

## EXECUTIVE SUMMARY

The aim of CURACAO is to coordinate research and monitor the results of the implementation of road user charging as a demand management tool in urban areas. The project is doing this by working with cities interested in pursuing road pricing to identify the barriers to their doing so, and providing evidence on ways of overcoming those barriers.

The State of the Art Report is based on evidence collated from research and practice over the period to the end of 2007. It addresses a series of themes which were included in the proposal for the project, together with others which were identified in the Users Needs Assessment Questionnaire (UNAQ). This document is organised around the resulting list of issues thus identified which are

1. the possible objectives of road pricing schemes
2. the ways in which road pricing schemes can be designed to meet those objectives
3. the technologies available to support such scheme designs
4. the Business Systems affecting the technology choice and operation of the scheme
5. techniques for predicting the effects of road pricing schemes
6. techniques for appraising/evaluating the effects of road pricing schemes
7. specific evidence of impacts on the economy
8. the environment
9. and equity
10. factors affecting the acceptability of road pricing schemes
11. the potential transferability of experience from one city to another.

Each section is structured around a series of questions which cities might ask, and answers to those questions based on available evidence. End User Cities were asked to comment on an initial list of these questions in November 2006. The resulting list of questions reflects their suggestions and concerns. A few of the issues which they raised then are being considered within the separate Work Package 3, since it is anticipated that the evidence will be more practical and city-specific in nature. More generally, the empirical evidence from case studies is also principally included in Work Package 3, though summary material is included in this Report.

Road pricing can be implemented in a number of ways, using point charges, cordons, area-pricing or distance-based pricing. There is increasing evidence that distance-based pricing is the most efficient, but it relies on technology which is still being developed. In the meantime, cities will need to rely on cordon and area-based schemes. Selecting the correct boundaries for these is critical to their success.

Road pricing will be more effective if integrated with policies to promote public transport, to reallocate road space and to manage land use. These measures are also likely to reduce the adverse impacts of road pricing on those travellers who are most disadvantaged by it. However, the best combination of these policy instruments will depend critically on the city context in which they are being applied.

The principal technologies are automatic number plate recognition, dedicated short range communications and global navigation satellite systems. The last of these, in particular, is experiencing rapid development and may in due course enable a wider range of pricing systems. However, automatic number plate recognition remains the principal tool for enforcement.

Business systems are needed to manage the complex and interacting requirements of monitoring, payment, accounting and enforcement. While such systems are widely available in the private sector, they are still being developed for complex public sector applications such as road pricing.

There is now increasing experience of methods for predicting the impacts of road pricing schemes. However, the complexities of road pricing make conventional prediction methods

less reliable. Moreover the lack of empirical evidence means that the elasticities to be used in those models remain uncertain. The prediction of distributional and equity impacts remains a significant challenge.

Appraisal requirements are in many ways similar to those for any transport policy intervention, but the scale of the changes induced by road pricing and its role in generating revenue make appraisal more complex.

While the evidence remains limited, it is increasingly clear that the impacts of road pricing on the urban economy are likely to be small and, in particular, much smaller than the business community predicts.

Road pricing will have a wide range of impacts on the environment, some of which are easier to quantify than others. While most impacts will be beneficial, redistribution of traffic may have negative impacts. More importantly, road pricing and the policies which complement it can be designed to focus the benefits more directly on environmental enhancement.

The assessment of equity implications relies on the clear identification of the relevant impact groups, and on assessment of the extent to which each is likely to be affected. Good practice on the listing of such groups is now available. However, for many such groups the prediction of impacts remains uncertain. This is an area in which empirical evidence is still needed.

Acceptability remains the principal concern of cities considering road pricing. Acceptability is mainly based on personal outcome expectations, which are typically negative. The roles of complementary policy instruments and of the use of road pricing revenue are critical to increasing acceptability. However, acceptability can also be influenced by pro-social values, and appeals to concerns over the environment or social justice may help to increase acceptability. There is increasing evidence that levels of acceptability are highly dynamic, and in particular are likely to decline as the proposal becomes more concrete and more imminent.

Transferability of results from one city to another remains a little understood aspect of road pricing policy, not least because of the lack of empirical results.

While it will be for individual cities to determine their own objectives for road pricing, it is essential that these objectives are made clear at the outset and consistently adhered to. There is a case for keeping the list of objectives short and simple, while not omitting objectives which will help foster support for the policy.

Road pricing design should follow a logical sequence, in which the overall strategy is determined first, and the role of road pricing determined as part of that strategy. This will help demonstrate that road pricing is needed, and also help to identify those complementary policy instruments which are needed to support it. Road pricing should then be designed in the context of those complementary policies. It is at this stage that it is appropriate to consider the type of road pricing regime to be adopted and the location and level of charges. There is a strong case for keeping that design as simple as possible, but the important role of exemptions and discounts in increasing acceptability should not be overlooked.

The performance of road pricing schemes will depend critically on the behavioural responses induced. It is important to identify the full range of both first and second order responses, and to understand their likely levels. In particular, motorists can be expected to change mode, route, destination, timing and number of journeys, but so too can those who use bus and rail or walk or cycle. Similar types of response can be expected from freight operators and drivers. Second order effects will include changes in the location of economic activity, homes and jobs, either directly in response to road pricing or, more probably, as part of the gradual process of change in individual, household and firm activity. More empirical evidence is needed on all of these responses, and particularly the second order ones.

Acceptability can be enhanced by demonstrating that there is a serious problem to be overcome, that a measure as dramatic as road pricing is needed, and that it is likely to work.

However, it is also essential that the impacts, both positive and negative, on individuals and on society are clearly identified and effectively communicated. Understanding of the concerns of the public, pressure groups, politicians and the media is essential, and needs to be achieved through a continuing two-way dialogue. In particular, it will be important to discourage politicians from overestimating the concerns of the public.

The use made of road pricing revenues is critical to determining the acceptability and effectiveness of the scheme. Most charged drivers will initially be made worse off by road pricing, and it is only when the revenues have been channelled into transport (or other) improvements that they begin to appreciate the personal benefits. It is thus particularly important that the costs of operating road pricing schemes are kept as low as possible. It is also essential that the surplus revenues are available to the city authorities to use in support of their overall strategy.

There is potentially a conflict between pursuit of acceptability, through lower charges and increased use of discounts, and pursuit of effectiveness, which may require higher charges and fewer exemptions. More work is needed on this issue.

While decisions on implementing road pricing will usually be taken by cities, national governments have a responsibility to develop a clear national transport strategy, to explain it clearly and consistently, to indicate who is likely to gain and lose from that strategy, and to take steps to compensate those who are likely to lose. Moreover, they need to provide the governance which enables city authorities to implement both road pricing and the policy instruments which will complement it, and to stimulate strong political leadership at local levels.