



## ROAD PRICING

Charging motorists for using urban roads - 'Road Pricing' - has been proposed as a way of controlling congestion in London and other UK cities. A study by the Department of Transport is in progress and trials are proposed in London and elsewhere.

*This Briefing Note examines road pricing and its potential use, and the issues raised.*

### CITY TRANSPORT PROBLEMS

While 85% of London commuters use public transport, the 15% who drive contribute to considerable congestion; between 8 and 10 a.m., traffic streams reach 70,000 cars/hr in central London and average speeds are only ~10 mph (see Table 1). At high traffic densities, accidents, breakdowns, roadworks, etc. cause major hold-ups, and delays sometimes accumulate dramatically. In December 1987, closure of an underpass in Blackfriars and accidents elsewhere brought traffic to a standstill through much of Central London for 7 hours.

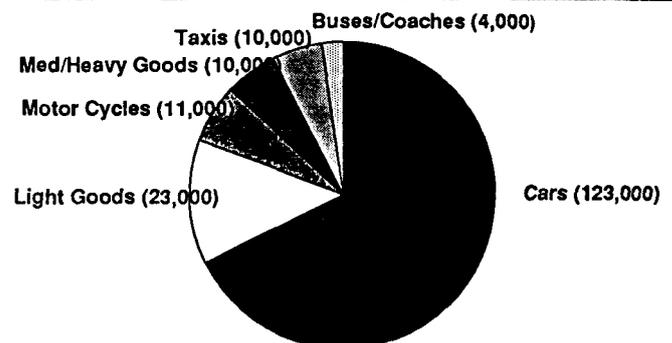
Congestion caused by commuting adds considerably to the costs of commercial transport in cities - the CBI calculates that it costs businesses in London and the South East ~£10,000M p.a. Some firms are particularly susceptible - the Post Office loses over £10M p.a through London's congestion; an increase in average road speed of 1.5 mph in London would save BT over £7M p.a.

There are also environmental considerations. Vehicle exhausts are now the main source of a number of air pollutants in inner cities, particularly carbon monoxide, nitrogen oxides, and the precursors for ozone and photochemical smogs. Pollution levels can exceed World Health Organisation guidelines and EC Air Quality Standards (e.g. nitrogen dioxide limits were exceeded in central London for 52, 148 and 95 hrs in 1990, '91 and '92 respectively). While further progress in reducing emissions per vehicle will emerge from emissions testing and control equipment installed in new vehicles, the number of vehicle-miles travelled will remain a key factor in determining future air quality.

### A ROLE FOR ROAD PRICING?

Table 1 shows that growth in traffic and congestion shows no sign of abating, despite measures such as bans on through traffic for heavy vehicles in London, 'red' routes and bus priority schemes, and there are calls in and outside Parliament for measures to be taken

Figure 1 MORNING PEAK FLOWS INTO CENTRAL LONDON, 1991



Source: DoT (London Traffic Monitoring Report, 1992)

Table 1 TRAFFIC IN LONDON

#### A. AVERAGE SPEED (MPH)

Year		1971-73	1980-82	1990-2
Morning peak	Central	13	12	10
	Inner	15	14	13
	Outer	20	20	-
Daytime Off-peak	Central	13	12	11
	Inner	19	17	16
	Outer	27	25	-
Evening peak	Central	13	12	10
	Inner	15	14	13
	Outer	22	21	-

#### B. RADIAL TRAFFIC MOVEMENTS (millions of vehicles in 24 hrs)

Year		1971	1980	1990
	Central	1.5	1.6	1.6
	Inner	1.9	2	2.2
	Outer	1.5	1.8	2.5

Note: The Central zone ('cordon') is a 2 mile radius 'circle' centred on Aldwych, the Inner area roughly tallies to the former London County Council, and the Outer cordon corresponds to the old administrative boundary of Greater London and lies entirely within the M25.

to increase the speed and efficiency of road travel and reduce the environmental burdens.

The main users of London's roads are cars (Figure 1), and a substantial proportion of car use may be optional in the sense that public transport could be used. One measure seen by transport economists as able to constrain demand for road space is to charge drivers in proportion to the use they actually make of the roads.

Tolls on bridges and tunnels are not new; and the New Roads and Street Works Act (1991) will also allow private contractors to charge tolls on new privately-financed roads. However, charging for the use of an urban road network presents wholly different challenges due to the large area to be covered and the need to have a system which does not itself cause congestion. Although proposed as early as 1964 in the Department of Transport (DoT)'s 'Smeed' report, it is only recently that technology has improved to the point that urban road pricing is becoming feasible (see Box).

## EXPERIENCE TO DATE

There has been some experience abroad of road pricing. Supplementary licensing (see Box for terminology) was introduced in Singapore in 1975 and led to a 60% reduction in solo motorists driving to work in the centre, a 25% fall in road accidents, and improved air quality. Charges are ~£2 per day and traffic levels have only grown marginally since 1975. In Hong Kong, the TRL trial system (see Box) was technically successful but was not applied due in part to civil liberties concerns over collecting information on vehicle movements (modern designs can overcome this problem).

In the USA, tolls are used to control congestion during peak periods, e.g. on bridges/tunnels in San Francisco and New York. These have had the effect of displacing some traffic into off-peak periods and encouraging car pooling and public transport. Financial incentives have been offered to US cities wishing to set up demonstration ERP projects but so far have not been taken up.

In Europe, an ambitious scheme including ERP, was to be introduced in West Holland in 1994 but a simpler system based on water-crossing tolls will be introduced instead. Ring roads round Oslo, Bergen and Trondheim now have toll booths, which charge between 70p and £1 to enter the city. Revenue is used for new road building. In proposed schemes in Stockholm, Gothenberg and Malmo, drivers would purchase a card allowing unlimited travel on public transport but would have to fit the card to the windscreen when driving in the city centre so credits could be deducted. In Milan, a peak-period entry licence for the city centre reduced traffic by 50%. Of travellers who altered their behaviour, 16% delayed their journeys, 36% parked in the suburbs and 41% switched to public transport.

In the UK, a number of bodies, including the Association of London Authorities and the London Boroughs Association see road pricing as part of an integrated London transport strategy. The DoT is currently engaged on a comprehensive, three-year study on 'congestion charging' which will report in December, 1994. Richmond Council were considering an ERP trial using 100 vehicles fitted with IVMs, but have decided not to proceed. Charging technologies are also being studied (with DoT support) in Bristol, Cambridge, and as part of the Edinburgh Integrated Transport Study.

## ISSUES

### *Is the Technology ready?*

Any system has to be simple (so drivers can forecast trip costs accurately), reliable (to avoid spurious charging), and capable of detecting non-payers. No system has fully met these criteria, and no system could yet handle London's complexity and scale. Outstanding

## □ HOW WOULD ROAD PRICING WORK?

### Toll Gate Models

The standard manual toll systems used on bridges etc., could not work in urban areas in view of the space constraints and the volumes of traffic involved. However technology can speed up the process. The simplest approach is to levy a **supplementary licence or cordon charge**, whereby drivers pay a flat fee for entering a particular city zone. Proof of payment, e.g. a paper sticker, must be displayed on the windscreen and can be checked visually (when passing a booth) or by a roadside camera. Drivers have to pass check points slowly in single-file but even then it can be difficult to spot counterfeit stickers.

### 'Natural Road Environment' Models

**Electronic Road Pricing (ERP)** attempts to avoid disrupting normal driving patterns. One ERP scheme was developed by the UK's Transport Research Laboratory (TRL) and tested successfully in Hong Kong during the 1980s. Cars were fitted with 'electronic number plates' which contained information which was 'read' by detectors buried in the road surface. If a non-compliant car passed an enforcement point, its number plate was photographed automatically for subsequent action by the police.

Modern technology is allowing more sophisticated schemes to be developed both by private industry and in an EC programme, 'Dedicated Road Infrastructure for Vehicle Safety in Europe' (DRIVE). DRIVE I (1989-91) was funded at roughly £40M; DRIVE II (1991-94) has ~£80M. About 15% is devoted to road pricing-related studies, with DoT contributing ~£1M p.a.

In one commercial ERP system being developed, each car would have an 'in-vehicle meter' (IVM) permanently fitted to the windscreen. The driver inserts a 'smart card' on which would be encoded registration details of the vehicle and/or driver and the amount of credits. As the driver passed small roadside radio beacons, charges would be deducted automatically. Separate beacons would also check for violations and record offending vehicles on video. The IVM could also be used as an in-car 'parking meter', activated by the driver on completing a journey (the IVM could be checked by a passing warden with a hand-held electronic unit).

With ERP, drivers can be charged on a travel-time and/or mileage basis with the highest rates applying during rush hours and in particular areas, e.g. city centres. Payment could either be by drivers purchasing 'credits' in advance (like buying a 'phone card') or information collected automatically would allow a monthly, itemised bill to be sent. Typically, an IVM might be the size of a tax disc and permanently fixed to the windscreen. At present, costs are commercially-sensitive and will depend on the nature of the scheme. (Electronic number plates in Hong Kong cost about £45).

Any system has to deal with occasional as well as regular local users. Out-of-town drivers unequipped with IVMs could, in principle, hire them at garages or, having paid the required charges, have their car number logged onto a central computer which would negate 'violation' signals from the check beacons.

technical issues include:

- Should most data processing be moved from the roadside to the car? This would increase the complexity and cost of the in-vehicle unit, but also its capability, and flexibility within an evolving scheme.
- Will a vast distributed network of beacons in London be able to work fast enough so as not to delay traffic, produce spurious readings, etc?

- Will a large central data base be able to cope with the potentially 40 million or so transactions daily?
- Will detection of non-payers be good enough to provide high rates of compliance with the law?

Though the remaining technical requirements are demanding, experts (e.g. at the University of Newcastle-upon-Tyne and elsewhere) believe that none of these problems is insurmountable and that the necessary technology could be available in 5 years or so.

Even assuming reliable and affordable technology is available, there are still many options for applying it to specific cities. One choice would be to divide the London area within the M25 into a number of segments and to levy charges when crossing boundaries between them. Alternatively, drivers could be charged per mile and/or per time on the road, or only when their average speed fell below a certain threshold, e.g. 20mph.

A charging structure would also have to be set. A 1989 report to the London Planning Advisory Committee suggested that the optimum Central London cordon charge at peak times would be £3 (this would reduce traffic terminating in Central London by 30% and through traffic by 75%). Cordon charges outside the centre would be smaller, tapering to zero by the M25. In a more complex ERP scheme, a charge of 70p for passing a beacon would give a typical trip cost of £3-£4.

However, charges might have unexpected effects on driver choices, and part of the DoT study is aimed at predicting how commuting habits might change - how drivers will adjust travel times and/or routes to minimise charges, and how many will switch to public transport. Key factors in any system will be ease-of-use and public acceptability, so as to avoid large numbers of law-breakers (whether through ignorance, accident, or design), which would require an impracticably large resource for enforcement. There are also issues of technological standardisation between London and other cities and whether an overseeing authority, separate from Government, will need to be set up to recommend standards and act as a revenue collector.

The Government has stated that it is open-minded on the issue of road pricing for London and does not wish to pre-empt the DoT study on congestion charging. Any road pricing scheme, in London or elsewhere, will need legislation, as the Road Traffic Act (1991) does not allow public bodies to charge for road space.

### **Pros and Cons of Urban Road Pricing**

Urban road pricing can have a number of objectives:

- Easing congestion to help buses, taxis, local commercial traffic etc. move faster.
- Reducing transport-created pollution in town both

by reducing the number of vehicles on the road and by reducing the high emissions while idling.

- Improving the local 'quality of life' (e.g. by releasing freed-up road space for pedestrianised areas).
- Generating revenue.

These aims are not necessarily mutually reinforcing and may even conflict, e.g. if revenue generated led to substantial road building, pollution might increase. Moreover, there is a large hidden demand for road space which is suppressed because congestion is currently so high. If road pricing were introduced, congestion might initially ease, encouraging more commuters to pay to use their cars, and congestion could eventually return to previous levels. A common experience of this and other countries<sup>1</sup> is that road pricing can generate strong feelings both for and against and therefore that a high degree of public acceptability is important. Indeed, in 1990, the Transport Select Committee stated that "any attempt to introduce road pricing without public consent would be fraught with political danger".

In surveys, over 90% of those polled in London regard traffic restraint as necessary and place congestion as a greater disincentive to living and working in the Capital than property prices or crime. However, Londoners see the *principle* of road pricing as acceptable only if it is part of an integrated package of measures, including better roads and public transport. Ultimately, attitudes to a *practical* scheme will depend on factors such as cost-per-trip, ease-of-use, reliability, and its stated objectives. Public acceptability will thus depend on a number of specific issues, including the following:-

Is road pricing an additional motoring tax? The DoT states that easing traffic congestion is the main reason for considering road pricing, in which case the private motorist must be a primary target. Motoring organisations see road pricing as merely another tax on motoring and argue that vehicle users are already heavily taxed through the £11,000M in fuel tax and £3,000M collected in vehicle excise duty; they contrast this with the £5,500M spent on new roads and road improvements in 1991/2. Environmentalists and others argue that the true costs of motoring should include indirect expenditures such as those for accidents (estimated by the DoT at £6,000M 1991/92), and 'social/environmental' costs (estimated by environmental groups at over £5,000M p.a.); on this basis, the car driver is seen as more subsidised than overtaxed.

There are also concerns over who would bear the cost, and related questions of equity. The Chartered Institute of Transport points out improvements to transport

1. The Dutch scheme noted earlier was reduced in scope after public and political opposition; a plan in Germany to introduce motorway tolls may be shelved after condemnation by left, right and green parties alike; even in Stockholm, where the revenue raised was to be allocated specifically to improving roads and public transport, opposition has been strong.

efficiency are maximised if exceptions and concessions are kept to a minimum. On the other hand, the Institute of Public Policy Research say there may be a case for concessions for essential travellers to Central London who have no public transport alternative, as well as more obvious groups like disabled drivers. Whether public road transport (buses and taxis) should be subject to charges is still a matter of debate.

A key factor in determining the effect of road pricing would be the response of the company car sector, since ~50% of cars entering central London are 'company cars' and ~70% of private cars used in London receive some financial help from employers through concessions such as 'mileage allowance' or free parking<sup>2</sup>. There is uncertainty over how far charges for company-assisted drivers would simply be paid by the employer and passed on in higher prices; if this occurred, traffic volumes might be reduced only marginally.

Where the motorist does pay personally, critics point out that the charges could be discriminatory in that some motorists have more options than others. Those from areas poorly served by public transport may have no alternative to the car; fears over personal security (e.g. women travelling at night) might preclude alternatives to car travel. Some occupations require flexibility of hours which necessitate the use of a car, and in relatively low-paid occupations, the extra cost could present a major burden. On the other hand, the Adam Smith Institute and others argue that road space is a commodity to which market principles apply as much as to any other, and that the road space released should lead to faster and easier journeys by bus, which will benefit lower-income groups. In addition, other options may be feasible such as ride-sharing.

In a cordon-charging scheme, there could also be variable and arbitrary effects within or close to chargeable areas. Residents within the area may benefit from less cars being on the roads; however, residents just outside a charge-boundary could be affected by parking difficulties, noise, etc. if out-of-area drivers clog roads to avoid paying. Residents living close to charge zone boundaries may pay higher charges for making short journeys, e.g. where a child's home and school straddle a charge-boundary. Shopkeepers may also be affected. Petrol stations, supermarkets, etc. have certain customer catchment areas and if a zone boundary intercepts a catchment area, then shopping patterns could change. Such distortions are difficult to avoid or anticipate but the ongoing DoT study should help to try and quantify relevant effects.

Surveys show that public acceptability is higher if the revenue generated is used for improving roads and public transport. UK policy is that taxes should not be

hypothecated; however various suggestions of partial hypothecation have been made. One is that the revenue should be divided into three - to Treasury, to improving public transport, and to upgrading roads - along the same lines as the German tax on mineral oil (about 8 p/gal) which is split between general taxation (51%), road improvements (22%) and rail (27%). Another suggestion is that revenue could be used for purposes benefiting the area of the road pricing scheme, e.g. in lowering business rates, or for public amenities.

### **Implications for Public Transport**

The DoT study should reveal how many drivers will switch to public transport. In the 1989 study mentioned earlier, the falls in terminating and through traffic into Central London (30% and 75% respectively) would increase demand for buses by 15% and that for trains/tubes 7%. In the current recession, London public transport has sufficient free capacity to absorb such demands but demand might have recovered by the time a road pricing scheme were introduced, in which case extra capacity could be needed rapidly. Buses provide the most practical means of increasing capacity since new surface and underground rail schemes are costly and lengthy to construct. They are also efficient (in London, buses comprise 1% of traffic but carry 33% of all road users). However, buses lack public appeal and are often seen as unreliable, slow and lacking in comfort.

The Government has attempted to improve bus speeds through a £10M package (started in 1991) of more bus lanes, bus-only streets, etc. However, uncertainties remain over the effects of deregulation of London's buses in 1995. In view of the questions which remain over the future trends in London's public transport system, many, including the London boroughs, see the issue of road pricing as inextricably linked with the adequacy of public transport and consider that the two questions should be taken together as part of an integrated transport policy where train, bus and underground services (and ticketing policies) mesh to allow passengers to move easily from one transport mode to another.

<sup>2</sup> This can be valuable since a 3-month parking season in central London costs £900, and parking assistance is exempt from taxation.