Road User Charging

A statement by The Royal Academy of Engineering

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Introduction

The pressures on the UK road network have been changing over time. In the past, the emphasis was on maintenance and expansion of the road network to provide an efficient transport network, but recently, road use has outstripped the Country's ability to extend and expand the road network and hence the policy emphasis has moved towards reducing congestion rather than mitigating its effects. In addition to this pressure is an incidental pressure, which argues that provision of new roads generates further traffic (because of added convenience) in isolation of other factors.

The Government is currently examining policies to reduce the burden of traffic congestion in an affordable and sustainable manner. One key mechanism to achieve this policy aim is Road User Charging, but if a national road user charging scheme is to be implemented successfully, there are a number of prerequisites which must be place.

The Royal Academy of Engineering held a briefing on Road User Charging: Risk and Uncertainties on 24th May 2006. That briefing brought together three Academy Working Groups whose recommendations have important implications for road user charging, namely: Transport 2050; The Challenges of Complex IT Systems; and Dilemmas of Privacy and Surveillance. The discussion session of the briefing has allowed The Academy, based on the recommendations of the three Working Groups, to set out what it believes to be some general prerequisites which must be met if the implementation of a first generation nationwide road user charging scheme is to be successful.

1. The Purpose of the Scheme

There are a number of reasons why road user charging might be introduced and these must be considered carefully before any decisions on the design of a scheme are made. Absolute clarity in the scheme purpose will be required by developers from the very outset and the scheme purpose must not be allowed to change once development has started.

Valid reasons for road user charging include:-

a. Congestion

Congestion based charging can be either event or rate based (see later under charging) and should provide a pricing signal that will incentivise drivers to make their journeys at less congested times. Smearing or reducing the peak load on the system should result in a similar or slightly lower number of journeys being made at an overall higher speed and therefore more efficiently.

b. Emissions

Reducing the amount of greenhouse gasses and other pollutants emitted by vehicles in general is best incentivised by a direct charge on the amount of fossil fuel used. However, there may be situations where an event based charge is appropriate to reduce the local impact of pollution in sensitive areas (i.e. residential areas or National Parks).

c. Recouping road maintenance costs

Recouping the costs of wear and tear on roads would probably be best achieved with a mileage based scheme (being independent of the time of journey). This could be seen as more equitable than the current flat rate Road Fund Tax, but complexity of such a charging scheme grows if differing rates are applied to different roads. In essence, this may look like a road toll scheme. Extra revenue could be raised to cover future investment above and beyond the maintenance costs.

It seems likely that congestion reduction will be the key aim for road user charging, but emissions reduction and recouping maintenance costs could be attractive options in some areas. If these purposes are combined schemes, there is a danger of complexity running out of control and financial incentives working against each other, thus reducing impacts.

Initially, schemes will only have a local effect. Introducing a scheme to reduce environmental impact within a restricted area will be likely to encourage longer journeys to avoid the zone, therefore increasing global emissions. However, a well designed congestion scheme may improve the efficiency of journeys within the zone and incentivise the use of public transport, both having an incidental positive environmental effect.

2. Harmonisation

Road toll schemes and congestion charging schemes are currently becoming more common (toll schemes having been common for some time on specific roads, bridges and tunnels). Notable current congestion schemes include Singapore, London and Stockholm, all of which employ different charging and enforcement mechanisms. So far, all congestion schemes have been developed independently and there may be calls for harmonisation of congestion schemes in the future, especially within Europe, where interoperability would be a significant advantage.

If harmonisation becomes a politically attractive idea, it will be important to restrict it to compatibility of charging and enforcement mechanisms. This is because of the likely piecemeal evolution of the first generation road user charging systems in the UK (see 4. below). Harmonisation of charging and enforcement protocols without restricting or prescribing technologies will allow apparently seamless operation from one charging scheme to another from the point of view of the user without restricting scheme design or development opportunities.

3. System Architecture

It would be dangerous to assume that the implementation of a road user charging scheme is a pure IT project. In reality, road user charging schemes are business and societal change programmes implemented by interacting groups of people and machine. However, a national road user charging system will always have a large and complex IT system at its core. As such, all of the rules for designing and implementing complex IT systems apply.

For each system to be implemented, the system architecture must be considered at the earliest possible stage after the purpose and deliverable of the scheme have been set. In general, the architecture should be modular in nature to accommodate piecemeal development (see below) with emphasis on the system's ability to be integrated with neighbouring schemes as they grow up in future. A good architectural framework from inception will reduce implementation risk and enable evolution and scaling of the system. It is highly desirable that a suitably professionally qualified system architect, with overall responsibility for the system be appointed at inception.

4. Piecemeal Development

It seems unlikely that there will ever be the political will or the budget available to instigate a nationwide system in one go. London already has a congestion charging system and a number of toll systems are currently operating around the country. The likely development would appear to be that local systems will be commissioned where the need is greatest and over time, these will overlap or be connected by mileage based toll systems.

In a piecemeal development scenario, it will be of the utmost importance that systems are designed from the outset to use common protocols for charging and enforcement. It is less important that they use the same technologies, are for the same purpose or use the same charging structures, but the integration from a user's point of view must appear seamless.

Piecemeal development requires a modular approach in the system architecture and this allows the choice of technologies to be more open, often with sub-optimal technologies being adopted for operational reasons that can be updated or supplemented as the system grows. This has been the case in the London congestion charging system and this is commended as an example of good practice.

5. Charging Mechanisms

Flexibility in the way users register and pay for road use is of particular importance. Personal choice over payment method, often trading privacy for convenience, ensures that no user is effectively disenfranchised for not having access to certain technologies.

Another key aspect of charging is the choice as to whether a system should be automatic or whether the user should be responsible for self declaration. Self declaration systems will be easier to manage, but enforcement will be more difficult. Allied to the choice of charging system, is the charging technology. If technology based on onboard equipment is chosen, the implications for non-regular, out of area users must be considered, as well as the cost of installing it. Solutions that allow regular users to have the convenience of onboard, automatic payment systems, but also allow self declaration and payment by others may be a way forward although it introduces added complexity.

6. Data Privacy and Enforcement

There are some real concerns being expressed about data privacy, the agencies that might have access to journey and vehicle data, and the uses to which it might be put. While a nationwide road user charging system would require the collection of large amounts of data, it should not be necessary to collect details of every journey and store these indefinitely.

The key concerns of the system operator are that revenue is collected and that enforcement is robust. It should be possible to design a system that creates logged audit trails only for vehicles that appear to be attempting to evade payment. The shear volume of data that might be generated otherwise makes this type of scheme attractive.

Once the purpose of a scheme and its charging mechanisms have been decided, strict rules on how personal data will be handled must be developed. This should be done within the guidelines provided by the Office of the Data Commissioner and should also provide for the "electronic shredding" of data that is no longer useful for the immediate needs of the system.

Conclusion

The Academy accepts that there are good reasons for looking to change the basic mechanisms by which road users pay for the use of facilities. Indeed, the implementation of true cost charging was a key recommendation of The Academy's 2005 report *Transport 2050*.

A nationwide road user charging scheme could be successfully implemented in the UK during the next decade, but to reduce risk, it should be introduced in a planned incremental fashion with the eventual aim joining neighbouring schemes into a nationwide scheme. Initially, revenues will be raised by Local Authorities or agencies and the transition to a national scheme with funds raised centrally may be difficult or unnecessary.

In order to generate and sustain public confidence and trust in first generation road user charging schemes, consideration should be given to the early establishment of a regulating agency or ombudsman as well as establishing agreed and open procedures for the handling of vehicle and journey data.

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