

LEGISLATIVE COUNCIL BRIEF
ELECTRONIC ROAD PRICING

INTRODUCTION

At the meeting of the Executive Council on 24 April 2001, the Council **ADVISED** and the Chief Executive **ORDERED** that –

- (a) the implementation of Electronic Road Pricing (ERP) should not be pursued at this stage; and
- (b) the findings of the Feasibility Study on ERP should be released to the public.

BACKGROUND AND ARGUMENT

Feasibility Study on ERP

2. The sharp increase in the number of private vehicles in the late eighties and early nineties prompted discussion on how to control car growth and address traffic congestion. In 1995, the Executive Council decided that increases in the First Registration Tax (FRT) and Annual Licence Fee (ALF) should be implemented if the private vehicle growth significantly exceeded 3% per annum. The Council also decided that ERP should be further explored as a means to achieve congestion reduction.

3. Funds were sought from the Legislative Council in 1996 to conduct a consultancy study on the feasibility of implementing an ERP system in Hong Kong and to identify the preferred technology. In approving the funds for the study, the Legislative Council saw the study as solely confirming the availability of a suitable technology. The justification for ERP would need to be separately reviewed.

Findings of the Consultancy Study

4. The Feasibility Study on ERP was commissioned in March 1997 with the objective of examining the practicability of implementing an ERP system in Hong Kong and assessing the need for such a system to meet transport objectives.

5. The main findings and recommendations of the Study are summarised as follows –

- (a) drastic restraint measures (such as ERP) are not warranted on traffic management grounds before 2006 for Hong Kong Island and 2011 for Kowloon at the earliest if the growth of the private vehicle fleet is no more than 3% per year;
- (b) both the Dedicated Short-range Communications (DSRC) system (i.e. fixed gantry locating system) and the Vehicle Positioning System (VPS) (i.e. satellite tracking system) can be adopted for a possible ERP scheme in Hong Kong. DSRC is a more mature technology but VPS is still at the development stage and will take some time before the technology reaches a stage of reliability and maturity comparable to DSRC;
- (c) ERP can only work where there is a high level of consensus in the community. A clear definition of what constitutes acceptable traffic speed is essential before drastic restraint measures, such as ERP, is to be contemplated. Making the scheme revenue neutral will increase public acceptability; and
- (d) a high level of enforcement accuracy (90% or above) will necessitate the use of a vehicle-specific coding system to identify the vehicle.

ERP Technology

6. A review of worldwide road pricing and related experience has identified two technological options, namely DSRC system and VPS, that can be adopted for a possible ERP scheme in Hong Kong. The DSRC system is based on an interchange of information between roadside readers and the in-vehicle unit (IVU) using microwave communication over short distances. Gantries are installed at the charge sites and vehicles are charged every time they pass a gantry. This is similar to the existing AutoToll system operating at the various tunnels in Hong Kong.

7. The VPS uses a satellite-based Global Positioning System (GPS) to determine the location of the vehicle. Data defining the charging zones, charging periods and charge rates are stored in the IVU. When the IVU determines that the vehicle has entered a charging zone, it automatically deducts the appropriate charge without the need to communicate with any roadside equipment.

8. The performance of an ERP system is measured by its ability to charge vehicles correctly and to detect violation vehicles. In the field tests conducted under the Feasibility Study, both DSRC and VPS performed well in their charging function, achieving an accuracy of more than 99%. The performance on the enforcement function was, however, much less satisfactory, with an accuracy level of 70% and 24% for DSRC and VPS respectively.

9. The accuracy of the enforcement system could be improved to over 90% by including a vehicle specific coding system, in which a unique serial number is assigned to each IVU. If a charge cannot be made, the roadside equipment will read the serial number of a violation vehicle and extract its identity from the database.

10. The Study has concluded that DSRC is a more mature technology with greater reliability. However, it requires comprehensive roadside equipment at every charging point making it less flexible to cater for changes in charging zones and distance charging. It also presents installation difficulties given the concentration of underground utilities along the existing road network.

11. The VPS, on the other hand, is in theory more flexible, and has the potential to be better integrated with other intelligent transport systems. However, the technology is still developing. Such a system has been tested in a few places but there is as yet no working VPS-based system in the world which can deliver the technology's theoretical potentials.

12. The Study has estimated that the lead-time for a DSRC-based system will be about five years and for a VPS-based system six years, including public consultation and the legislative process. The estimated lead-time for VPS was worked out on the assumption that there would be major breakthroughs in the VPS technology in the next two to three years, resulting in off-the-shelf VPS products for public consumption.

Need for ERP on Transport Management Grounds

13. One of our key transport objectives is to ensure a smooth flow of traffic on our roads. In this regard, the Administration has adopted a three-pronged approach. First, where there is a clear need to cater for new population centres such as New Towns or strategic links such as cross-boundary control points, new road infrastructure is provided. Secondly, encouraging greater use of public transport services, particularly railways, and promoting a quality public transport system is already a key part of our transport strategy. Currently, some 90% of our daily passenger journeys (around 11 million passenger journeys) are made on public transport. Thirdly, we also apply measures to manage traffic demand through fiscal means (such as adjusting the First Registration Tax, Annual Licence Fee and fuel tax) and traffic management (such as designating bus-only lanes, and implementing loading and unloading restrictions). These measures have been effective in restraining private vehicle growth and usage. Over the past five years, the average growth of the private vehicle fleet was around 3%, while the average peak hour traffic speeds on Hong Kong Island, Kowloon, and the New Territories are maintained at 20km/h, 27km/h and 41 km/h respectively, levels comparing favourably with the urban area travel speed of any major city in the world.

14. In determining whether there is a need for more drastic restraint measures such as ERP, credible benchmarks have to be identified against which the public could measure the level of congestion. The Feasibility Study adopted an easily understood benchmark of peak hour traffic speed as the measure.

15. Based on the historical average speed for the main east-west corridor on Hong Kong Island, the Study adopted 20 km/h as the test trigger point. Under such a scenario, vehicles could travel from Central to Causeway Bay in 12 minutes. It is worth noting that the test trigger point of 20 km/h is higher than the present day traffic speed of Tokyo (18.5 km/h), central London (16 km/h) and New York (11 km/h).

16. Using 20km/h as the test benchmark and applying the high and low car growth scenarios to forecast the traffic speed between now and 2011, the Study found that the projected traffic speed during peak hour on Hong Kong Island and Kowloon up to 2011 under different vehicle growth scenarios would be as follows –

| | 1997 actual (km/h) | 2006 forecast (km/h) | 2011 forecast (km/h) |
|---|-----------------------|-------------------------|-------------------------|
| Hong Kong Island (Western, Central, Wanchai and Causeway Bay) | 22.6 | 17.8 - 19.7 | 20.6 - 23.9 |
| Kowloon (Tsimshatsui, Jordan, Mongkok, Tai Kok Tsui, Shamshuipo) | 20.8 | 23.4 - 25.9 | 23.0 - 25.3 |

17. From the above forecast, the Study concluded that for Kowloon, there would not be a need for any drastic traffic restraint measure at least until 2011, the planning horizon of the Study. For the busier Hong Kong Island, no additional restraint measure would be required before 2006 at the earliest to bring the traffic speed back to the test benchmark of 20 km/h. The need for restraint measures would also diminish after 2010 with the completion of the Central-Wanchai Bypass. Also, there are other equally effective proven vehicle restraint measures that can achieve the same result. The 1982 doubling of the First Registration Tax and tripling of the Annual Licence Fee which resulted in five years of negative private vehicle growth is a good example.

Need for ERP on Environmental Grounds

18. There have been suggestions that the ERP technology could be implemented to meet environmental objectives.

19. The Feasibility Study on ERP has indicated that, in overall terms, an ERP system is likely to bring about limited environmental benefits restricted to the charging zones only. While there could be reduction in roadside emission and traffic noise in most charging zones, the environmental conditions of the areas adjacent to the charging zones could deteriorate due to overall redistribution of traffic in relation to ERP charges.

20. For ERP to be used effectively for the purposes, the Administration's assessment is that the following criteria must be met –

- (a) Charging zone: the ERP system should cover the whole territory, or at least all the built-up areas and their immediate environs;

- (b) Charging rate: ERP charges should be adequately hefty to change people's behaviour in vehicle usage and choice of transport;
- (c) Charging method: ERP charges should be levied against mileage driven and not the number of times a vehicle enters a charging zone. The charges should be scaled in such a way as to penalise more heavily the more polluting vehicles, vehicles travelling within the more polluted charging zones, and vehicles travelling during peak vehicle and pedestrian traffic hours; and
- (d) Charging targets: the ERP system should apply to all vehicles except pollution-free vehicles when these become available.

21. While ERP could be used as a tool to improve air quality, its impact would mainly be on roadside air quality. ERP will not provide the solution to the wider ambient air pollution problem. To improve the air quality of the Pearl River Delta Region requires the joint effort of SARG and the Guangdong Government. On this front, the two Governments are undertaking a study to identify the major air polluting sources within the region with a view to mapping out practicable improvements to reduce emissions.

22. It is considered that the Administration should, as a matter of priority, focus on implementing the various measures to which we have committed for reducing local vehicle emissions, and on reducing emissions from major regional polluting sources in conjunction with the Guangdong Government. If these measures are fully implemented, Hong Kong would be able to meet its current Air Quality Objectives, provided there is no significant increase in vehicle mileage and provided there is no significant growth in regional air pollution.

Need for ERP for Other Reasons

23. There have also been suggestions that the ERP technology could be used for revenue collection purposes, replacing the current fuel duty. For ERP to act as a meaningful substitute for fuel tax, the VPS technology has to advance to a stage where it can be distance-based supported by an enforcement system with a very high accuracy level and privacy concerns satisfactorily resolved. Such technology is not yet available at this point.

Conclusion

24. The Feasibility Study on ERP was commissioned to assess ERP's applicability in meeting transport objectives. The study reveals that there are no transport grounds for applying drastic restraint measures like ERP in Hong Kong at this stage and that there are other equally effective measures to discourage the use of private cars, increase the use of public transport services and reduce traffic congestion, if necessary.

25. Provided there is no significant increase in vehicle mileage and no significant growth in regional air pollution, full implementation of the measures to which the Administration has committed for reducing local vehicle emissions will enable Hong Kong to meet its current Air Quality Objectives and that ERP will not provide a solution to the wider ambient air pollution problems.

26. To conclude, the Administration does not see any transport or environmental justifications to proceed with ERP now. We therefore will not pursue ERP in Hong Kong at this stage but will continue to monitor the development of the ERP technology, as well as the transport and environmental needs for the application of ERP.

FINANCIAL AND STAFFING IMPLICATIONS

27. The decision of not to pursue ERP does not have any financial or staffing implications.

ECONOMIC IMPLICATIONS

28. The decision does not have any economic implications per se. Fiscal and traffic management measures will continue to be adopted to reduce traffic congestion.

PUBLICITY

29. There will be a press conference on 24 April 2001.

Government Secretariat
Transport Bureau
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