KPMG

Unblocking traffic congestion

A map to road pricing schemes in Australia

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Congestion is one of the biggest challenges facing Australian cities and regions. It is affecting our liveability, productivity and global reputation as a destination of choice for investment. Despite several independent bodies including Infrastructure Australia, the Henry Tax Review and the Productivity Commission calling for a road user charging scheme for Australia, there has been little action. Road user charging can help manage demand as well as provide a more equitable and reliable source of funds for investing in infrastructure.

It is time we act on the advice from these respected bodies. A detailed study including a trial of different road user charging models is needed to establish the model and pricing regime that will be suited to each city.

"A road pricing trial will help to build the political and public support for agreeing on and implementing the right scheme".

Paul Low, Partner, Advisory

Congested country

Australia is still seen as an attractive place to live, work and invest, but this could be at risk if congestion continues to undermine our productivity and liveability.

Analysis by Infrastructure Australia shows that the cost of road congestion in the six largest capital cities will grow by almost 300 percent from $13.7 billion in 2011 to $53.3 billion in 2031.[1]

Compared to many similar cities around the world, Perth, Adelaide, Melbourne, Brisbane and particularly Sydney, perform worse for congestion. For instance, Sydneysiders spend a similar amount of time sat in traffic compared to London, Los Angeles or Paris, despite these cities having significantly bigger populations.

City congestion around the world

Source: KPMG analysis based on data from TomTom International and www.citymayors.com

"The time for talk is over, we must start to act now".

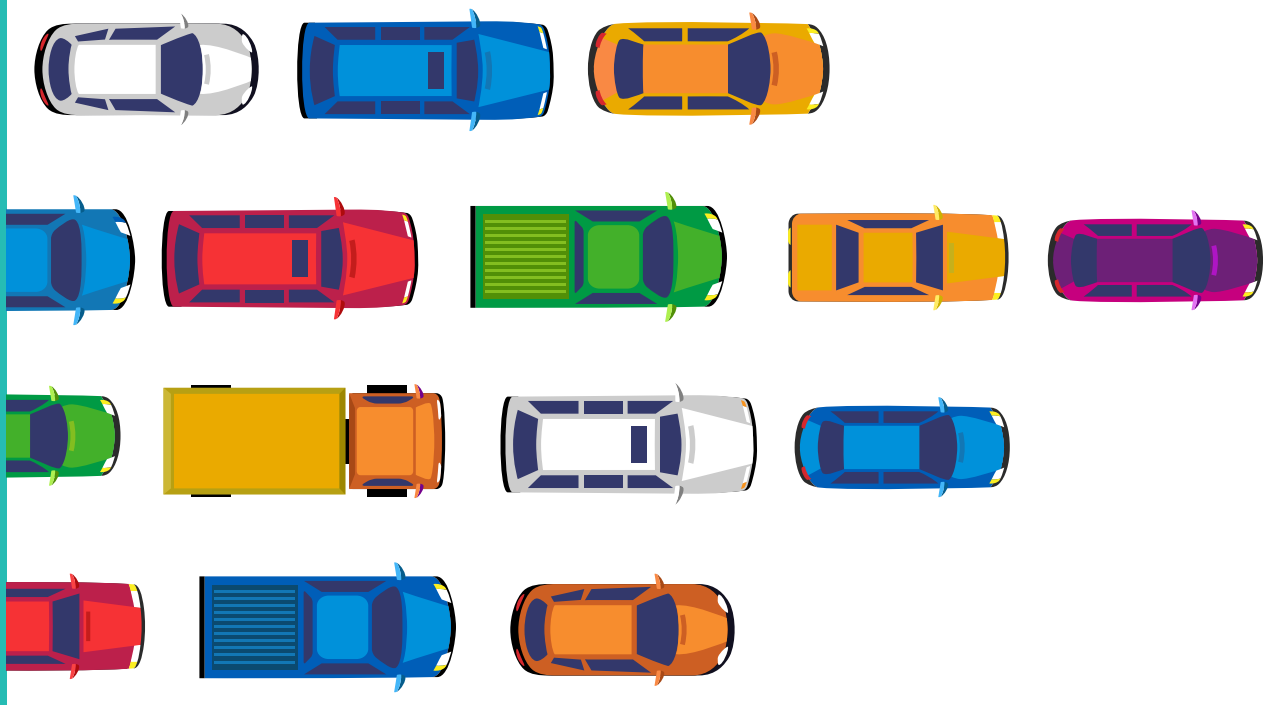
Paul Foxlee, National Sector Leader, Transport & Infrastructure

1 Infrastructure Australia, 2015, Australian Infrastructure Audit Report

Commuters are also concerned. A 2014 consumer survey found that road infrastructure and congestion, and public transport were the second and third most important issues requiring Government leadership and action. Improving transportation ranked ahead of education, the economy and housing affordability.[2]

Australians deserve better. The technology and policies for effective road pricing schemes have been tested in cities around the world.

A primary barrier to addressing Australia's congestion problem is the significant infrastructure 'deficit' facing most Australian cities. Budgetary constraints faced by the State and Commonwealth Governments mean that the funding available to address some of the supply side measures are significantly limited. The traditional models to fund transport infrastructure are experiencing a major shortfall. Between 1998 and 2007 public and private spending on roads was matched by roads-related revenue, such as fuel excise, registration duties and licensing fees. From 2007 onwards expenditure on roads began to exceed road related revenue. In 2012-13 combined public and private sector roads expenditure was $6.6 billion per year more than the revenue generated by road related revenue sources.[3] This trend is expected to continue to worsen as fuel efficiency of the fleet continues to improve and/ or uptake to alternatives such as electric vehicles grows.



2 Transurban, 2015

3 BITRE (2014) BITRE Statistical Yearbook, Tables 1.2e and 1.3; KPMG analysis

Root causes of congestion

A 2006 inquiry by the Victorian Competition and Efficiency Commission (VCEC)[4] summarised the root causes of congestion in terms of demand side and supply side factors.

Demand side factors	
Economic growth	Rapid growth in road freight, personal and business travel
Accessibility	Rapid growth of car use, poor accessibility in some areas to alternatives like public transport
Peak periods	High use of cars for peak period trips, both for work and education
Urban patterns	Patterns of urban settlement and unemployment, including low density land use
Price signals	Under-pricing of road use, no direct connection between the cost of road use and traffic conditions
Supply side factors	
Infrastructure	Bottlenecks, level crossings, traffic lights and management of access to freeways and highways
Shared use	Shared use of roads with trams or parking at certain times of the day

Source: KPMG based on VCEC, 2006

Road pricing models

Effective road pricing schemes can not only assist with managing demand, but can also provide the funding necessary to address the transport infrastructure bottlenecks — thereby addressing both the demand and supply side factors.

There are four main models of road pricing: location specific (cordon and area charge), corridor specific, partial network and whole-of-network charging schemes. Within these models, pricing can be targeted on the time of day, a particular vehicle fleet type, or distance travelled.

1 Location specific

Models seek to regulate demand for limited urban road space within a defined geography by putting a time-of-day price on access. They usually operate by charging all road users on entering a defined area, such as the central city or CBD. The London Congestion Charge Zone is an example of location specific cordon charge.

2 Corridor specific charging schemes

Charge users for access to a particular strategic road corridor. This may involve the application of variable tolls throughout the day or charging for use of a free-standing express lane. Express toll lanes in Maryland, US is an example of corridor specific charge.

3 Partial network schemes

Apply to select portions of a road network and are usually implemented where acute congestion is evident. For example, Germany's Heavy Goods Vehicle (HGV) scheme applies to federal turn roads and highways with four or more lanes.[5]

4 Whole-of-network schemes

Apply across the entire road network. In either partial or whole of network schemes, pricing may be applied uniformly across all vehicle classes, or differentially applied based on the type of vehicle, vehicle mass, distance travelled and/ or time of journey.

4 VCEC, 2006, *Making the right choices: Options for managing transport congestion*, Melbourne

5 Federal Ministry of Transport and Digital Infrastructure, 2016, *The HGV tolling scheme on federal trunk roads and on federal highways with four or more lanes*, accessed: www.bmvi.de/SharedDocs/EN/Artikel/G/hgv-tolling-scheme-on-federal-trunk-roads.html

Location specific charging schemes are favourable for policymakers given their relative simplicity in design and implementation. The discrete coverage of these schemes mean that motorists affected by the charge are the principal beneficiaries. These charging schemes works best with heavily city-centric travel patterns where users enter a CBD in private vehicles and relatively good transport alternatives are available. Corridor charging schemes such as the I-95 Express in Maryland respond well to road infrastructure demand. However, equity may be a concern if citizens are perceived to not have access to appropriate alternative routes or mode of transport.

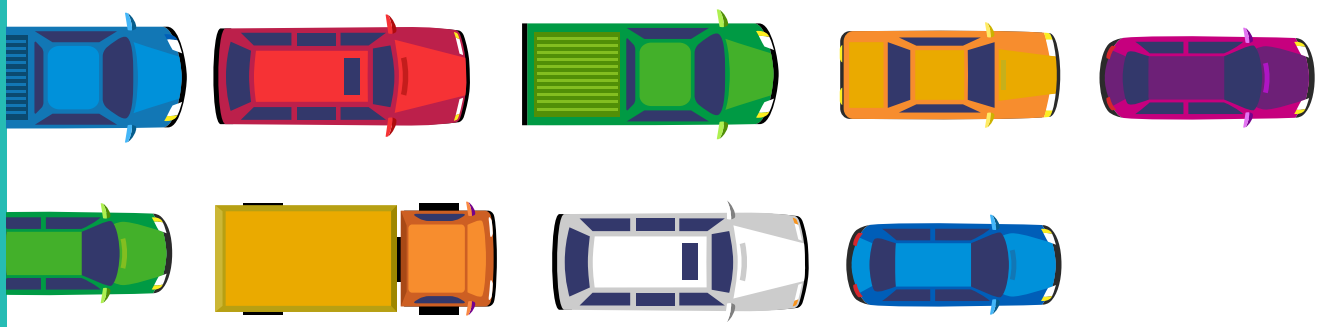
Variable pricing models applied to a broader portion of the network (partial or whole-of-network) are arguably the most sophisticated. These schemes provide the opportunity to improve network performance through the alignment of demand and supply. Challenges associated with such a charging scheme include: the rationalisation of existing fuel excise and other fixed access and registration charges, and the allocation of investments that support the vehicle class that is subject to the charging scheme.

Managing demand and providing a more reliable funding source

A well-designed road pricing scheme has the potential to be the most effective policy tool for managing congestion. If implemented properly, it can help address both the demand and supply side challenges. Road pricing can:

- Help reduce low value travel during peak periods and encourag more efficient travel such as car sharing, improved mode share etc.), in turn lowering the demand for additional road capacity; and
- Provide an additional funding pool for investment in infrastructure.

21 percent of all trips made in the morning peak period in Sydney are for shopping, personal business, social and recreational purposes.[6]



6 Transport for NSW Bureau of Transport Statistics, 2014, *Household Travel Survey Report: Sydney 2012/13*, Table 4.6.4

The underlying principles for road pricing include:

- The current cost of providing road infrastructure does not fully reflect the value of infrastructure to users.
- Without price signals, road users are not incentivised to reduce road travel, to undertake lower value/ non-essential travel (such as shopping trips) during off-peak periods, or to use alternative modes of transport.
- Inefficient travel leads to designing infrastructure projects that service peak demand, leading to inefficient use of investment and redundant infrastructure during off-peak periods.
- Lack of direct pricing signals contributes to social inequity with all residents contributing a similar amount to funding roads regardless of place of residence and personal road use.
- Lack of pricing results in increased externalities – travellers do not take into account the increased congestion they pose on others. The reduced speed results in increased fuel consumption, and thus increased greenhouse gas emissions.

When traffic on congested roads reduces by 5 percent, traffic speeds can increase by up to 50 percent.[7]

Consistent with this argument, and others contained within the Australian Infrastructure Plan, Infrastructure Australia has made the following recommendations:

- Recommendation 5.4: Federal, State and territory governments should commit to the full implementation of a heavy vehicle road charging structure in the next five years.
- Recommendation 5.5: Federal, state and territory governments should also commit to the full implementation of a light vehicle road charging structure in the next ten years.[8]

Implemented properly, road pricing will greatly assist in increasing the efficiency of Australia's road network, and will lift productivity and improve economic outcomes as a direct consequence.

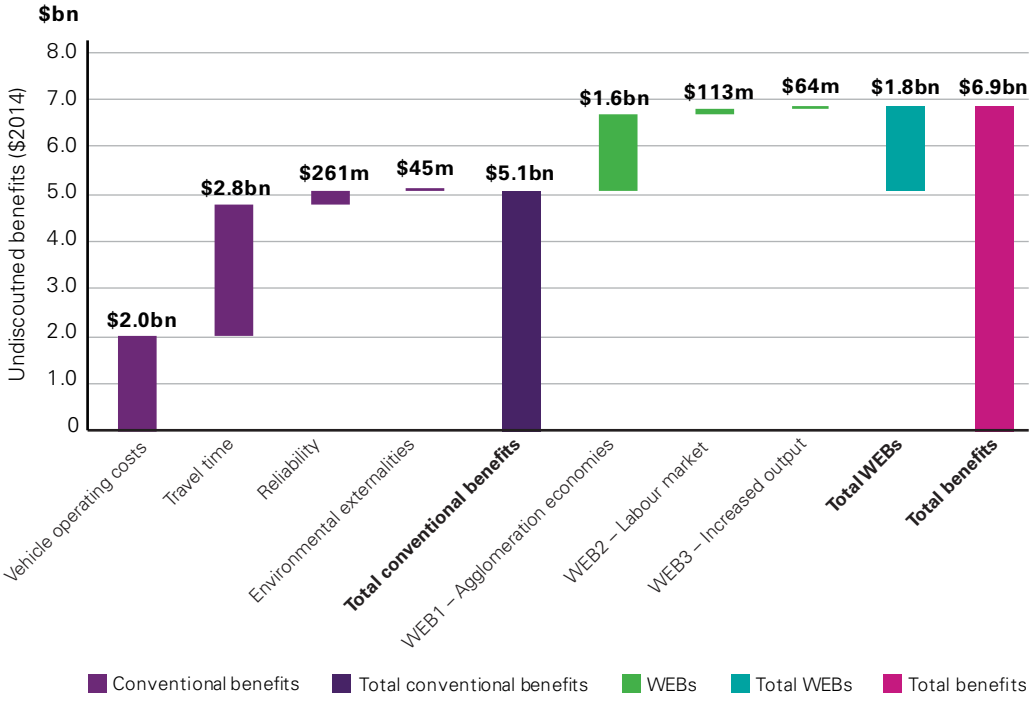
7 NRMA, 2011, *Decongestion: 10 ways to relieve Sydney's traffic headache*
8 Infrastructure Australia, 2016, *Australian Infrastructure Plan*

Economic contribution of road pricing in Australia

Australian cities have used road pricing, via toll roads, (a form of corridor specific road pricing scheme) for over 70 years.[9] Australia currently has 16 toll roads in Sydney, Melbourne and Brisbane. Implementing road pricing in the form of tolls enabled these infrastructure projects to be delivered earlier than would have been possible under a fully government funded model.

KPMG estimates that the 16 toll roads in Australia directly contribute approximately $7bn per year in economic, social and environmental benefits. This is the opportunity cost of delaying the delivery of the 16 roads by every single year.

Australian toll roads: Cumulative benefits



Source: Transurban data, KPMG analysis

Over a ten-year period, the present value of the benefit is estimated to be in the order of $52bn using 7 percent real discount rate. Approximately, $24bn of this total benefit is estimated to be productivity enhancing, directly improving our standard of living. Economy wide modelling using the Computable General Equilibrium (CGE) model estimates that Australia's GDP is $37bn higher over ten years in present value terms due to the operation of these roads.

"The analysis demonstrates that the economic, social and environmental benefits of a well-considered road pricing reform can be substantial".

Brendan Rynne, Chief Economist & Partner

9 We note, that the tolls charged by toll road operators might not equate to the economic cost. Nevertheless, toll roads provide a mechanism to directly link the cost of providing the infrastructure against the value that the users/beneficiaries derive from that infrastructure.

Toll roads have been highly effective in bringing forward increased road capacity in a timely manner. A by-product has been that toll road users are now able to make value of time trade-offs and therefore influence demand through pricing.

Australia's network of single point toll roads has been transitioning from sectional tolling to distance-based tolling and the current debate is seeing a shift towards development of network pricing models. In the US, the congestion management levers have seen toll roads used to moderate peak demand through the use of high-occupancy toll (HOT) lanes. Accordingly, the developing network of integrated toll roads in cities such as Sydney, Brisbane and Melbourne provide the technology and customer foundation to transition to a comprehensive road pricing scheme.

Key considerations for implementing road pricing

Infrastructure Australia recognises that reform will be challenging, not least due to the likely political pressure from vested interest groups. In order for change to happen, the political will must be strong enough for the government to make necessary reforms for the benefit of the economy and the broader community.

The productivity benefits of this reform for Australians are substantial. KPMG recognises that road pricing schemes are highly complex. They require careful assessment of the efficacy of various road pricing models, and consideration of factors such as equity concerns, particularly for disadvantaged communities or areas which lack alternative transport networks (including alternative road and/ or public transport).

A factor that plays in our favour however, is that the concept of road pricing is not new. It has been trialled and implemented in a number of cities overseas, including Singapore, Washington, London and Stockholm. In Australia, Transurban is currently undertaking a Road User Study. The study is being conducted across the whole Melbourne road network, involving 1,200 volunteer participants and will trial different user-pays models. When completed it will provide valuable information for developing a road user charging model for Australian cities.[10]

How did Stockholm obtain public and political support for cordon charging?

In 2007, Stockholm adopted congestion charges via a referendum after a 7-month trial. The charge is levied in a cordon around the city, and time-differentiated charges are applied up to a maximum daily limit.

The congestion charges eventually gained the support of more than two-thirds of the population and all political parties. The reductions in traffic congestion have remained stable since its introduction.[11]

Prior to the introduction of the trial, 39 percent of all newspaper articles in Sweden portrayed the issue negatively, compared to only 3 percent of articles which expressed support.[12] Immediately following the trial, traffic crossing the cordon reduced by 20 percent, alleviating congestion by between 30 to 50 percent. This led to an increase in favourable newspaper articles to 42 percent and negative articles dropping substantially.

10 Release, *The rising cost of road congestion is avoidable, Transurban CEO says*, www.transurban.com.au/files/MR_Road_congestion_101115.pdf

11 Borjesson et al. cited in Eliasson, J, 2014, *The Stockholm congestion charges: an overview*. Centre for Transport Studies, Stockholm

12 Eliasson, J, 2014, *The Stockholm congestion charges: an overview*. Centre for Transport Studies, Stockholm

The review of road user charging schemes across the world also provides a number of lessons for Australia to consider. These include:

Charging model – There's no 'one size fits all' for Australian cities. The societal objective, traffic patterns and projected demand, availability of alternative routes and modes of transport, socio-economic conditions etc, need to be considered and assessed to understand the road user charging model that may be suitable for a city.

Pricing – Price determination and ensuring that the system is equitable and efficient for all road users is critical. In general, best practice in Germany and Singapore have leveraged real-time traffic information and advanced technology in order to regulate prices. For instance, Singapore's Electronic Road Pricing (ERP) rates are adjusted quarterly based on a review of traffic speeds on affected road networks, using an optimal speed range of 20-30km/h on arterial roads and 45-65 km/h on expressway.[13]

Use of revenue – How the revenue generated from road pricing schemes is used is a key determinant of both public consensus and cost-effective congestion management. Revenue raised from Stockholm's congestion charge was directed to public transport upgrades and the introduction of an extensive park-and-ride space network within the cordoned area.

Political support – The clarity of objectives such as whether the need for road pricing is to manage demand or raise revenue is vital. Particularly, which objective should take primacy when trade-offs need to be made. The clarity of objectives and the primacy is critical in designing and selecting appropriate road pricing model and the specific price to be charged.

Public and industry support – In addition to clear objectives, transparency is also essential. It is important to lay out a range of factors such as the use of funds raised, the role of private sector (if any) and the public sector, who will collect the charges, and how actual and perceived equity and dis-advantage considerations will be incorporated into the scheme.

Legal support – Equity issues should be considered, as well as privacy concerns relating to the collection and handling of private information.

Organisational arrangements – Whether government or an independent regulator will regulate the charges based on demand for infrastructure and current and anticipated need for investment for the maintenance and new infrastructure development needs to be considered.

Financial and administrative procedures – Including back office and administrative functions.

Use of technology – Particularly opportunities presented by the availability of cost-effective Global Navigation Satellite Systems (GNSS) to enable dynamic pricing scenarios informed by predictive modeling.

Governments tend to focus on the last of these elements, however, it is the lack of clarity about the first six that present real challenges.

13 Land Transport Authority, 2016, *Electronic Road Pricing (ERP)*, accessed: www.lta.gov.sg/content/ltaweb/en/roads-and-motoring/managing-traffic-and-congestion/electronic-road-pricing-erp.html

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