

# **IRF Road World Congress - Paris 2001**

## **“Options for Reform”**

**Peter Papantoniou**  
**Principal Advisor (Economics and Financing),**  
**Queensland Department of Main Roads**

**and**

**Neil Doyle**  
**General Manager (Strategic Policy and Development),**  
**Queensland Department of Main Roads**

### **INTRODUCTION**

The issues facing road agencies are very similar worldwide:

- increasing capacity requirements and congestion in urban areas;
- significant backlog in maintenance and rehabilitation works;
- decreasing funding (in real terms) dedicated to roads over the years due to competing demands;  
and
- increasing environmental concerns.

Much of this pressure is generated by the mechanism by which road funding is collected.

Road pricing, using cost effective emerging technologies, has the potential to one day provide a more equitable and efficient system of pricing and charging for road use throughout an entire network. The possible use of Road Pricing however should not only be seen as a tool to implement travel demand management through pricing or as a way to increase revenue.

There are however a number of challenges in reaching this goal and these are discussed further in this presentation.

As many of you would be aware, the road funding issues facing us are not unique to Australia. The backlog in maintenance and rehabilitation work, and the increased capacity requirements faced by road networks around the world are driving institutional and operational reforms. What is unique to Australia however, is the extent of the problem given our relatively small population base and wide distribution. Our road length per 1000 population is over twice that of the United States and four times that of Japan.

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Over the past 5-10 years Australia has seen significant reforms in the road maintenance and construction service delivery areas of road agencies, which have traditionally been provided by day labour forces, through commercialisation processes. This has included:

- full outsourcing of service delivery by way of privatisation;
- corporatisation of service delivery areas into Government Owned Enterprises;
- exposing internal service providers to competitive tendering; and
- packaging of works to gain economies of scale.

Although there have been some minor problems in some of these approaches, in general they have achieved significant productivity gains. These reforms have focused on the relationship between the road agency (as the owner) and the commercial delivery of the infrastructure. The gains achieved however are not sufficient to meet the funding shortfall needs of most road networks.

The primary area of reform which must be addressed is commercialising the relationship between the road users and the manager of the road network, the roads agency. Australian road users incur in excess of \$90B in costs every year in terms of maintenance, crash costs, time lost etc.

Various studies have shown that for every \$1 the road agencies or Governments defer/avoid spending on the road network, road users bear a cost of at least \$2 and sometimes up to \$5. These are real costs, not “paper” costs.

Our traditional sources of funding and the methods used to allocate those funds, do not necessarily reflect the needs or desires of the road users ie., some road users may be prepared to pay an extra \$1 to save a minimum of \$2 if the user can be certain that the additional money will go directly to the provision of better maintained roads or an increase in capacity.

## **ROAD AGENCIES RELATIONSHIP WITH ROAD USERS**

Much of the pressure on current road funding is generated by the mechanism by which road funding is collected. At present we have a system which relies largely on an access fee (registration) to the network and element based on usage through the Federal fuel excise, to raise the necessary funding to maintain and improve the country’s road networks. In Australia road users pay in excise four dollars for every dollar in registration fees but only a small part of the excise is returned to roads.

There are some obvious downfalls in using this charging regime. However, what compounds the situation is the fact that, in general there is no direct linking of such revenue to the roads agencies responsible for the networks, especially at the Commonwealth level. Therefore, most road agencies do not have a direct customer-provider relationship with the users of the road network. Clearly much of the collection is effectively a tax, not a charge.

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In addition, economic benefits as a result of investment in roads infrastructure, for the most part, flow back to the road users and the Federal Government through increased company taxes generated from more profitable businesses. The increase in revenue from State taxes and charges as a result of these economic benefits (eg., increased payroll tax) is quite minor.

While road users believe they pay for roads by registration and fuel taxes, traditional sources of funding for most road agencies have been from allocations from State and Federal Governments which are based on budgetary priorities. As a result, road expenditure is not directly related to road use or road costs, although increased charges normally provide some increases in roads budgets.

This lack of a direct link from the road management body to the road user by way of an appropriate charging regime means road agencies cannot set a price for use of the network, differentiate between different users or time of use, and therefore cannot influence road user behaviour or receive signals from the market in relation to how much users are prepared to pay to use a service.

Competing transportation modes such as rail and passenger transport do not have this same problem however subsidies and Community Service Obligations distort market signals. In roads infrastructure, capacity of the service is determined by the owner rather than the needs of the user and the willingness of them to pay. This could result in inadequate or excessive infrastructure.

There are a number of questions which must be asked if we are to establish the reforms needed to ensure that the necessary funding is available to provide the users of the road network with the services and products they are willing to pay for.

1. *Can road management be run as a business?*

The simple answer is yes or at least, much more like a business than the present case.

In general, most road management bodies have focused predominantly on ensuring they meet the relevant Government's broader economic and social objectives, this is essential. As a business, a road management body must be more responsive to the needs and desires of the users of the services provided and must clearly provide benefits to the users of the network, while meeting full costs.

The broader economic and social objectives of the State can also be met in this environment through appropriate investment decisions, but must be individually identified and explicitly funded by Government. These investments provide benefits which do not accrue to all road users and would be fully transparent in a business environment.

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2. *What is the role of Government?*

Is it a revenue collector or a policy setter and funder of social commitments and all non-commercial activities? Or is it a surrogate purchaser of road capacity and access on behalf of users? Does it reasonably reflect their various needs and priorities?

3. *How can the relationship between the road user and the roads agency be commercialised?*

Through institutional and operational reforms. The fundamental shift required to facilitate the commercialisation of the relationship between the road user and the roads agency is in the operational focus. At present most road agencies regulate use of the system eg., heavy vehicles mass limits and limiting damage to the network.

Roads agencies must focus on repositioning themselves to meet the users needs ie achieving a greater customer focus. Using the above example, if a user of the network such as the transport industry needs an increase in mass limits, the commercial relationship would dictate that the manager evaluate and determine under what conditions the roads agency can meet the users needs. This may mean levying an additional charge to the user to fund upgrading or repairs for accelerated damage to the network if the service can be provided.

If we use a theme park as an analogy, the owner/manager is not concerned with the user wearing down the equipment as long as the user is prepared to pay an appropriate price which would reflect that usage.

4. *Are there technological advances which may assist any reforms?*

Electronic road use pricing using emerging technologies has now developed to a stage where it is technically feasible and would actually assist institutional reform.

At the heart of these charging and pricing mechanisms is a reduction of negative social impacts based on user pays principles. This approach is generally more acceptable than a levy across the board because of the realisation that there are serious social consequences. Some users are currently overcharged while others are undercharged. Prices that reflect the full cost of a trip, including congestion costs, would have the desired outcome of changing behaviour. The vast majority of people continue to prefer to drive their cars for safety or service reasons. This pragmatic approach is realistic and saleable in that it allows people to make a choice but pay for the privilege.

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Moving towards a use based charging regime, would ensure that all users of the network contribute in a fairer way to its maintenance and upgrading while allowing all subsidies/Community Service Obligations to be fully transparent. In addition, this pricing mechanism has the added benefit of being able to affect user behaviour ie., demand management.

It will allow road agencies to provide consumers with what they want and not what we think they want. Over the past decade, the climate of significant reform has made the community and industry more willing to accept change if it provides them with a better product and a better choice.

This would be fully consistent with the current approach taken within other infrastructure businesses within the Australian public sector. For example, users of water are not charged by water authorities solely for having access to the pipe which provides them the water, regardless of the quantities they use. They are charged for what they use. Another simple example is the telephone. The consumer pays an access charge for the phone and is also charged each time the phone is used.

There is some progress in Australia in using ITS technology to allow heavy vehicles operations to enter into agreements that link extra load, road condition and price. This is discussed further in the paper.

## **WHAT COMMERCIAL RELATIONSHIPS HAVE BEEN ESTABLISHED TO DATE IN AUSTRALIA AND THE PITFALLS**

### Fuel Excise

The use of fuel excises has in the past been the most efficient form of “use” based charging available. This type of pricing of the network however is based on average use and does not take into account factors such as time of day, location, load etc. Consequently, it cannot send a signal to the users of network regarding the true cost of using the road or to affect behaviour. In addition, recent improvements in engine efficiency have reduced its relative value.

Another serious impediment in the use of fuel excises as a “use based charge” is the fact that the Commonwealth fuel excise (which is by far the largest component of fuel excise charged to road users) is not directly hypothecated to road agencies, with the majority considered to be a tax for general use. Instead, it is allocated based on budgetary priorities. In addition, there is no clear distinction between what portion of the excise relates to road usage and what portion is a tax for general revenue. Again this means there is lack of a commercial relationship between the users of the network and the roads agencies.

### Tolls

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Tolls have been used in Australia since the early 1900's on a relatively small number of bridges and more recently for the early provision of significant road infrastructure. The use of tolls has provided significant benefits to local communities and the business community. There are however, limitations in pricing of tolls such as:

- (i) It usually does not take into account congestion costs and tonnage issues.
- (ii) There are equity issues:
  - some areas have been waiting for upgraded roads for over 20-30 years while others in the meantime have been funded from the public purse. It may be perceived as inequitable now to tell these people who have waited that they must pay to get a new road/upgraded road by way of tolls.
  - there is also the problem of placing the toll plazas on the road itself which also raises equity issues for local residents.
- (iii) The pricing of tolls is normally focused on cost recovery. This may mean that ultimately the price for using the toll road may be so high that it will force people off the tollroad onto the urban system. This pricing of the toll road does not take into consideration of the major benefit of the toll road which is the reduction in congestion and the environmental impacts on the surrounding system.

The efficient collection of toll revenue and the resultant administrative costs are just as important as the revenue itself. The use of toll plazas is an inefficient use of infrastructure (stop/start nature of collection) and will inevitably lead to additional congestion costs as traffic volumes increase, particularly during peak periods.

Electronic tolling and differential pricing based on the time of day are two methods which can be adopted to minimise congestion. It is a more complex process and requires additional operational infrastructure but provides flexibility and additional functionality.

### Shadow Tolls

Shadow tolls have been used by many agencies around the world to raise additional funds from Government on behalf of road users to finance specific projects. This option allows Government to provide better roads sooner, however, as a process to influence road user behaviour, it fails in the same way as an access charge.

Shadow tolls fail to provide varied products to meet users needs and do not link the persons using the service and the persons paying for it. There are also social and equity concerns when all road users are required to contribute to a project which they may not use or obtain any benefit from.

## **INTERNATIONAL EXPERIENCE**

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What is in existence in other countries:

- New Zealand - there has been significant institutional reform in recent times;
- Malaysia - there is the provision of relatively cheap toll roads with an existing trunk system, which relatively speaking, is managed at a lower standard .
- Italy - provision of good toll roads in the context of alternative routes which are not efficient to use due to the extra travel-time.
- US experience - pricing so far is based on a limited view of congestion charging ie., adding extra capacity at a price. US experience shows that you must get people used to paying before you can go the next step of introducing more complex use based charging.
- Holland - introduction of tonne per kilometre electronic road use pricing for heavy vehicles is proposed.
- Norway - cordon pricing that funded upgrades to the road network.
- Singapore - cordon pricing however there are real cultural and geographical differences in translating this to Australia.
- Japan - all expressways in Japan are currently tolled but are severely congested due to the toll plazas. Japan is now moving to electronic tolling.

## **ELECTRONIC ROAD USE PRICING**

Emerging technologies now make it possible to charge more directly for use of roads according to vehicle type, distance traveled, road type, time of day, area traveled and congestion, through Electronic Road Use Pricing (ERP).

Implementation of ERP will assist road agencies to establish the commercial relationship with road users that is required to manage the country's road networks in the long term.

The use of Electronic Road Use Pricing (ERP) will ultimately provide targeted pricing marketed directly to different users and pricing of variable products. The initial use of ERP may be to price use of the road network in terms of vehicle location, time of day and vehicle type and could be extended further to include vehicle axle mass and emissions.

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Some time in the distant future, pricing and charging for road use may go something like this:

- All vehicles would have access to the road network at a minimal cost .

Registration costs would reflect:

- a small access fee;
- the cost of maintaining the registration database; and
- the cost of other government initiatives which would be recovered at a flat rate from all road users eg., road safety funding.

- Fuels would be taxed at the same rate as all other goods purchased. No special treatment either way as input to industry.

Fuel would be taxed at the standard rate applicable at the time and fuel excises would be nil. Apart from any CSOs/subsidies paid, this would create a level playing field between transport modes, and modal choices would then be made based on the actual rather than average cost of usage.

- Private sector partners could run the ERP scheme for the entire country and distribute the revenue to the relevant levels of road managers, Federal, Regional or Local ie direct hypothecation to the area affected.

Cross boundary issues would then be a thing of the past.

- Area Specific ERP Concept: All vehicles would be fitted with on-board electronic tagging and tracking equipment which would allow the relevant Road Agency to determine and charge for:
  - actual usage of the road network during each trip ie., kilometres driven;
  - what part of the network was accessed during the trip and the road type eg., 50 kms of national highway, 20 kms of state controlled road and 10 kms of local road;
  - time of day used eg., peak hour in capital cities may cost more as it contributes to congestion and time delays;
  - vehicle axle mass and the maintenance impact on the network (on-board weight sensors);
  - the impact on the environment (on-board emission sensors); and
  - the type of vehicle driven.
- Federal, Regional and Local road managers would have the ability to set different prices for use of their section of the network. Eg., users of rural roads and off-peak urban travel would pay less than users of urban roads travelling in peak period.

Prices can be altered (down as well as up) for whichever variable outlined above and demand for the various products/services offered can be affected ie. targeted pricing marketed directly to different users and pricing of variable products.

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This would include allowing for Government subsidies/CSO's (eg., pensioner, rural, primary producer) and for these subsidies to be fully transparent and equity issues addressed.

- Network compliance and enforcement techniques, especially for heavy vehicles, would be based on exception reporting from the system (assuming on-board equipment is tamper proof). Focus could then be directed to non-compliance.
- Accurate traffic flow data would be available which could be used in investment decisions by the relevant road managers.
- It would also assist road agencies to establish the commercial relationship with road users. It will require however a change in focus by most agencies ie., from road constructors/maintainers to managers of a road network.

The implementation of cost effective targeted pricing using emerging technologies in Australia is currently in the development stage but pilots overseas are encouraging.

Australia's State road agencies are currently working together on a national e-Transport initiative called the Intelligent Access Project (IAP) which intends to develop and trial an information management system that can monitor heavy vehicle compliance utilising ITS technology.

The IAP's focus is:

- to demonstrate how a certified 3rd party (CSP) can deliver information services to industry, and key road use data to road authorities;
- to demonstrate smart compliance opportunities for heavy vehicles that are subject to special access and operational arrangements;
- based on GPS vehicle positioning, data transmission and other in vehicle and road side technologies; and
- to provide regulatory benefits to industry on the basis of participation in the scheme.

Implementation of such a model has the potential to substantially assist transport and roads agencies to better manage network access, road behaviour and road costs.

Although the agreed scope of the project does not extend to pricing/charging, there is potential to introduce ERP for heavy vehicles to use certain roads with higher load limits.

Overseas there are a number of proposals which are aimed at reducing traffic on specific road systems, reducing congestion in busy central city areas or on specific road systems, or even during peak traffic periods on those particular roads.

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There are however a number of issues which must be addressed before any type of electronic road use pricing can be seriously considered ie., Policy, Institutional, Technical and Pricing issues.

#### Policy Issues

- Productivity: matching of vehicle mass and road capacity
- Charges: equity and transparency
- Data: for operators and road providers
- Infrastructure: targeted investment
- Social cost: pricing for externalities
- Traffic demand management

#### Institutional Issues

- Collection and distribution of revenue
- Direct payment to road owner
- Constraints on pricing behavior - dependant on road ownership?
- Identification of taxes and charges
- Interaction with current charging mechanisms

#### Technical Issues

- Equipment eg., GPS experience
- Data collection and data processing
- Funds transfer
- Privacy
- Compliance

#### Pricing Issues

- Marginal cost
- Full cost
  - expenditure recovery
  - lifecycle costing
  - allocation of fixed/non-separable costs
- Ramsey
- Multi-part tariffs

There are also a number of options available in terms of Pricing Models associated with ERP:

- (i) Route Specific Pricing using roadside tolling stations and electronic toll collection.  
This is technology which is currently being used to finance major road infrastructure projects around the world eg., CityLink in Melbourne, Australia. It is however not the most suitable of models if an entire road network is to be priced.
- (ii) Area Specific Pricing using roadside tolling stations and electronic toll collection (in effect cordon pricing).  
This technology is currently being trialled and implemented in Hong Kong and the Netherlands but may not go far enough and lacks flexibility.

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(iii) Area Specific using GPS: requires on board equipment and tag.

This option requires the use on on-board equipment such as GPS and e-tags but is by far the most flexible and functional of all models.

Other issues to consider are the data requirements needed to price the use of the road accurately such as:

- maintenance costs
- pavement damage
- use of capacity
- emissions (externalities)
- congestion costs
- crash costs.

We need to be mindful that the cost of collecting this additional revenue does not outweigh the charge itself.

A trap which most innovative developments fall into is that we tend to wait around for the next better technology. Given we now have the technology to implement such systems, if proven cost effective, implementation of current technology with appropriate and established migration paths would appear a feasible option.

The problem may be however that although we have the technology, we are still not at a point where we can price roads and use the technology in the current environment. The utilisation of a ERP however, would ensure all road users contribute their fair share for use of the road network.

## **SMART CARDS**

Toll companies have generally looked to operate in isolation when developing electronic toll collection. Financial service providers could dictate some of the technology used for tollways as we move to a cashless society.

We are already seeing examples of this in Australia with the conversion of public telephones to take smart cards. Multi-use smart cards linked to on-board e-tags is a real possibility.

## **CONCLUSION**

Significant institutional reform within Australia will take some time and is dependant ultimately on the political will of the governments in power.

Road pricing based on ERP technology is an area where user pays charging is a possibility in the not too distant future. It is saleable because it is inherently fair. It allows choice, and demands payment based on that choice. However, incremental steps in the areas of heavy vehicles and marginal pricing

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is a step in the right direction. This does not require significant institutional reform and will provide benefits to road users.

The major impediment to such an approach is obviously the public perception and associated adverse reaction. If it can be demonstrated that the public is receiving a better service for its money, that reaction can be minimised. A recent example of this is the timed local calls debate in Australia : ten years ago no-one wanted timed local calls, however now a large proportion of the population are using mobile phones where timed local calls apply. The mobile phone provided an improved service for which people are prepared to pay.

Full implementation however of ERP for all vehicles is a long way into the future.

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#### **MORE INFORMATION:**

If you wish to discuss any of the issues raised in this paper, please contact:

Neil Doyle  
General Manager (Strategic Policy and Development)  
Queensland Department of Main Roads  
GPO Box 1549  
Brisbane QLD 4001

Phone:           (07) 3237 9645  
Fax:             (07) 3225 8152  
E-mail: [neil.a.doyle@mainroads.qld.gov.au](mailto:neil.a.doyle@mainroads.qld.gov.au)

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Peter Papantoniou  
Principal Advisor (Economics and Financing)  
Queensland Department of Main Roads  
PO Box 452  
Brisbane Albert St QLD 4002

Phone: (07) 3405 5434

Fax: (07) 3405 5464

E-mail: [peter.a.papantoniou@mainroads.qld.gov.au](mailto:peter.a.papantoniou@mainroads.qld.gov.au)

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