will generate no revenue, and will add to administrative costs.

Physical controls on the moving vehicle

Some regulations, such as bus and high occupancy vehicle lanes, achieve their effect by reducing the road space available for cars; so do traffic management measures such as road closures and pedestrian streets. Rather more subtle reductions in road capacity can be achieved by traffic signal control and through environmental traffic management measures, such as mazes and speed humps. The principal effects of such controls are to increase the delay to traffic, and in some cases to add to journey distance and hence time. As a result they may have adverse impacts on congestion and the environment. Unfortunately few studies have attempted to find out what alternatives drivers have used. One frequently quoted example is Zurich, where capacity for car use has gradually been reduced as bus priorities have been introduced, and car traffic levels have remained static over a long period (Fitzroy and Smith, 1993). A recent study has
reviewed the international literature on this process, and concluded that reductions of over 15% can be achieved in affected traffic, after allowing for rerouting, where full closure of a road has occurred. However, the range of responses is complex, and predicting the impact therefore difficult (Goodwin et al, 1998).

**Fiscal controls on the moving vehicle**

The simplest approach to increasing the cost of car use is to increase fuel taxes. There is clear evidence that fuel price increases reduce car traffic, with short run elasticities of around –0.3, and longer run values approaching –0.8 (Terzis et al, 1995). However, evidence suggests that most of the reduction in car use is in off peak and leisure journeys, while purchase of more fuel efficient vehicles explains much of the longer run effect. Thus fuel price increases may reduce environmental problems, and generate significant revenue, but they are less likely to relieve congestion.

Road pricing provides a more directed means of imposing charges on car use in congested areas. It was originally developed as a means of charging car users for the congestion costs which they imposed on others (Smeed, 1964), and has more recently been considered as a method for charging directly for environmental and safety externalities. It has also been used primarily to raise revenue to finance infrastructure. The simplest form, in use in Singapore since 1975 to control congestion, involves charges on vehicles to enter a defined area. Singapore originally used a paper-based system, but converted it to an electronic one, with all vehicles equipped, in 1998 (Menon, 2000). Three cities in Norway have used paper and electronic methods to raise revenue for infrastructure (Odeck and Brathen, 2002). More recently London has successfully introduced a congestion charging scheme which imposes a charge on all vehicles used within Central London during the working day (TfL, 2004). Parallel developments in the US have focused on charging for particular facilities and roadways, most recently through the use of so-called HOT lanes, which permit vehicles which either have high occupancy or pay a toll (Wachs, 2003). Other studies have considered more complex patterns of cordons and screenlines (Richards et al, 1996) and charging based on distance, time or delay (May and Milne, 2000), but none of these has yet been implemented.

The original Singapore scheme was immediately effective, achieving a 45% reduction in traffic entering the centre in the morning peak (Holland and Watson, 1978). The subsequent implementation of electronic road pricing achieved a further 15% reduction in traffic levels, largely as a result of imposing a charge each time a vehicle passed the charging points. The London scheme, too, has been successful, with 30% reductions in cars entering central London, traffic delays and excess bus waiting time and a 30% improvement in journey time reliability (TfL, 2004). The Norwegian schemes have had a much smaller impact on traffic, but it is important to note that they were designed to raise revenue, rather than reduce traffic (Odeck and Brathen, 2002). All road pricing schemes have the potential to generate substantial income; most studies suggest gross revenues of around $150 per capita per year for a well designed scheme (May, 1994).

**4 The relative effectiveness of alternative measures**

Based on the review in Section 3, it is possible to summarise the performance of each of the measures listed in terms of their ability to reduce congestion; to improve the environment, safety and sustainability; and to raise revenue. Table 1 provides such a summary.
### Table 1: Contribution of traffic restraint measures to key objectives

<table>
<thead>
<tr>
<th>Measure</th>
<th>Objective</th>
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<tr>
<td></td>
<td>Congestion Relief</td>
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<tr>
<td>Ownership</td>
<td></td>
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<tr>
<td>• Regulatory</td>
<td>-</td>
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<tr>
<td>• Fiscal</td>
<td>¬</td>
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<tr>
<td>Parked Vehicles(1)</td>
<td></td>
</tr>
<tr>
<td>• Regulatory</td>
<td>¬</td>
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<tr>
<td>• Physical</td>
<td>¬</td>
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<tr>
<td>• Fiscal</td>
<td>¬</td>
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<tr>
<td>Moving Vehicles</td>
<td></td>
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<tr>
<td>• Regulatory</td>
<td>¬</td>
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<tr>
<td>• Physical</td>
<td>¬</td>
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<tr>
<td>• Fiscal</td>
<td>¬</td>
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<tr>
<td>o Fuel Tax</td>
<td>¬</td>
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<tr>
<td>o Road Pricing</td>
<td>¬</td>
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</tbody>
</table>

Key :  
(1) Assuming comprehensive control
* positive impact
x negative impact
- no impact
? uncertain impact

It can be seen that controls on ownership and fuel taxes are unlikely to relieve congestion, but can aid the environment and sustainability and, through taxation, raise substantial revenue. Physical measures, and regulation of parking, are likely on their own to aggravate congestion somewhat, but may improve the environment. Regulation of car use can have significant impacts on congestion and the environment, but will, as with regulation of parking, impose a substantial additional administrative and enforcement cost. Road pricing and, to a lesser extent, parking charges, emerge as the measures best able to achieve all three objectives.

It should be noted that it is possible to combine two or more of these restraint measures to increase their effectiveness and overcome any deficiencies. In particular, physical controls on through traffic can make parking controls more effective, and fiscal measures can help to pay for a permit scheme. Singapore offers the most comprehensive approach currently, with car ownership controls, permits to allow some vehicles to be used just at the weekend, parking controls and road pricing, all designed to focus control on car use where it is most needed (May, 2004).

5 Implementation challenges

With the exception of Singapore and more recently London, it is difficult to find examples of intensive use of controls on car use. The most widely used measures are the range of parking control measures, but applied only to public parking; regulatory controls on the moving vehicle, and selectively applied physical controls on moving vehicles. With the possible exception of regulatory controls, none of these is proven to be particularly effective in reducing congestion or relieving the environment. This lack of action contrasts with the intensive effort over three decades to demonstrate the potential benefits of the more effective control measures such as road pricing (May and Sumalee, 2003). While there are some technical problems.
and legal barriers to be overcome, the principal barrier is the lack of political will to implement what are seen to be publicly unacceptable measures, whose benefits have not been proven in practice. The principal political concerns relate to the side-effects of controlling car use; impacts on the economy; equity implications; and underlying acceptability. Langmyhr (1999) provides an interesting analysis of these barriers to implementation.

Technical problems

The technical problems are limited to the operation of road pricing and the efficient enforcement of most measures. It is already possible to introduce paper-based road pricing schemes; the main constraint is that the scheme must be kept simple, and may thus be less effective. Electronic road pricing is also in operation, with automated enforcement, but it requires all affected vehicles to be equipped, and this will be more difficult in cities with a substantial hinterland. Norway has overcome this problem by permitting both electronic and paper-based transactions. London uses number plate recognition technology to avoid the need for paper-based systems or in-vehicle technology. This range of approaches will enable simple road pricing schemes to be introduced as soon as legislation permits; meanwhile further research is underway to develop GPS-based technology which will enable both point-based and distance-based charging regimes (May and Sumalee, 2003). Enforcement for most restraint measures is labour-intensive, and under-staffing can rapidly lead to high levels of violation. There is now widespread interest in using technology to aid enforcement (ERTICO, 1998) and to change the status of the offences so that fines can be imposed immediately, and legal costs minimised. In due course control measures which can be operated electronically, whether they are video-detected permits, transponder-operated barriers or automated payments, will provide the lowest cost approach to enforcement.

Legal barriers

Of the measures listed in Section 2, fiscal controls on ownership, all controls on public parking, physical controls on moving traffic and fuel taxes can be implemented now in most countries. Subject to the political barriers below it should thus be possible to implement them immediately. Conversely, few countries permit regulation of car ownership, control of private parking spaces, permit systems for car use or road pricing. Legislation will be needed for these, and will only be forthcoming once political and public accessibility barriers have been overcome. One approach which is likely to make such legislation more palatable is the use of enabling powers which delegate to local government the decision to implement restraint and permit them to use the revenue to support transport policy measures.

Side effects

Any measure to control car use will give rise to a range of responses by the driver, who may chose not to travel, to travel to a different destination, by a different mode, at a different time, or on a different route. These are listed roughly in descending order of their beneficial impact on congestion and the environment. The effect of changes in destination will depend on the level of congestion there, and the relative distances. However, in the longer term, such changes are likely to result in journey patterns which are less amenable to further restraint. The effects of changes in mode should be beneficial, as long as the new mode does not itself become congested. Changes in time and route are more likely simply to redistribute congestion and environmental intrusion. Unfortunately these last two are the most common responses; research has indicated that drivers are much more likely to adopt these than to change mode, and that rerouting in particular may well remove much of the benefit of road pricing (May et al, 1998). It is crucial to the effective design of restraint measures to avoid the worst side effects of these responses. This can be done
in part by extending the measures throughout the area in which traffic reductions are needed, and in part by the use of complementary measures, as discussed in Section 6.

**Impacts on the economy**

Decisions not to travel, or to change to a different location, are likely to have an impact on the economy of the area affected. Conversely, those dependent on public transport, walking or cycling may be encouraged into the area, and the improvement in the environment there may provide a further incentive, as has been found with traffic calming schemes in German town centres (Hass-Klau, 1993). Because such responses take some time to occur, they are difficult to identify, and there is still considerable uncertainty over the power of predictive models to assess them. Not surprisingly, therefore, the negative reactions of traders and business in the affected area will be difficult to refute. A recent example of this has been the claim that congestion charging in London has led to reductions in turnover of 10% or more in certain stores. A more detailed analysis has suggested that any such reduction is likely to have been caused principally by other factors (TfL, 2004), but it is difficult to isolate the impacts of different potential causes. This is an area in which more evidence is needed. However, a major UK report concluded that it should be possible to design car use controls so that they have a positive impact on the economy (SACTRA, 1999).

**Equity implications**

Some of the equity implications of individual measures have been identified in Section 3. More generally they arise under three broad headings: income-related effects; locational effects; and need-related effects. The first is the most often cited, the argument being that any fiscal measure bears more heavily on lower income families. In practice the position is more complex, since lower income families are more likely to use public transport, and it is perfectly possible, as predicted in London (May et al, 1996), that the net costs are greatest for the highest income groups. Even so, the poorest car users who have no alternative to the car will be the most severely affected, and it is difficult to avoid this outcome. Location-related effects arise with all types of restraint, either because some live within the affected area while others do not, or because of the effects of rerouted traffic. They are amenable to design improvements, either by relocating the boundary or by taking action to avoid rerouting. Need-related effects can concern those with mobility handicaps who have little alternative to the car, and people for whom the nature of their journey rules out alternatives to the car. Both are capable of solution through exemptions, subject to the cost of administering and enforcing them. This was a key element in the success of congestion charging in London, which offered rebates and exemptions to several sensitive user groups, including residents of the affected area (TfL, 2004).

**Public attitudes**

There is ample evidence that restraint measures are unacceptable to the majority of the public, and to a larger proportion of car users (Jones and Hervik, 1992, Jaensirisak et al, 2004). However, it appears that the balance of opinion is changing, with increased awareness of the problems caused by cars. Most surveys have concentrated on road pricing, but recent work suggests that physical and regulatory controls may be more acceptable to the public than fiscal ones, even though, or perhaps because, they are less effective. However, even the least acceptable forms of restraint become much better received if they are combined with enhancements to public transport and other alternatives to the car, and particularly so if the revenue which they generate is used to finance these alternatives. In a survey in London, 43% of respondents considered road pricing acceptable; this rose to 62% when revenue could be used to improve public transport. Similar figures for a UK-wide survey were 30% and 57% (Jones and Hervik, 1992). It is clear, therefore, that public attitudes will change over time, that they can be enhanced by careful scheme design, and that their integration with positive measures, as outlined in Section 6, and their use to finance
those measures, can make the overall policy acceptable to the majority. Even so, carefully designed promotional campaigns will be needed if the public is to be convinced of the merits of traffic restraint measures as part of an integrated strategy.

**Political commitment**

All of the factors considered in this section can be presented as reasons for not pursuing traffic restraint measures. Progress will only be made if those with political authority have the commitment and are willing to take the risk. As an earlier OECD study, Better Towns with Less Traffic, concluded, the sites which had been successful in reducing car traffic all had two things in common: a committed politician, and a technical expert able to realise the political ambitions (OECD, 1975). As the Linz seminar concluded, the same holds true today (ECMT, 1998).

Table 2 summarises the severity of the constraints considered in this section for each of the types of restraint covered in Section 3. Unfortunately, the most effective restraint measures (Table 1) tend to have the most serious constraints.

**Table 2: Severity of constraints for individual restraint measures**

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Restraint Measure</th>
<th>Ownership</th>
<th>Parking</th>
<th>Moving Vehicles</th>
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<tbody>
<tr>
<td></td>
<td>Regulatory</td>
<td>Fiscal</td>
<td>Regulatory</td>
<td>Fiscal</td>
</tr>
<tr>
<td>Technology</td>
<td></td>
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<tr>
<td>Enforcement</td>
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<tr>
<td>Legislation</td>
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<td>!1</td>
<td>!!!</td>
</tr>
<tr>
<td>Side effects</td>
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</tr>
<tr>
<td>Urban economy</td>
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<tr>
<td>Equity</td>
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<tr>
<td>Public attitudes</td>
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<tr>
<td>Political will</td>
<td>!!!</td>
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<td>!2</td>
<td>!!!</td>
</tr>
</tbody>
</table>

Key: !: intensity of constraint
1: particularly for control of private parking
2: more so for control of private parking

6  *A possible implementation plan*

**Setting targets**

As noted in Section 2, it is as yet unclear what the appropriate level of car use in Russian cities might be. Car use should almost certainly be permitted to grow, but not at the rate that is being experienced currently. It will be important to be clear on the objectives for controlling car use, and to use these to determine appropriate reduced growth targets.
Choice of car use controls

Once these targets are known, it will be possible to identify the most effective and acceptable methods. Reference to Table 1 suggests that the most effective methods of reducing congestion and environmental impact are likely to be parking charges, possibly combined with other controls on car use; regulatory controls on car use; and some form of road pricing. However, parking controls will only be effective if it is possible to control all forms of parking, and if through traffic can be controlled by other means. If these are not possible, parking controls should be rejected, or simply used to reinforce other more direct means of car use control.

The choice between regulatory controls and road pricing will depend on their relative acceptability, and the financial requirements of the strategy. Table 2 suggests that both suffer from similarly severe constraints, but the nature and importance of those constraints will differ from one city to another. It is worth assessing each of them carefully for each of the two types of control to assess which is likely to be more acceptable. The principal difference between the two, though, lies in their financial impacts. While a regulatory scheme will require a continuing financial outlay to administer and enforce it, road pricing is able to generate a significant revenue stream after meeting the costs of administration and enforcement. As noted earlier, this can potentially be sufficient to cover the costs of the other elements of the overall strategy.

Reallocation of road space

While decisions are being made on the longer term approaches to car use control, there is one type of measure which may be more readily available to Russian cities than it is in Western Europe. Physical control of road space, and its reallocation to other users, will be much easier to implement when car use is low; it will also prove beneficial in removing one of the principal attractions of car use in urban areas: relative fast journeys on relatively lightly trafficked streets. The approach applied in Zurich, of gradually reallocating road space to avoid any further growth in car use, should be seriously considered as a means of limiting the rate of growth of car use. Care will, however, be needed to ensure that buses and commercial vehicles are protected from any increased congestion which results from such controls.

Complementary measures

As with any element of transport policy, controls on car use are likely to be more effective if implemented with complementary measures, many of which have been considered in other sessions in this conference. A recent decision-makers’ guidebook for sustainable urban transport strategies (May et al, 2003) suggests four ways in which different policy measures can complement one another:

- by reinforcing the benefits of each other;
- by overcoming acceptability barriers;
- by overcoming financial barriers; and
- by protecting those who would be disadvantaged.

To take public transport improvements as an example, they will attract people from cars, thus reinforcing the benefits of controls on car use; they will be more acceptable than car use controls, and will make the overall package more acceptable; and they will provide an alternative for those who no longer use their cars. However, they will not assist in financing car use control measures, except possibly through increases in fares, which would run counter to the other benefits of the strategy. Table 3, taken from the Dublin paper (May, 1999) and updated, applies these principles to a number of potential complementary measures. The first of these is reallocation of road space, which is advocated above as an initial means of controlling car use, but could be sustained once other control measures had been introduced. The others include improvements to public transport; improved conditions for walking and cycling; so-called “soft
measures” such as awareness campaigns and travel plans (Cairns et al, 2004) and land use policies (Greiving and Wegener, 2001).

Each cell indicates the ways in which the pair of measures can complement one another. The table as a whole can be used, having selected a preferred method of car use control (in a column) to identify the other policy instruments which could usefully be applied to offset any identified disadvantages of the chosen method.

Table 3: The interaction of car use control measures and complementary measures

<table>
<thead>
<tr>
<th>Complementary measure</th>
<th>Car use control measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ownership</td>
</tr>
<tr>
<td></td>
<td>Regulatory</td>
</tr>
<tr>
<td>Reallocation of road space</td>
<td>RP</td>
</tr>
<tr>
<td>Public transport improvements</td>
<td>RAP</td>
</tr>
<tr>
<td>Improved walking and cycling</td>
<td>RP</td>
</tr>
<tr>
<td>Soft measures</td>
<td>RA</td>
</tr>
<tr>
<td>Land use policies</td>
<td>RA</td>
</tr>
</tbody>
</table>

R: reinforced benefit
A: increased acceptability
F: increased financial support
P: protecting the disadvantaged

7 Policy implications and priorities

The following policy implications can be drawn from this review:

(1) It is essential to be clear as to the objectives of controlling car use (Section 2). Different objectives will justify different solutions (Section 4), and a clear articulation of objectives will help reduce resistance to what are inevitably unpopular measures.

(2) It may be helpful to set targets for controlling car use, but these will depend on the objectives, and will almost certainly involve a reduced rate of growth rather than an actual reduction (Section 2).

(3) Controls can be imposed through regulation, physical restriction and fiscal measures (Section 3). Of these, only fiscal measures can reduce congestion, improve the environment and generate revenue. Regulatory measures can potentially relieve congestion and improve the environment, while physical measures are only likely to achieve environmental improvement. If all three objectives are being targeted, fiscal methods are thus preferable (Section 4).
Controls can be imposed on car ownership, car parking and car traffic (Section 3). All are likely to improve the environment, but only those which are focused on congested locations are likely to reduce congestion. Ownership control and fuel taxes fail to do this; parking controls and moving vehicle controls are likely to be more effective (Section 4).

If all three objectives of congestion relief, environmental protection and revenue generation are to be pursued, road pricing appears to be the most effective measure. Charging for parking can also be effective, provided that it is applied comprehensively and through traffic is also controlled (Sections 4, 6).

If revenue generation is unimportant, regulatory controls on car use may be a preferable alternative (Sections 4, 6).

One other approach, which can be implemented now, is physical reduction of road space. In situations in which levels of car use are still low, such measures can limit further growth and protect public transport (Sections 3 and 6).

Enforcement will be required for all regulatory and fiscal controls on parking and moving traffic, and will prove to be increasingly expensive unless automated. Improved technology for enforcement is thus a priority (Section 5).

Legislation is needed in most countries for control of private parking, permit systems for car use, and road pricing. Where possible such legislation should be enabling, allowing local government to make the final decision on need, and should provide support for local government by permitting hypothecating revenues to pay for them (Section 5).

Any car use control measure will have unwanted side effects as drivers seek alternatives (Section 5). It is important to identify these in advance, and ensure that controls are in place when the restraint measures are introduced.

There is considerable uncertainty over the impacts of car use controls on the urban economy, and more research is needed, particularly through pilot studies. There is some evidence, however, that careful design, and environmental enhancements, can allay any adverse impacts (Section 5).

While car use controls should benefit the majority, there will inevitably be some who are adversely affected. These equity impacts need to be identified in advance, and designed out where possible. Solutions will depend on the problem, but can include provision of alternatives (Section 6), modification of the boundaries of the scheme, and exemptions (Section 5).

The majority of the public is typically opposed to car use controls, but there is evidence that this opposition is declining, and it is clear that it can be substantially reduced by providing alternatives to the car, and by using the revenue from pricing measures to finance them. Even so, considerable effort will be needed to promote such measures as part of an integrated package (Sections 5, 6).

The use of complementary measures can reinforce the benefits of car use controls and offset some of their adverse impacts. Careful consideration of these adverse impacts can help in selecting the most appropriate measures to include in an integrated strategy (Section 6).
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