

Scheme Design



Why is scheme design an important factor for road user charging?

Key characteristics of road user charging schemes include the level and structure of the prices, where and when the prices are levied, and the extent to which prices and/or exemptions are allowed to vary by class of users. The scheme design depends upon the urban road user charge (URUC) objectives selected, and will have a strong impact on the effectiveness, performance and acceptance of the URUC scheme in practice.

What is currently known about road user charging scheme design?

Road user charging schemes can broadly be classified into four types:

- **Point-based charges:** A charge is levied for specific small locations and not spread across the network (e.g. tolls to cross a bridge or to enter a section of motorway),
- **Cordon-based schemes:** A charge is levied when a cordon is crossed, and may vary with time of day, direction of travel, vehicle type and location on the cordon. There could be a number of cordons with different prices.

- **Area license-based schemes:** A charge is levied for driving within an area during a period of time. The price may vary with time and vehicle type.
- **Distance or time-based schemes:** Charges are based upon the distance or time a vehicle travels along a congested route or in a specified area, and may vary with time, vehicle type and location.

Other elements are:

- **Location:** The charging area depends largely on urban form, network topology, geography and the scheme objectives. The benefits of road user charging critically depend on the choice of boundary: while congestion will be reduced within the area, it might well be aggravated outside it.
- **Level of charge and variation by time of day:** A flat price may be more acceptable and straightforward to implement. On the other hand, letting the prices vary in accordance with time and location of congestion will improve the efficiency and benefits of the scheme. Also it is important to allow for some flexibility over time. Travel patterns will evolve and, consequently, the demand for road space will vary. A relatively fixed system may become inefficient over time. In practice, for reasons of political acceptability, charges are likely to be set at a rate that is less than optimal in terms of reducing congestion.

- **Variation by vehicle type:** The Norwegian urban charging schemes have always charged heavy vehicles twice the normal amount. An equitable way of varying charges by vehicle type to reduce congestion is to use the passenger car equivalents (paying in relation to occupation of space on the road).
- **Exemptions (and discounts):** Rules for exemptions are strongly related to obtaining acceptability. Public service vehicles, vehicles for disabled drivers, electric vehicles, cycles and buses are mostly exempted. Motor-cycles are often exempted for practical reasons. Extensive exemptions have operating cost implications and may undermine the scheme objectives. In London, the exemption of motorcycles and mopeds led to an increase in the number of these vehicles entering the charging area. Also, there are issues of spatial equity that are inextricably linked to scheme design. The discount for residents in the charging zone varies from 90% in London to 0% in Singapore.

What further research is needed?

While there is a general understanding of the range of design options for road user charging schemes, guidance on good practice in scheme design is still limited. This is true both of specific road user charging schemes and of their incorporation into wider transport strategies.

What can we conclude at present?

Scheme design always depends on at least physical characteristics of the area and policy objectives. The process of developing and introducing the scheme is more universal and can therefore be improved by learning from experiences elsewhere.

Most designs are based on a mix of professional and political judgment, with little or no consideration of context and only limited assessment of whether alternative locations would be more effective. In recent schemes, the key elements in the design process were to avoid adverse impacts and to gain public acceptance. Decision makers focus on the simplest designs, and may be overlooking designs which achieve greater economic benefit

DOs

Keep the design simple

Focus on cordon or area schemes until technology for distance-based road user charging is proven

Vary charges by time of day and class of vehicle

Keep end up then charges are stable and readily ascertainable by road users before they leave

Consider using multi-cordon or zonal-based schemes as a stepping stone towards achieving distance-based road user charging

Use information obtained through appraisal and later Evaluation and Monitoring to iteratively refine scheme design elements

Consider the business systems required before finalising the design

DON'Ts

Do not assume that the most obvious design will be the best; changing charging locations and charge levels can dramatically affect performance

Do not pursue a complex scheme; drivers need to be able to understand it

Do not offer too many exemptions and discounts; they will undermine scheme objectives, add to costs and reduce income

