BRITISH VIEWS ON ROAD PRICING

David BAYLISS
Director of Planning
London Transport
London - England

INTRODUCTION

The subject of road pricing has been studied and debated in Great Britain for many years. However it would be misleading to suggest that there is a clear "British" view on this complex and controversial subject. Nevertheless in the course of these studies and debates most of the significant issues have been identified and a number of them clarified to the point where their implications are quite well understood. What this paper seeks to do therefore is to review the results of previous studies and discussions of road pricing in order to establish what the main issues are currently seen to be. It identifies where there is agreement, where there are still significantly divergent views, what further studies are needed and then it speculates on policy developments in this area.

1. A BRIEF HISTORY OF ROAD PRICING IN BRITAIN

As in many other European countries there is a long history in Britain of direct charges to road, rail and canal users. Tolls were charged for many roads, which were called "turnpikes" in Britain during the Middle Ages. Whilst the process of tolling is similar to what we now call "road pricing" the purpose is different. Tolls were invariably charged to repay the costs of constructing, maintaining and operating the road. Road pricing is a charge essentially to control congestion.

This difference in purpose, and the paradox it could create, was made clear by Dupuit[1] as long ago as 1844. Where a road was of value to the community, to charge for its use would reduce the number of times it was used and thereby diminish its value. This however is not the case where the free use of the road would be so intense that it would become congested and levying a charge would reduce congestion and therefore increase community benefits. In such situations levying a direct user charge can serve as both an instrument of efficient rationing and a way of raising revenue to pay for the facility and its upkeep.

In Britain the application of the concepts of welfare economics and social cost benefit analysis started to be applied by a few progressive economists to transport projects in the late 1950s and this quickly threw up the

notion of optimal pricing strategies for scarce transport facilities. In turn this led to an academic lobby for the introduction of selective road user charges which have come to be called "road pricing".

In response to this the UK Government of the day formed a committee, under the Chairmanship of Reuben Smeed, to look into the feasibility of road pricing. This reported in 1964[2]. and concluded that electronic road pricing was likely to be the most effective way of controlling urban traffic congestion and was technically feasible. There can be little doubt that the work and conclusions of the Smeed Committee were well in advance of current thinking on ways to deal with the urban transport problem. Although the Government took no action this study however firmly established electronic road pricing as a potential transport policy option and clearly demonstrated that it could be a powerful congestion regulator and fund raiser in appropriate conditions.

During the 1960s and 1970s a series of studies into the generality and possible specific applications of road pricing were carried out[3]. Each came to its different conclusions but collectively they broadly confirmed the conclusions of the Smeed Report. Parking controls were often considered as the alternative to road pricing as the way of reducing urban traffic congestion but was seen to have a number of deficiencies depending on the specific location. These included; the difficulty of on-street enforcement, the problems of dealing with large amounts of privately owned off-street parking and the inability to restrain through traffic.

Other means of restraining traffic that were given consideration included cheaper and better public transport and the restriction of traffic capacity into the areas where traffic flows were to be reduced. Whilst improved and cheaper public transport did have some effects on road traffic levels these were usually rather limited. Restricting road space to restrain traffic in busy urban centres usually caused more congestion that it relieved. Even policies of improved public transport, lower fares and capacity restrictions did not appear to offer a great deal.

In one city - Nottingham - a zone and collar restraint system was tried[4]. This entailed a collar around the city centre which limited general road capacity but including bus priorities through it, and within the city centre it encircled, accompanied by park and ride stations and new express bus services into the centre. It was taken out before its longer term effects had time to reveal themselves but appears to have had little effect on mode choice whilst it was in operation. During this period most of the cities that looked at restraining excessive road traffic came to

the conclusion that a combination of parking controls, bus priorities, improved public transport and, perhaps, some limited road building while not achieving all the desired objectives, would cope for the time being at least. In some cities - Oxford for example - local conditions were such that these were quite effective, but in most others traffic conditions continued to deteriorate.

London had then, and still has, the worst traffic congestion in Britain and it was in London that most work was done on road pricing as a means of dealing with the growing traffic congestion. In 1974 a study was carried out into a Supplementary Licensing scheme for London[5]. and this concluded that such a scheme was feasible, efficient and could reduce traffic in both inner and central London. However the scheme was rejected by the Greater London Council as too difficult to enforce and being inequitable. Later a simplified scheme[6]. - Area Control - involving restricted entry into central London by low occupancy cars, unless a special licence had been purchased, was developed but again rejected for political reasons.

More recently interest in road pricing has stirred again. A considerable amount of work has been put into a congestion pricing scheme for Cambridge.[7]. Here the City is already badly congested and clearly unable to accommodate the forecast growth in road traffic. The congestion pricing scheme is seen as being coupled with a new light rail project which would be funded from the proceeds of congestion pricing. The scheme is rather different from conventional road pricing in that the on-vehicle meter is triggered by the car's average speed falling below thresholds which typify congestion. Payment is by decrementing a prepaid "smartcard". In south-west London a different type of scheme is being proposed[8]. in which vehicles are charged for the period they spend on roads inside a congested area. In this scheme the on-vehicle meter is activated not by the vehicles' speed characteristics but by roadside beacons at the edge of the zone. Both these are serious proposals but have some way to go before they are capable of being implemented. Other cities, including Edinburgh[9]., are also seriously investigating road pricing as a policy option for the late 1990s.

2. TAKING STOCK OF WHERE WE ARE NOW

Concern about traffic congestion in Britain has quickened and interest in road pricing widened. The Chartered Institute of Transport has recently carried out a review[10]. of its potential and the problems of its application. The remainder of this paper draws heavily on

the conclusions of that work.

The costs of traffic congestion in Britain are difficult to measure but have recently been estimated to be as much as £10bn to £15bn[11] with most of this arising in London and the South East of England. These costs are of particular importance to the British economy as Britain already suffers from being a peripheral member of the European Community as well as having the physical barrier of the Channel to overcome. The first conclusion of the CIT study was that traffic congestion is a damaging drain on the British economy as well as a major social and environmental nuisance.

Traffic in Britain has been growing strongly since the early 1950s. Official forecasts[12] indicate that road traffic may well double over the next thirty five years. In British towns and cities a doubling or more would probably not take place because of the restricted capacity of most of their road systems. However the levels and extent of congestion that would be required to choke off substantial further growth would impose such economic, social and environmental costs as to be generally unacceptable. It seems therefore that this, already serious, problem is going to get worse.

Large scale road building to provide the vast increase in road capacity needed to accommodate this additional traffic at reasonable service levels is not regarded as worthwhile or acceptable. Improvements to public transport, whilst important to any sensible transport strategy, are unlikely to effect major reductions in traffic growth on their own. Traffic management and "smart" highway infrastructure can also increase the effective capacity of existing road systems but the scope for this is fairly limited, especially if the environments of residential areas and town centres are to be protected and improved. The tried and tested policies for dealing with urban transport therefore will not be sufficient on their own to allow us to effectively face the challenges of the next two decades or so.

Whatever the form and timescale of taxes designed to depress car use such as "carbon taxes" they are poorly suited to dealing with the problems of urban traffic congestion. If these general restrictions were powerful enough to deal with peak hour congestion in the largest cities their effects on general mobility would be huge and extremely disruptive. Whilst therefore such general policies might well be working in a similar direction to road pricing they would not be an alternative to selective road user charges designed to reduce traffic congestion.

The case for the introduction of some form of selective road user charges in the more congested towns and cities is therefore compelling. Road pricing however, whilst simple

in theory, presents complex technical and political issues which need to be carefully thought through before an efficient and acceptable scheme can be implemented.

3. THE PRINCIPLE ISSUES

In the recent study by the Chartered Institute of Transport entitled Road Pricing: Supplementary Report[13] five main issues in the development of road pricing in Britain were identified as needing to be addressed. These are:

The Impact on the Different Sections of the Community
The Consequences for Commercial Traffic and Taxis
Public Attitudes
Technology and Enforcement
Administration

A central conclusion that has emerged from recent work is that there are strong technical and political reasons for road pricing to be introduced as a core element in a wider package of transport and environmental measures. This means that any conclusions drawn about road pricing per se must be conditioned by potential enhancements and countervailing effects which would arise from the rest of the policy package. The sorts of measures which could be linked with road pricing include:

Greater priority for buses
Improved traffic management
Automatic driver guidance
More park and ride
Traffic calming
Reduction of highway bottlenecks.

It is also important that the general transport taxation regime (as opposed to selective user charges) is modified to eliminate any features which encourage un-economic behaviour (e.g the transfer of ownership taxes to use taxes).

4. IMPACTS ON DIFFERENT SECTIONS OF THE COMMUNITY

Whilst generalisations are difficult, it appears that an Electronic Road Pricing (ERP) scheme in a metropolitan area would have the following general effects:

- Overall reductions in traffic would be small with effects concentrated in peak periods and on the busiest roads.

- Higher income households, who own more cars, would be most likely to be affected.
- Professional and managerial workers would tend to be most affected as they drive more in peak periods.
- Commercial traffic has the most to gain as delays cost it more than car traffic.
- Bus services would improve and become more productive.
- Groups such as women, children and the elderly who depend heavily on buses would stand to benefit as would the environments of areas where traffic was reduced as a result of ERP.
- Local residents would also benefit from less congestion but would have to pay more. Retail outlets in pricing areas should also benefit from a better environment and easier deliveries.

Whilst car users tend to have higher than average incomes, they are not a uniform group and it appears that the direct effects of ERP would be to benefit the upper and lower ends of the car owning income range. The upper end would be better off because their time tends to be more valuable and the lower end because they are more likely to take advantage of improved public transport.

ERP would also, to some extent, change the relative attractiveness of different parts of the urban area to different types of land use. However higher charges would be partly offset by easier travel. As a result businesses with low turnovers but which generate large volumes of traffic would tend to locate in low and no price areas whereas high value added enterprises which do not generate heavy volumes of road traffic would move in the opposite direction. This elimination of hidden "congestion subsidies" to some types of enterprise would lead to gradual and limited changes in land use patterns and result in new development patterns which would be in better balance with the transport network.

5. THE CONSEQUENCES FOR COMMERCIAL VEHICLES AND TAXIS

Commercial vehicles as a group have higher time dependent operating costs than cars[14] and therefore will be less sensitive to road pricing than cars. A proportion of cars are also likely to be particularly sensitive to charging as their occupants can easily switch to public transport. Therefore direct user will lead to mainly cars being displaced leaving commercial traffic to enjoy the benefits of reduced traffic congestion. This rather simplified analysis also goes for taxis, however because of

the potential importance of the effects of ERP on commercial vehicles this is a matter which needs careful further study prior to the design of ERP scheme.

6. PUBLIC ATTITUDES

One of the most important reasons why road pricing has not been introduced in Britain is because of concern by policy makers about public attitudes. The growth of traffic congestion, its costs to industry, its inconvenience to the growing numbers of car owners and its damaging effects on urban amenity mean that public opinion is slowly becoming less antagonistic to ERP as a means of controlling urban traffic congestion. Recognition that large scale urban road building is unacceptable and that buses can't do their job properly when caught up in traffic has added support to the idea that something new, and perhaps radical, needs to be done.

A review[15] of recent public attitude surveys carried out in Britain shows that most people would prefer positive measures to be the primary means of easing urban traffic congestion. Outside London around 70% support better public transport, park and ride, encouraging walking and cycling along with better enforcement of existing traffic regulations as the best ways to combat traffic congestion. Restricting or banning cars from town centres could be acceptable to about half the population but only a quarter or so find charging to enter congested areas appealing. However this is not seen to be as bad as increasing fuel taxes.

Inside London the same order of preferences can be found although some form of traffic restraint or road pricing is less and between a half and a third of people see it as probably necessary to reduce congestion. The most recent survey[16] into this matter in London found:

a. Congestion is the single biggest problem of living in London.
b. Reducing congestion requires a package of measures including the "carrot" of improving public transport and the "stick" of measures to discourage car use.
c. Road charges would be acceptable to the majority if the revenues were reinvested in improving roads and public transport, or reducing taxes.
d. There is a core of about 30% of people to whom road pricing would not be acceptable even if the revenues were reinvested.

e. Simple methods such as additional licences to travel in congested areas would be more acceptable than methods such as in-car meters.
f. Over half of people asked believe that road pricing should be introduced now in central London in the peaks.
g. There is far less support for the immediate introduction of road pricing in the suburbs at present levels of congestion.
h. As congestion rises, support for introducing charging over a wider area of London will increase.
i. A charge equating to £0.5 per hour would take almost a quarter of the peak hour trips made by those surveyed off the roads. Higher charges intensify this effect.
j. Most trips taken out of cars would switch to public transport which would have to cope with higher peak loads. Further investment in public transport will be necessary.

From known behavioral responses to transport price changes it is likely that higher charges than those quoted above would be needed to reduce peak car traffic by a quarter. Also the switch to public transport has probably been overestimated by the respondents.

This most recent survey suggest that a simple form of road pricing in Central London could be acceptable and effective now if the proceeds were re-invested in road and public transport improvements.

7. TECHNOLOGY AND ENFORCEMENT

Most of the component technologies needed in an ERP scheme are available and both electronic tolling and the Hong Kong pilot scheme indicate that a real life scheme should be feasible. A key step therefore is the definition of a performance requirement for an ERP scheme and central to this is the need for effective and efficient enforcement: the bugbear of current traffic management in Britain.

Another critical issue is that of privacy and its possible invasion by remote tracking. The system in which stored value is deducted by an on-board meter activated by a roadside signal appears to be able to meet this requirement best although automatic vehicle identification (AVI) with off vehicle processing can also be designed to protect data on individual vehicle movements in pricing areas. Operators of fleets of commercial vehicles, on the other hand, are likely to want to have data on where and when charges were incurred if, for no other reason, they want to optimise routing and scheduling.

An urban ERP system therefore should be capable of:

multi-lane operation
wide variations in traffic speeds
random vehicle positioning, mix and angles
high data transmission rates
in-vehicle metering probably using smart cards
different charging for different directions
including AVI as required

The number of daily road pricing transactions could be of the order of ten million for a London wide scheme and the scope for fraud, evasion and miss-payment is correspondingly large. A high degree of integrity and security is therefore essential and the operator will require:

security of financial transactions
tamper proof on-vehicle equipment
reliable detection of offenders
security of value stock
a high deterrence penalty system.

The user's requirements include:

foreknowledge of the relevant charging rates
real time confirmation of charging
a reasonable guarantee of no invalid charges
warning of low credit levels
protection from "unfair" charging.

The most suitable enforcement regime seems to be by using roadside cameras which record the number plates of vehicles which do give out a valid code as they pass the pricing point. Whilst there are problems of poor visibility, modern high sensitivity/high resolution cameras are capable of producing reliable pictures most of the time. It is not essential that every invalid pass is recorded if the penalties for infringement are sufficiently substantial to make the overall risk of detection unrewarding.

8. ADMINISTRATION OF ERP

The way in which an ERP scheme would be administered is important to its acceptability and success yet relatively little thought has been given to this aspect in Britain. Road pricing is unlikely to be the exclusive province of one level. From a British perspective it appears that there are three levels of Government with a legitimate interest in an ERP scheme. At the European Community level the EC would want to ensure that ERP schemes in member states were not

discriminatory. It might also have an interest in the application of taxation to ERP revenues. The EC has also shown an interest in the question of technical standards and would probably wish to see some form of basic standardisation to permit compatibility between schemes in member states.

In the same way the national government will be interested in compatibility between schemes in different areas, technical standards and, of course, the principle of whether selective road users charges could be applied and under which conditions and constraints. Local government is clearly best placed to determine the form of ERP scheme which best meets the requirements of its area and has the breadth of involvement in transport and environmental matters to devise the multi-element packages which appear to be essential to the successful introduction of ERP. Moreover as the implications of ERP extend into the social and commercial life of the local community this is clearly where local government has the lead. In Britain the scale and complexity of the structure of local government is such that there are choices as to the level and grouping of ERP authorities which will depend on the scope and nature of the scheme. The principle however is clear, that central government would be the enabling and regulating authority with local government the sponsor and manager.

9. SUMMARY AND CONCLUSIONS

Interest in road pricing in Britain has quickened over the last few years. The theory is well understood and the principle is now gaining support. There are at least two areas of Britain (Cambridge and Richmond) which are seriously considering ERP schemes and the Government has recently commissioned a major study into the possibility of a road pricing scheme for London.

General transport taxes are too blunt to deal with urban traffic congestion and more conventional means of influencing transport use insufficiently effective on their own where congestion is acute. Road pricing presents itself as the core of multi element policy packages to manage urban traffic congestion. As well as providing an effective way of limiting congestion, ERP can generate the revenue needed to fund the improvement schemes likely to accompany it.

Generalisations about the effects of road pricing are more difficult than generalisations about other transport policies as these depend strongly on the circumstances of particular applications. Those who depend most on buses are likely to benefit as are those lower income motorists who switch to public transport for some of their journeys.

Higher income motorists will also benefit as they are able to benefit from reduced congestion.

Commercial traffic stands to gain most from road pricing. Land use patterns will also be effected by the relative changes in time and money costs that road pricing would occasion. These effects however are likely to be small.

Public attitudes to road pricing have slowly changed and there is a growing acceptance that traditional ways of dealing with traffic congestion are not going to be sufficient to cope with future congestion and environmental problems. Where the problems of traffic congestion are worst resistance to the idea of road pricing is weakest. The return of at least part of the proceeds to the benefit of the affected ares seems important to the idea attracting the support of a majority of people.

The basic technologies for ERP seem to be available and limited trial and other applications are reassuring. However the requirements of a full application are onerous and more work needs to done to prove their workability.

Several levels of Government will legitimately have an interest in ERP systems including the EC, central government and local government. At the upper end the EC will wish to ensure that the effects of any ERP schemes are fair between member states. At the lower end local government is best placed to design and administer ERP schemes and the associated policies and projects.

After almost thirty years of study the needs and opportunities for Electronic Road Pricing in Britain have reached a level where it is being seriously considered as a policy option and a major central government study is in hand. Public and institutional attitudes seem to becoming rather less adverse but further research and development is desirable before real applications. The British view is still mixed but the prospect of the introduction of ERP in one or more urban areas in Britain before the end of this decade is now real. If Britain's peripheral position in the European single market is to be compensated for then internal movement within this highly urbanised country must be made more efficient. Road pricing offers the only really effective prospect for this in the foreseeable future.

BIBLIOGRAPHY

1. Dupuit, J. On. Tolls and Transport Charges (1849). Reprinted in Institute of Economic Papers, Vol.11, London, 1962.

2. H.M.S.O. Road Pricing: The Economic and Technical Possibilities. London, 1964.

3. May, A.D. Traffic Restraint: a Review of Alternatives. Transportation Research, Vol.20A, Oxford, 1986.

4. Vincent, R.A. and Layfield, R.E. Nottingham Zones and Collar Study - Overall Assessment. Transport and Road Research Laboratory Report LR 805, Crowthorne, 1977.

5. Greater London Council. Supplementary Licensing. London, 1974.

6. Greater London Council. Area Control. London, 1979.

7. Oldridge, B. Limits of Growth: Congestion Metering. Conference on Practical Possibilities for a Comprehensive Transport Policy with and without Road Pricing, PTRC, London 1990.

8. Beacons of Hope. Surveyor, London, October 1991.

9. May, A.D, and Roberts, M. The Development of a Transport Strategy for Edinburgh. Proceedings of the PTRC Summer Annual Meeting, London, 1991.

10. Chartered Institute of Transport. Paying for Progress. CIT, London, 1990.

11. Confederation of British Industry. Trade Routes to the Future. London, 1989.

12. Department of Transport. National Road Traffic Forecasts (Great Britain). HMSO, London, 1989.

13. Chartered Institute of Transport. Paying For Progress: Supplementary Report. CIT, London, 1992.

14. Jones, P.M. UK Public Attitudes to Urban Traffic Problems and Possible Counter Measures: A Poll of Polls. Government Policy,London, 1991.

15. Department of Transport. Highway Economic Note 2. London, 1990.

16. National Economic Development Office. A Road User Charge - Londoners' Views - Report on Survey Findings. Harris/NEDO, London, 1991.