INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

9 August 2018

Mr Shane King MP
Chair
Transport and Public Works Committee
Parliament House
BRISBANE QLD 4000

Via email: tollroads@parliament.qld.gov.au

Dear Mr King,

RE: Submission to the Transport and Public Works Committee's inquiry into the operations of toll roads in Queensland

Infrastructure Partnerships Australia is pleased to provide this submission to the Transport and Public Works Committee's inquiry into the operation of toll roads in Queensland.

Infrastructure Partnerships Australia is an independent think tank and executive network for Australia's infrastructure sector. We are a public and private sector membership-based organisation drawing together industry and government in a genuine partnership to debate the policy reforms that will prepare Australia for the challenges ahead.

We are committed to engaging stakeholders and the community on the economic and social benefits of major infrastructure projects and reforms, such as through improved road funding mechanisms.

At the outset it is important to establish that there are only two sources of funding for infrastructure – taxes and user charges. Put simply, when the need for a piece of infrastructure (such as a road) has been established the community can choose to pay for that asset either through allocations of their tax contributions and/or through direct user charges, such as tolls.

The progressive provision of toll roads in Queensland has allowed for the accelerated delivery of high quality road infrastructure across the State's fastest growing region. Toll roads have delivered significant economic benefit to the region and ensured road infrastructure capacity has increased as the population has grown.

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Without tolls, major road corridors may not have been delivered, or their delivery would have been significantly delayed. This delay would, in turn, have meant the deferral of the substantial economic benefits Queensland's tolled motorway network has provided. By leveraging contributions from the beneficiaries of infrastructure, in this case motorists, successive Queensland governments have been able to deliver more and higher quality roads for those users.

While toll roads have been undeniably successful in lifting South East Queensland's network capacity and service quality, and delivered significant economic benefit, they remain a discrete solution to the broader road funding challenge facing Australia.

Looking forward, there is an opportunity to further reform the way we fund and invest in the road network. Reform though a rehabilitated road user charging mechanism to provide a fairer, more sustainable, and more efficient road system.

With both the immediate and longer-term in mind, this Committee should take the opportunity to demystify and explain the utility, structure and purpose of direct user charging through tolls. The Committee should also take the opportunity to develop the case for wider, whole of network charging reform.

Our understanding of road tolling in Queensland:

- tolling has historically been a fundamental mechanism to fund major urban motorways, supplementing government investment on behalf of taxpayers;
- without tolling, many of Queensland's most significant and economically valuable road corridors would not exist, or would have been constructed at a much later date;
- the private sector's investment in toll roads has allowed the Queensland Government to focus on, and fund, public transport capacity, operations and upgrades;
- from the 1980s until the late 2000s, effectively all road tolling concessions in Australia were granted through competed Public Private Partnerships (PPP);
- tolling revenue has created the cash flow to attract competitive design, investment and operation of road infrastructure, which has provided Queensland with high quality road infrastructure, efficient risk transfer and substantially enhanced amenity;
- because these tolls are set by the procuring state in a sovereign contract with investors, they cannot be changed without the willing agreement of the investors. This provides certainty and a commitment device between all participants; and
- concession contracts have also protected the Queensland Government and taxpayers from project delivery and operational risk. This has meant that Queensland taxpayers were protected from imprecise patronage forecasts and subsequent insolvency of RiverCity Motorways and BrisConnections.

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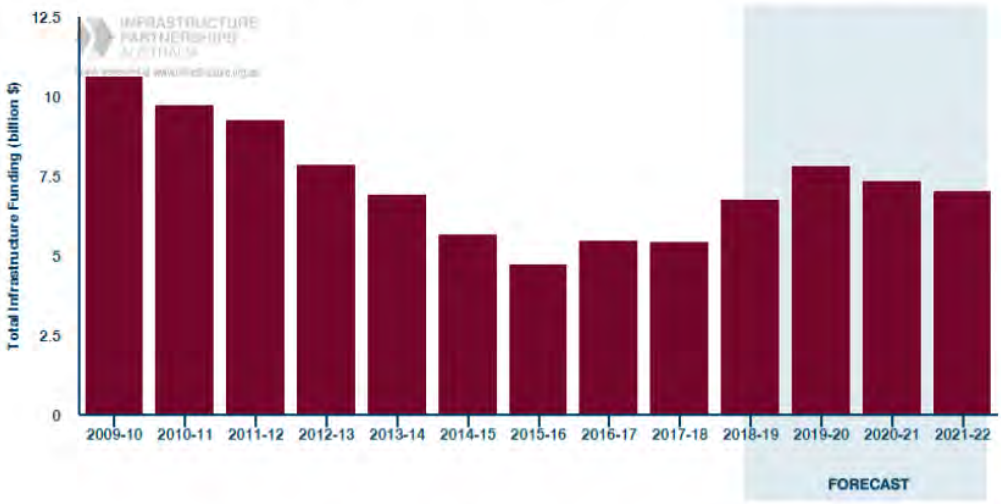
Our understanding of the wider transport funding issue:

- this year's Federal Budget reduced transport infrastructure funding below decade-average funding levels to the states, including Queensland;
- while the Queensland Government's 2018-19 Budget turned the trend on infrastructure funding, funding levels still sit below the decade average (see Figure 1).

Figure 1: Queensland Government infrastructure funding (2009-10 to 2021-20)



Source: Infrastructure Partnerships Australia, 2018

- other than NSW, Victoria and the ACT, all other jurisdictions are reducing their infrastructure funding, reflecting their constrained fiscal capacity;
- a much wider application of road user charging is increasingly important as Commonwealth Fuel Excise revenues continue to decline and Queensland's fiscal capacity faces continued constraint;
- moving to a direct user charging system is an equitable and more transparent mechanism to appropriately cover the cost of constructing, maintaining and operating roads;
- this is an important issue as the current road funding regime is increasingly unfair, unsustainable and inefficient for motorists and the broader community;
- there is also a logical limit to the number of new motorways or lanes that can be added, we cannot just 'build our way out of trouble' for ever; and
- therefore, road user charging reform will also need to consider a demand management mechanism over longer-term.

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Our attached submissions

The key points made in this letter are developed in a series of our research papers and submissions, which are attached as part of our submission, being:

- *Urban Transport Challenge: A Discussion Paper on a Role for Road Pricing in the Australian Context;*

Our first paper on network-wide road user charging considers the fundamental decline of transport network revenues and the allocation challenges – and develops the case and structure for a network-wide direct user charge.

- *Road Pricing and Transport Infrastructure Funding: Reform Pathways for Australia;*

Our second and most comprehensive paper on road funding develops and applies our 'Universal Road User Charging' model – and a reform pathway for Australia.

- *Submission to Select Committee on Electric Vehicles - inquiry into the use and manufacture of electric vehicles in Australia*

This recent submission to the Federal Senate's Select Committee on Electric Vehicles outlines the once in a generation opportunity to attach road reform to the rise of a disruptive technology – Electric Vehicles. However, the submission notes that this opportunity to reform road funding in the near-term is closing. That is because of the increasing and rapid uptake of Electric Vehicles. Once Electric Vehicles become a dealership mainstay, road user charging reform through Electric Vehicles will become electorally unachievable. The submission states that a distance-based user charge should be accompanied by removal of any upfront disincentives, to encourage Electric Vehicle uptake.

- *Pre-budget submission on National Reform Incentives;*

Our 2017 Federal pre-budget submission describes the core responsibilities and role for the Commonwealth in driving national reform to infrastructure markets to best leverage the limited Federal funding capacity and improve outcomes for road users across Queensland and the other states and territories.

Conclusion

Infrastructure Partnerships Australia hopes that the Committee will further demystify tolling and advance the discussion about how we fix Australia's transport system using efficient charging structures. Such a reform would ensure Australia's investment and road funding regime is fairer, sustainable and more efficient. Over time this should also include how we can use demand management to reduce growing road congestion and improve network efficiency.

We would be delighted to discuss the matter further with the Committee. In the meantime, if you require any further information please do not hesitate to contact Mr Nick Hudson, Director of Economics and Policy, on [redacted]

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Yours sincerely,

Adrian Dwyer

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INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

BUILDING AUSTRALIA TOGETHER

Urban Transport Challenge:

A DISCUSSION PAPER ON A ROLE FOR ROAD PRICING IN THE AUSTRALIAN CONTEXT

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Contents

Executive Summary

This discussion paper considers the potential role for a national road pricing scheme in Australia. This paper considers how reform of transport taxation could both act as a transport management tool and assist Australia to fund its next generation of public transport and road projects.

This paper does not suggest that road pricing reform is an easy - or an immediate - option. Rather, this paper is designed to inform and shape the public debate about the merits and the challenges posed by such significant reform. Even if consensus can be achieved, it is likely that implementation would take between five and ten years.

Everyone can see that Australia faces profound challenges in managing and expanding its transport infrastructure network. Over the coming 25 years, demand for passenger and freight transport will double; with demand across the freight network to triple by 2050.

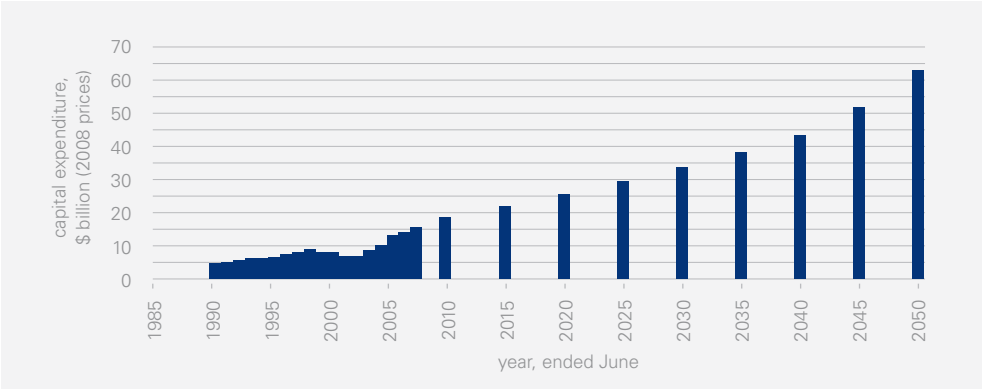
Congestion already costs Australia $9.4 billion every year. Without action, these costs will more than double to $20.4 billion by 2020. Inefficient, congested freight networks also have a significant impact on national productivity, with each one per cent improvement in supply chain efficiency estimated to save Australia more than $1.5 billion in deadweight logistics costs.

Forecasts prepared for Infrastructure Partnerships Australia show that population growth and economic development will require transport infrastructure investment to double by 2030 and increase four-fold by 2050 across all transport modes. Indeed, these estimates of future funding requirements may be conservative. In recognition of existing infrastructure shortfalls Australia's governments boosted their investment in road infrastructure by more than 26 per cent above historic levels between 2005-06 and 2006-07. Sustaining the required levels of investment over the long decades ahead is likely to require significant change.

▼ Figure 1

Transport Infrastructure Investment, 1990-2050

Source: IBIS World (2008)
Note: Excludes airports



▼ **Table 1**

Road-related Revenue and Expenditure, 2005-06 to 2007-08
Source: BITRE (2009d)

	ROAD EXPENDITURE ($ BILLION, 2007 PRICES)					ROAD-RELATED REVENUE ($ BILLION, 2007 PRICES)				
	TOTAL	FEDERAL	STATE	LOCAL	PRIVATE	**TOTAL (INC GST)**	**TOTAL (EXCL GST)**	FEDERAL (INC GST)	STATE	TOLLS
2007-08	**13.9265**	2.7238	7.3354	3.1273	0.740	**-**	**-**	-	-	-
2006-07	**12.1412**	2.9598	5.9708	2.6778	0.5328	**22.808**	**17.998**	15.551	6.126	1.131
2005-06	**10.4113**	4.7756	2.7349	2.2685	0.6324	**22.577**	**18.277**	15.765	5.881	0.931

Australia's transport sector is facing a range of significant challenges which require sustained focus from government and industry alike. These challenges include:

- **Historic under-funding of transport infrastructure development and maintenance** – resulting in an inefficient transport system that inhibits Australia's productivity and international competitiveness.

- **Demand pressures** – pressure from a rapidly growing population and economy are exacerbated by shifting demographics, an ageing population and the impacts of adjusting to climate change and carbon abatement.

- **Inefficient use of transport infrastructure** – leading to increased urban congestion, vehicular emissions and operating costs.

- **Ineffective taxes and charges** – taxation and road user charges can be in conflict and send insufficient and confused price signals to road users.

The scale and complexity of Australia's transport challenge has seen road pricing attract renewed attention from policymakers in Australia. Utilities like water, energy and telecommunications have already undergone significant and ongoing reform in terms of how monopoly infrastructure is priced - and how demand is managed. Under most of these regimes, revenue generated from access to monopoly infrastructure is reinvested to improve overall performance and promote efficiency.

Our research finds that the international experience of road pricing schemes has been broadly positive. For instance, the London Congestion Charge has shown that congestion pricing can be very effective in concurrently raising revenue for improvement of the transport system, while managing transport demand by pricing externalities. After three years of operation, the decline in congestion was broadly in line with the 30 per cent reduction realised in the first year. The Singapore Road Pricing Scheme had achieved a 31 per cent reduction in traffic levels in 1988, relative to levels prior to its introduction. Other jurisdictions, such as the Netherlands and the US State of Oregon are now considering the implementation of similar schemes.

Global experience has shown that growing congestion and environmental degradation, declining liveability and fewer opportunities to support new investment have been important preconditions in the public's acceptance of the need for road pricing.

The same conditions are now affecting Australia's major urban centres. These challenges are complex and will likely require a coordinated, long-term strategy which balances the provision of new infrastructure with considered ways of shaping and managing demand.

There is a public consensus that new investment in transport infrastructure must be a first order priority for all Australian governments; however there is also a growing consensus that building new infrastructure will only take us part of the way there. Global experience has shown that an approach that blends supply and demand management presents the most effective strategy to manage congestion - and provide a new revenue stream to fund major projects.

This discussion paper considers whether road pricing can change the game in Australia. Under the status quo, Australia faces an array of inconsistent fees, taxes and charges that contribute to the cost and complexity of transport, without encouraging behavioural change to meet economic, social and environmental goals.

This research discusses how a national road access pricing regime, coupled with substantial taxation reform, might replace existing registration, licensing and fuel excises. Through a sound scheme design, a national road pricing scheme could deliver a fairer, more balanced system that would see high-end road users pay more and those who access roads less frequently, or during periods of low demand, pay less than they do under the status quo.

A road pricing scheme based on distance, location and time of travel would improve equity outcomes across society by:

- Increasing the accountability of road users for the impacts arising from their road use;
- Removing upfront fees and charges that act as barriers to vehicle ownership – thereby reducing the impacts of social isolation; and,
- Reducing the current, disproportionate fees and charges that apply to some heavy vehicles.

The introduction of an Australian road pricing regime could also play a central role in managing demand, and help to fund the next generation of major transport infrastructure projects. Road pricing could be set at a level that achieves revenue neutrality once existing road taxes and charges are removed; or at a level which increases revenue to allow expanded investment in the maintenance and construction of projects that promote a sustainable transport system, including road, rail and public transport.

Modelling undertaken for this discussion paper has shown that current road-related expenditure of $11.371 billion (2006-07) could be derived with a light vehicle road user charge averaging just 4.6c/km. A charge averaging 10.4c/km for light vehicles could generate revenue equivalent to that currently derived from road related fees and charges. Assuming full revenue hypothecation to transport projects, this approach would provide an additional $10.857 billion per annum for investment in new transport projects.

The model of road pricing ultimately discussed in this paper would deliver a charge for the average motor vehicle of just 7.9c/km and replace all existing road related taxes and charges (barring the Goods and Services Tax and Fringe Benefits Tax). At this price, the scheme would also recover externalities like congestion and air pollution. Under this model, an additional $4 billion annually would be made available for investment in transport infrastructure.

While FBT would not be removed under the model proposed in this paper, significant issues remain with the interaction of this tax and road use. As part of the broader review of taxation, the FBT should be reformed to remove existing incentives that actually promote road use - and provide neutrality between the treatment of motor vehicles and public transport.

The consideration of the implementation of a national road pricing scheme with the broader review of the taxation system offers the potential to:

- Hypothecate revenue for investment in transport infrastructure;

- Vary the revenue collection functions and capabilities of government, including the transfer of funds between the Australian Government and the state and territory governments; and,

- Change the expenditure requirements of governments – for instance, new costs associated with the development of the scheme, and the elimination of costs associated with the collection of current fees and charges.

The allocation of revenue collected through the scheme would require transfers between the Commonwealth, state, territory and local governments to provide for ongoing expenditure in line with the road management responsibilities of each jurisdiction. The distribution of the additional revenue collected under a national road pricing scheme could be centralised through an infrastructure fund (such as the Building Australia Fund) which could determine the redistribution of revenues through an objective determination of investment priorities. In this case, a board comprising representatives of the Australian and state governments should determine the allocation, based on a rigorous and transparent assessment of each project's benefits and costs.

The potential benefits of a well-designed, well-delivered national road pricing scheme in Australia could be significant. There has been a long-term policy reform trend towards the use of mass-distance-location pricing for heavy vehicles through the National Transport Commission (NTC) and other agencies, such as the Productivity Commission.

But even if a firm commitment from government and broad public acceptance is achieved, it is likely that implementation of a scheme would likely take between 5 and 10 years due to technology challenges, scheme design and the requirement for pilot programmes.

The purpose of this paper is not to solve all of these issues - but rather to begin an informed and seasoned public debate about the relative merits of a national road pricing scheme - and its potential to change the way Australia funds and manages its transport infrastructure.

The central focus of this debate must be the development of a harmonised national scheme that promotes competition and drives productivity through renewed investment in transport infrastructure.

Fundamental Considerations for a National Road Pricing Scheme

The introduction of a national road pricing scheme should seek to deliver more efficient use of existing transport infrastructure while generating funds for investment in new transport infrastructure. In moving towards a pricing scheme, the following issues need to be considered within the public debate:

1. **Should a scheme be developed on a national basis with uniform charges, or on a state-by-state, or city-by-city basis using a common framework?**

   The net benefit of moving toward a national scheme needs to be weighed against proceeding with a state-based scheme and whether a national scheme should be extended to include a centralised registration system encompassing a common clearing house for collection and distribution of revenues.

2. **What effect should a scheme have on current road user charges and government revenue?**

   A national road pricing scheme could be developed to be revenue neutral (maintaining the overall budgetary position of each jurisdiction) or revenue positive (providing additional funds for investment in key infrastructure).

3. **How should current road user charges be changed?**

   The impact of replacing the current system of fixed registration charges with distance based registration charging needs to be assessed in terms of its likely effect on changing user behaviour. The current review of Commonwealth taxes also needs to take into account:

- Trade-offs between road price and excise to fully recover road expenditures;
- Incentives for private vehicle use derived from the Fringe Benefit Tax; and,
- Possible taxation reforms in other areas to offset any potential deficit in general revenue caused by the hypothecation of revenue to transport infrastructure, as a move toward a more equitable basis for taxation.

4. **How should revenue be spent?**

   International experience suggests that public acceptance of road pricing is enhanced when the revenues collected are hypothecated to an infrastructure fund used to improve the transport system (including both road infrastructure and public transport). Governments need to agree on a strategy to expand infrastructure capacity, including priority investment classes, the distribution of surplus revenue between jurisdictions and criteria for project prioritisation.

5. **What other practical issues need to be considered?**

   The potential benefits of road pricing are clear, but other important practical issues need to be considered as part of the debate. Among others, these include:

- Making sure the system is transparent and can be easily understood by road users;
- Ensuring the objectives for the system, including pricing framework, privacy and practicality considerations, drive the technology adopted and not the reverse;
- Ensuring the right balance between transport outcomes and the cost of administration; and,
- Balancing efficiency and equity objectives to ensure that low income groups are not disadvantaged in their access to broader community needs.

6. **What type of framework should be adopted for a road pricing system?**

   A pricing system could be founded on a number of different components, e.g. a base charge for road use paid by all road users, premiums for excessive wear on the network and the generation of externalities such as noise and emissions in urban areas. As a first step, a pricing regime could include time of day pricing on key road corridors.

A Road Map Proposal

1. **Implementation of a National Road Pricing Scheme for all Vehicle Classes**

   Australia should consider implementing a national road pricing system applying to all vehicle classes. The scheme would provide dual systems of heavy vehicle and light vehicle road pricing, reflecting the differing impact on the road network and the generation of externalities, such as congestion and noise pollution.

   The introduction of a national road pricing scheme would necessarily require a long-term implementation agenda of 5 to 10 years. As next steps to facilitate the implementation of a scheme, the Australian, state and territory governments should consider:

a) **Implementation of heavy vehicle mass-distance-location charging across urban and non-urban road networks;**

b) **Phased implementation across light vehicles to enable equipment roll-out and transition by road agencies to distance and efficiency-based charging;**

c) **Inclusion of a time of day mechanism to apply to urban road networks to encourage more efficient use of infrastructure during peak periods;**

d) **Investment in public transport and "transport system deficiencies" to provide road users with a viable alternative to private vehicle use, particularly during peak periods;**

e) **Development and staging of trials in capital cities to demonstrate:**

   i. Technology options;

   ii. Changes in travel behaviour, including incentivisation of travel outside periods of peak demand;

   iii. Trade-offs between fixed charges and variable charges based on vehicle use rather than vehicle ownership; and,

   iv. Options available to employers to allow adjustment of work patterns for commuters to avoid peak demand for road use.

▼ Table 2

The Key Principles of an Australian Road Pricing Scheme

KEY OBJECTIVE	Focus on vehicle use rather than on vehicle ownership
VEHICLE CLASSES	Heavy vehicle: mass-distance-location system Light vehicle: per kilometre system, reflecting vehicle efficiency
PRICING STRUCTURE	A three-tier tariff: • **Road use base charge** – per kilometre reflecting vehicle class • **Urban road use charge** – reflecting externalities associated with the use of congested roads in major Australian cities, including initially: - Sydney; - Melbourne; - Brisbane and neighbouring South East Queensland; - Adelaide; and, - Perth • **Urban peak road use charge** – reflecting externalities associated with the use of heavily congested roads during peak periods, and to encourage behavioural change.
CURRENT CHARGES	Removal of current taxes and charges associated with road-use, excluding privately collected tolls, the Goods and Services Tax (GST) and Fringe Benefit Tax (FBT). These reforms should be undertaken as part of broader reform of taxes and charges paid by all sectors of society.
SURPLUS REVENUE	Invested in an infrastructure fund and used for the construction and maintenance of infrastructure to facilitate mobility, including roads and public transport.
IMPLEMENTATION	Staged to facilitate the introduction of a heavy vehicle scheme, followed by the two stage roll-out of a light vehicle system.
PRIVACY	A central consideration in the final structure of the scheme. Special concessions should be made to reflect privacy concerns; however these must not undermine the basic policy structure of the scheme.
TECHNOLOGY	Must be driven by scheme design, with final technological solution to be determined through trials and a competitive tender.

2. Integrating a National Road Pricing Scheme with National Transport Policy

The introduction of a national road pricing scheme should not be viewed as simply taxation reform. Rather, it must form a central component of ongoing reform of Australia's transport policy. An effective national road pricing scheme would have as central tenets efficiency of infrastructure use and investment in new transport infrastructure.

The move to a national road pricing scheme must form part of a broader reform of transport infrastructure and services. These reforms must include:

- A commitment to long-term transport planning;
- The integration of land-use and transport planning;
- Promotion of sustainable transport solutions, including encouraging greater modal neutrality;
- Project prioritisation and a committed funding pipeline; and,
- Regulatory and governance reform to promote productivity.

The introduction of a national road pricing scheme should be coordinated with national transport reform processes including:

a) Harmonisation of State Transport Regulations Through the COAG Reform Agenda

The lack of consistency and uniformity across jurisdictions in their approaches to transport regulation has increased the cost of doing business in Australia. In addition, the duplication of activity has imposed a significant administrative cost on society. The Council of Australian Governments (COAG) reform agenda requires full support from all governments and industry if these burdens are to be removed and cohesive reform of the transport market is to take place.

b) Current National Heavy Vehicle Reforms, including the Heavy Vehicle Charging Scheme and National Licensing Scheme

Heavy vehicle reforms provide a platform for the rollout of a mass-distance-location pricing regime, as well as the further harmonisation of existing fees and charges. Commitment should be given to the established reform process including the expansion of these reforms to give regard to their role as a mechanism for a national approach to a road pricing scheme for all vehicles.

c) Harmonisation of Existing City-based Tolling Schemes and Extension of Demand Management-based Solutions

Australia's three largest cities – the greatest contributors to national congestion costs – benefit from established, harmonised electronic tag-based tolling systems. The reform of existing tolling arrangements to support harmonised schemes within each city's toll road networks could aid in the delivery of many existing transport policy objectives, such as transparency, effectiveness and efficiency.

Expanding the role of tolling from recouping infrastructure financing costs to include demand management could offer further important reform in advance of the implementation of a national road pricing scheme.

1. Introduction

Australia faces major challenges in maintaining and enhancing its transport networks to meet the twin challenges presented by rapid population growth and economic development. To meet these demand pressures, new transport infrastructure capacity is already urgently required. Forecasts conducted for Infrastructure Partnerships Australia show that Australia will need to double its investment in transport infrastructure by 2030 across all transport assets; and fund a four-fold increase by 2050[1].

The development of new transport infrastructure in recent decades has been fundamental to maintaining national productivity and improving connections between regions and communities. However, Australia's next generation of transport infrastructure will be of an unprecedented scale and complexity. The effects of the Global Financial Crisis, high profile failures of some large transport projects and the sheer size of future transport projects means that it is now time to consider new, stable funding mechanisms for Australia's transport system.

New investment in roads represents the lion's share of transport infrastructure investment, reaching $12.14 billion in 2006-07. A considerable proportion of this investment is associated with maintenance, comprising $4.19 billion in the same year. Despite of the considerable annual investment in road infrastructure, it is apparent that demand for highway and local road networks is fast outstripping the capacity of governments to deliver new projects, with urban congestion a common feature across all major Australian cities.

Addressing congestion will require new transport capacity, coupled with innovative asset management to ensure that finite capacity at peak times is utilised by journeys which best contribute to the nation's economic, social and environmental objectives.

The concept of road pricing has been debated for many years. It is advocated as a way of managing demand for road space, while also generating new revenue for investment in transport assets. Internationally, several jurisdictions have successfully implemented road pricing systems, with more complex and far ranging schemes, such as a national scheme in the Netherlands, due in the near future.

Setting appropriate price signals for road infrastructure can:

- Better match the demands of road users with the available capacity or 'supply' of road space;
- Provide a basis for replacing outdated and inappropriate taxes and fees, and provide a fairer set of charges which match charges and payments to actual road use and the impact this has on society; and,
- Provide a more sustainable and transparent funding mechanism for maintaining and improving the transport system.

1 Infrastructure Partnerships Australia and PricewaterhouseCoopers (2008)

While there is now a general consensus about the theoretical benefits of road pricing, in policy terms the concept has often been put in the too-hard basket; yet road pricing is again being debated in the Australian context. It is important to understand why the concept now receiving increased attention.

Continuing advances in technology, and the benefits demonstrated by schemes in other countries have helped break down some of the barriers which have previously prevented the introduction of more efficient road use charging arrangements.

Policymakers are beginning to accept that the implementation of a road pricing scheme could play a critical part in the reform of infrastructure funding toward a more efficient and coordinated approach. Critical to the success of a road pricing scheme are considerations like the scheme's reach, equity considerations and the opportunity to fundamentally reform the existing myriad of fees and charges to deliver a fairer, more transparent charging mechanism.

It is recognised at the outset that the approach proposed may warrant some re-thinking of Australia's existing taxation arrangements for transport with implications for the Commonwealth-State fiscal balance. However, it is critical the delivery of transport policy objectives, must be the focus of the reform process, not simply the creation of new taxation revenue.

The Review of Australia's Future Taxation System (the Henry Review) provides an opportunity to consider opportunities for reforming taxes and other charges that distort the economics of transport use. Central to this consideration should be the impacts of these fees and charges on the objectives of the Council of Australian Governments (COAG) transport reform agenda.

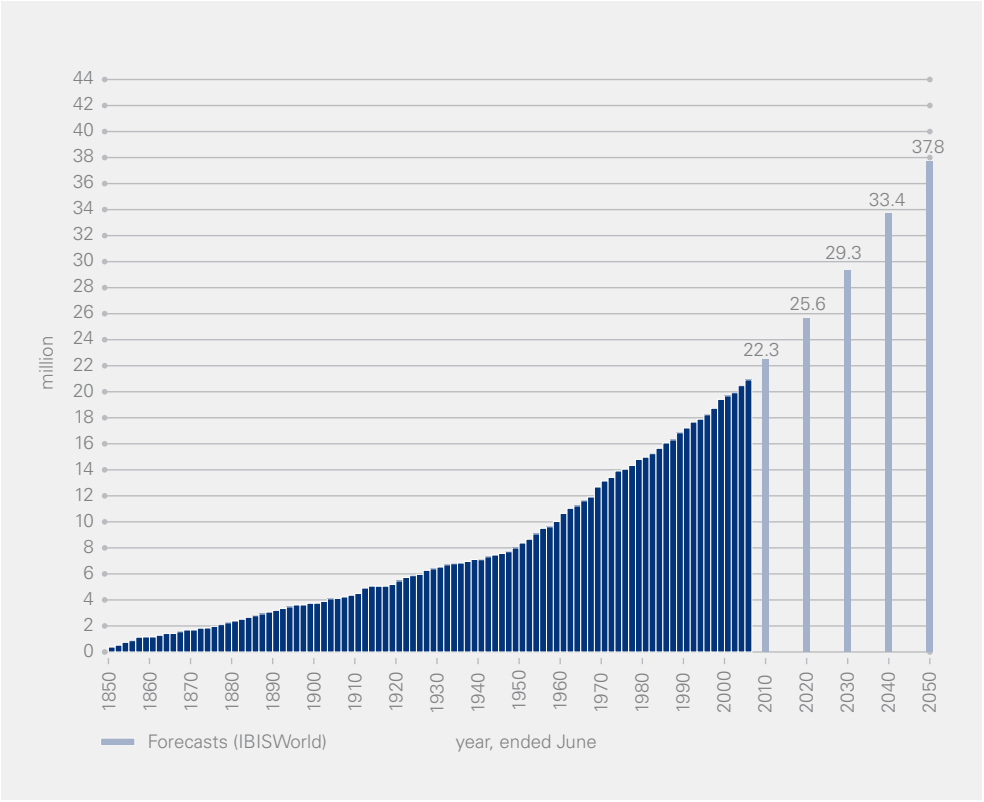
2 Setting the Scene: Why Do We Need Road Pricing?

Australia's population growth over the past 20 years has accelerated the demand for infrastructure and services, particularly in our capital cities. Population projections prepared for Infrastructure Partnerships Australia suggest that Australia's population could reach 37.8 million in 2056[2].

▼ Figure 2

Australian Population, 1850 - 2050

Source: IBISWorld (2008)



It is apparent that the scale of population growth is outstripping the capacity of Australian governments to supply the required supporting infrastructure. The sectors most affected by this supply and demand side imbalance are transport, health, education and utilities. In transport, demand management measures offer an opportunity to enhance productivity across the national economy and to better meet the expectations of the community in terms of access to functional, reliable and efficient transport networks. This growth is expected to continue over the coming 25 years as the freight and passenger tasks double in line with population and economic growth.

2 IBIS World (2008)

2.1 The Established 'Hands Off' Approach to Managing Transport

Over recent decades, regulatory reform has played a critical role in better managing the supply and demand for monopoly network infrastructure, such as energy, telecommunications and water. These continuing reforms have played an important part in modernising access to finite assets within these infrastructure classes.

This approach contrasts markedly to the 'hands off' approach to the management of transport networks, where it has been assumed that the inherent costs of accessing transport infrastructure like fuel and vehicle maintenance, will of themselves act as a signal to dampen demand for access to road space.

The expectation that underpins this approach is a belief that people will adjust travel behaviours according to trade offs between the way they value time and the levels of service offered by the road network. Costs of travel include lost time, fuel and vehicle maintenance, which increase during periods of high demand, such as peak hour congestion. As a result, people who place a high value on their time (e.g. work commuters) will be less flexible in their use of the transport system compared to other people (e.g. leisure travellers), who may be prepared (and more able) to access the road network at less busy times of the day.

However, in reality, this 'hands off' approach by transport policy makers has done little to manage the impact of unrestrained growth in travel demand and its effects on infrastructure use and society more broadly. This lack of success can in part be attributed to the inability of road users to access information regarding the true costs of road use, expected periods of high demand and limited access to viable alternatives, such as public transport.

While road users bear the direct cost of their transport activities, their decisions to consume transport resources may not be based on the correct 'signals' or information. In economic terms, there are three key shortcomings or sources of 'failure' in transport markets, notably:

- **Inappropriate taxing arrangements for road transport users** – the amount road users pay to access the road system does not accurately reflect when, where and how frequently they use the road network. This creates inequity across road users since many transport system users are charged more than they should really pay, while others are charged much less.

- **Failure to price externalities** – while transport users who decide to travel during peak hour may incur some delay themselves, they do not pay for the effect they have on other users of the system, or for other externalities, for instance the additional pollution caused by choosing to use the network at a busy time.

- **A lack of a direct relationship between infrastructure charges and asset provision** – there are a range of different taxes and charges collected by governments from transport users, but there is not a clear link between the allocation of these funds back into the transport system for the benefit of those users.

2.1.1 Transport Externalities

The mismatch between demand growth and the provision of new road infrastructure has seen the impact of urban congestion continue to grow markedly over the past decade. These pressures have real impacts on roads user, the productive capacity of the Australian economy as well as the secondary, longer term negative effects on society and environment.

According to Bureau of Infrastructure Transport and Regional Economics (BITRE) estimates, the total cost of congestion will rise from $9.4 billion in 2005 to $20.4 billion in 2020[3]. Excessive congestion has a negative impact on economic productivity and reduces the liveability and efficiency of Australia's cities. The study also concluded the dead weight – or recoverable – costs of congestion equalled about $5.6 billion in 2005, rising to $12.6 billion by 2020.

Around 11.7 per cent (or $1.1 billion) of the total cost of congestion comprised additional air pollution. These and other costs associated with congestion are generally referred to as externalities, since the cost is not directly borne by the road user.

In addition to the costs identified by BITRE, a number of additional costs were not factored into the study including reduced personal safety and impacts on the personal health of drivers (e.g. through stress factors), as well as broader health impacts on society. Other studies have indicated that these costs can be considerable, with the total cost of externalities accounting for as much as one third of the total cost of congestion.

Negative externalities, such as air pollution and noise, are not shouldered by the road user but instead met by the community. Road pricing provides the opportunity to internalise many of these costs. The externalities produced by road transport increase considerably due to the impacts of congestion. For instance, it has been estimated that vehicles consume between 30 and 40 per cent more fuel consumption between free-flow versus stop-start, congested conditions.

2.1.2 Capacity Augmentation and Demand Management

Under the established system, state and territory governments independently undertake transport planning, as well as development and maintenance of the road network, largely funding expenditures through their own budget processes.

The past five years has seen a step change in transport planning and project delivery through programmes like AusLink, the Nation Building Programme (AusLink II) and more recently, through the Infrastructure Australia infrastructure audit and prioritisation process. These reforms have seen the Commonwealth markedly increase its role in assessing and funding road infrastructure. AusLink and the Infrastructure Australia prioritisation process have been important to developing cohesive, long-term road infrastructure plans to alleviate bottlenecks on the nation's most significant transport corridors.

Between 2006-07 and 2008-09, road-related expenditure jumped significantly from the established long-term trend to $16.745 billion. This represented an increase of approximately two-thirds over the long-term funding trend, which averages around $10 billion per annum for at least the five years following 2001-02.

3 BITRE (2007)

▼ Table 3

National Road Expenditure, 2000-01 to 2007-08 or 2001-02 to 2008-09
Source: NTC (2009)

	ESTIMATED ARTERIAL ROAD EXPENDITURE ($ MILLION)							
	2001 - 02	2002 - 03	2003 - 04	2004 - 05	2005 - 06	2006 - 07	2007 - 08	2008 - 09
URBAN	1710	2059	2130	2177	3164	4441	5157	6338
RURAL	2629	2425	2591	3018	2941	3173	4049	4752
TOTAL	4339	4484	4721	5195	6105	7614	9206	11090
	ESTIMATED LOCAL ROAD EXPENDITURE ($ MILLION)							
	2000 - 01	2001 - 02	2002 - 03	2003 - 04	2004 - 05	2005 - 06	2006 - 07	2007 - 08
URBAN	2560	2675	2593	2589	2670	2741	3016	3409
RURAL	1578	1679	1702	1748	1700	1687	1891	2246
TOTAL	4138	4354	4295	4337	4370	4428	4906	5655

Despite the recent and significant escalation of investment in transport infrastructure, several recent studies have highlighted the deficiency in investing in Australia's transport infrastructure. Infrastructure Australia recently identified around 40 projects that need to be considered to achieve an efficient and sustainable transport system in the longer term. Together, these projects total almost $60 billion of capital investment. The range of projects in the Infrastructure Australia priority list covers roads, terminals, ports, airport facilities and public transport. For the roads sector alone, twelve high priority projects have been identified, totalling $15.5 billion worth of capital investment.

It is important to recognise that this investment plan does not take account of the high cost of maintaining existing infrastructure. The funding challenge is compounded when consideration is given to the ageing of our transport infrastructure, particularly in the rail sector.

There is no doubt that the augmentation and extension of major road networks is essential, but governments should also embrace concurrent strategies to make better use of the existing road network. It is a commonly accepted phenomenon that by increasing the capacity and ease of access to the road network, the added convenience of new infrastructure often increases traffic volumes over and above the projected traffic growth rates for the established infrastructure.

As a result of this, a study of a number of the world's leading cities by the Commission for Integrated Transport (CfIT) in London has found the only way to reduce car use is to balance the development of new capacity with a measure of demand management that in turn complements public transport investment[4]. This finding is becoming more commonly accepted and is resulting in a change of thinking among transport planners. Rather than merely adding to the stock of road infrastructure to increase road capacity and meet demand, planners in many cities are now openly considering charging for road access as a means of managing increased congestion.

The Victorian Government undertook a review of options for managing transport congestion in 2006, Making the Right Choices. A key message of the report was the need for further work to explore the benefits of road use charging.

4 CfIT (2009)

The New South Wales Government made a modest first step toward the use of pricing to manage demand on Sydney's harbour crossings through the introduction of a time of day toll price in January 2009, the first in Australia to do so. The Victorian Government has also made a modest commitment to exploring demand management techniques through the use of ramp metering, a physical method of managing traffic entering a roadway to improve the operation of some freeways in that state.

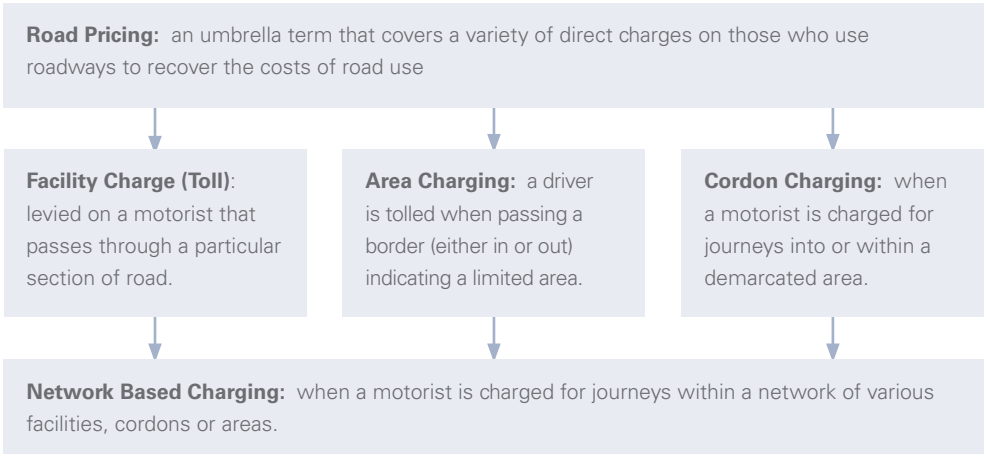
Despite this progress, a consistent approach to demand management is absent from long-term transport planning at both the national and jurisdictional levels. The creation of a national road pricing system has the potential to balance demand for road space with road supply, and generate a new source of revenue to finance the expansion of the network.

2.2 What is Road Pricing?

Road pricing is the direct application of a price for road use. Road pricing is a common feature of the road transport systems in many countries throughout Europe, North America and Asia. The application of tolls to motorways, bridges and tunnels in Sydney, Melbourne and Brisbane are also forms of road pricing.

▼ Figure 3

Classifications of Road Pricing



Facility Charge (Tolling)

Tolling is principally a financing mechanism to fund infrastructure provision and has been used extensively in Australia to develop urban tollway networks in Brisbane, Sydney and Melbourne. Tolling in Australia has traditionally been based on the costs of construction and maintenance of that facility. The use of road tolls has a long history in Australia stretching back to 1802. The introduction of travel behaviour influencers, such as time of day charges, to manage demand is common through Europe, Asia and North America.

Cordon and Area Pricing

Both systems refer to a charge for providing access to a defined part of an urban network, usually associated with a central business district. The primary purpose of such an approach is to ration demand within an area which is characterised by a highly concentrated level of activity. An area scheme differs from a cordon scheme in that it charges for movements within the specified area, as well as movements into and out the area. Examples include London, Trondheim, Oslo, Stockholm and Singapore charging schemes.

Network Based Road Pricing

Network-wide road pricing is a more comprehensive approach to charging for road use and could potentially encompass elements of all of the above schemes. A network-wide pricing system could be levied on both urban and non-urban based traffic and may be varied to reflect location, time of use and distance travelled. Additional factors may be added to each charge to reflect factors influencing the cost of externalities.

A fully dynamic network-based road price, varying to match demand for and availability of road space in real time, is theoretically the optimal method for managing the efficient use of road space. However, in practice no country in the world has yet achieved such a dramatic shift in the way that the entire network is managed. The Dutch Government has committed to the implementation of a national road pricing system using a per kilometre charge based on environmental and economic efficiency of a vehicle, as well as peak period surcharge. The system is planned for introduction in 2018, an earlier version having been delayed for political reasons.

A network-based road pricing scheme theoretically provides the greatest net benefit from the total road asset. It involves pricing all links of the road network to achieve that end.

2.2.1 Role of Road Pricing in Delivering Transport Policy Objectives

Road pricing can contribute substantially to the two key objectives of transport system management:

- **Revenue generation** - revenue could be generated for a range of purposes, however most frequently for the recovery of costs associated with construction and maintenance of an existing road asset, or for capacity augmentation; and,

- **Demand management** - road pricing can also be used to ration limited road space. Through the application of a price, demand for use of a road asset can be better managed. Drivers may be influenced to travel at particular times, on particular routes or to reduce unnecessary travel.

In many cases the price is designed to require road users to more closely meet the costs of their actual use of the road network, such as the costs of road maintenance, air pollution and in some cases congestion. Central to this concept is the recognition that road users do not currently meet many of their costs for use of the road network, imposing these costs on society. While there are many fees and charges that apply to road use, most notably Fuel Excise, vehicle registration fees, Stamp Duty and road tolls, these charges either are:

- **Variable** - providing only partial reimbursement for full cost of road development and maintenance; or,

- **Flat** - not reflecting actual road use. As a result, these charges over-charge some users and under-charge others.

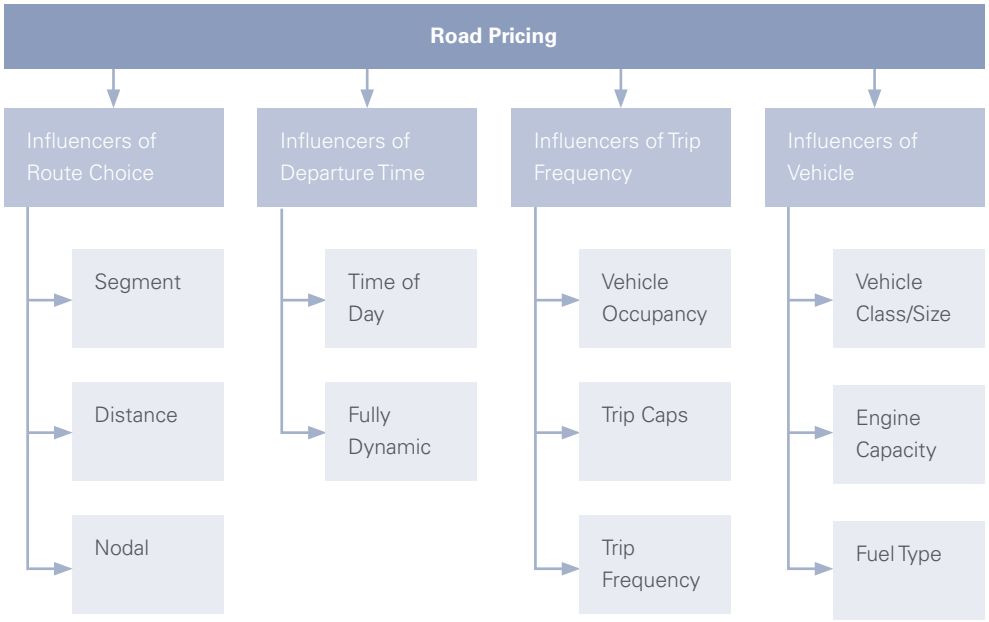
2.2.2 Using Road Pricing to Influence Behaviour

Road pricing can be used to influence travel behaviour in various ways based on the objectives and structure of a scheme. Road pricing may be used to influence the decision to travel or avoid the reason for the journey, and to influence the travel behaviour of an individual should they choose to travel. In order to influence behaviour, a road price may be structured to reflect specific factors that influence the cost of road use, such as time of day, distance travelled, frequency of journey or vehicle type.

In Australia, debate has historically centred on the use of a road price to capture the additional costs of congestion and environmental impacts created by road users and not directly recovered. By structuring a road price in this way, a scheme seeks to either to discourage a particular behaviour or recover the costs associated with a specific aspect of road use, for instance noise and greenhouse gas emissions.

▼ Figure 4

Behaviour Influencing Road Pricing Models



Influencers of Route Choice

- **Segment** – road networks, particularly motorways, can be divided into tolled segments. The value for a section may vary due to construction cost, length, capacity or numerous other factors.

- **Distance** – vehicles are charged a rate per kilometre travelled, which is calculated dependent on their entry and exit points on the network.

- **Nodal** – applies a charge based on the capacity of traffic to be passed through a node, portal or gateway, to another section of the road network. A nodal toll typically applies where traffic must travel the length of the segment, prior to being given the option to leave the motorway. This could be the distance between intersections, motorway off-ramps or changed traffic conditions (such as the introduction of additional lanes).

  Nodal tolling recognises the requirement to travel a full segment and delineates prices based on attributing values, such as capacity, speed limit and on-road conditions, of each section.

Influencers of Departure Time

- **Time of day** – demand for travel is relatively predictable, meaning that congestion occurs in predictable patterns across the day. Time of day tolling sees lower tolls charged at times of low demand to spread demand across the day.

- **Fully dynamic to traffic** – effectively auctions road space and sees the rate of toll change moment by moment to maintain free flow traffic. Theoretically, this allows demand to be managed to ensure optimal use of the roadway.

Influencers of Vehicle Type

- **Vehicle size or class** – tolls already vary according to vehicle class (for example, motorbike, passenger cars, heavy vehicles and buses) on many but not all of Sydney's motorways. Similar systems utilising vehicle weight or number of axles are used across Australia to determine indirect fees and charges and internationally to determine tolls.

- **Engine capacity** – similar to vehicle class and size however based on vehicle specifications, like engine capacity or fuel consumption.

- **Fuel type** – vehicles using particular fuel types, such as alternate or renewable fuels like biodiesel, or low emission fuels, such as LPG, receive discounted tolls. In doing so, regulators can encourage the adoption of renewable and low emission fuels and reduce the environmental costs of congestion.

Influencers of Trip Frequency

- **Vehicle occupancy** – High Occupancy Vehicle (HOV) or car-pool lanes are utilised in various jurisdictions with and without tolls attached to their use. Under this model, access or toll is dependent on the number of occupants within a vehicle. Typically single occupant vehicles pay the highest rate of toll, with lower charges for dual and treble occupancy.

- **Trip caps** – an equity measure which can limit the impact of multiple or distance based tolls. This approach encourages longer journeys, smoothing the impact of multiple charges on users from outlying areas. Caps can also be used, where appropriate, to discourage the use of a network for short 'local' journeys by providing a discount rate for longer journeys.

- **Trip frequency** – a discounted toll for particular users who access the network multiple times within a specific period. By discounting frequent use, road users, such as heavy vehicles, mass transit or taxis, can be encouraged to use the tolled network rather than diverting to free routes during periods of low demand.

2.2.3 Examples of Behaviour-based Road Pricing Schemes

Beyond the management of demand to limited road space, road pricing systems have in many cases been developed to influence the behaviour of road users around one or several of these factors.

Congestion Pricing

Congestion pricing is perhaps the most common behaviour-linked road pricing model. Under a congestion price, the charge for road use is set at such a level to ration road space by discouraging discretionary access by vehicles. Prices are set to balance the supply of infrastructure and the demand for use of that infrastructure, as distinct from the cost of the provision of infrastructure. In this way, a congestion charge seeks to limit the impacts of externalities from vehicle use.

A congestion charge could incorporate various behaviour influencers, such as a nodal charge to reflect the capacity of a particular segment or road, or time of day charging to discourage road use during times of peak demand.

Congestion pricing may take the form of charging to use specific roads, a broader network wide pricing or cordon pricing (i.e. a specific area or zone). The concept of congestion pricing was raised in the COAG *Review of Urban Congestion, Trends, Impacts and Solutions* as a means of containing the forecast growth in the cost of congestion in Australia's capital cities. As the impacts of congestion are most prevalent in major cities, it is likely that any use of a congestion charge in Australia would focus primarily, if not exclusively, on capital city urban road networks.

Heavy Vehicle Charges

Beyond the use of pricing to influence access to specific locations, road pricing can also be used to influence the use of specific vehicle types, such as heavy vehicles, or public transport, such as buses.

Heavy vehicles generate substantially greater wear and tear on road pavement surfaces than light vehicles. The American Association of State Highway and Transportation Officials place the relative damage at a factor of four times the number of axles on a vehicle. However, the damage associated with heavy vehicles varies markedly depending on the maximum load capacity of the vehicle as well as the weight actually carried[5].

The National Transport Commission first introduced heavy vehicles charges for the road freight industry in July 1995 for vehicles greater than 4.5 tonnes gross vehicle mass (GVM).

5 Bridle & Porter (2002)

Before their introduction, registration charges varied markedly by vehicle class across jurisdictions, and there was no real correlation between vehicle mass and registration charge in most jurisdictions. The pay-as-you-go (PAYGO) approach was used to recover expenditures on road construction and maintenance attributable to heavy vehicle use of the road network, and comprise registration fees and a net fuel charge. The registration charge is set at a uniform rate for each vehicle class to reflect the mass of the vehicle and its capacity to cause road damage. However, the current vehicle registration charge system is not capable of accounting for the true cause of road damage, vehicle load mass. A heavy vehicle will only result in substantial road damage when carrying a substantial load and therefore, on average, are overcharged for journeys when unloaded.

2.3 The Role of Governments

2.3.1 Road Related Revenue Collection

Road transport is an essential component of the Australian economy. Access to efficient road transport supports productivity within the national economy, including the cost effective provision of goods and services. Recent work by Ernst and Young examining the economic contribution of the Sydney Motorway Network placed the net present value of the economic contribution of the toll road network at $22.7 billion[6]. The Australian Bureau of Statistics found the road transport and associated storage industry contributed $17.988 billion to Gross Domestic Product (GDP) in 2007-08[7].

As the benefits of cost effective transport are shared throughout the economy, the established practice in Australia has been to support the provision of public road infrastructure funded through general revenue. Hypothetically, this approach would provide the greatest access to funds for the development of the road network. However, over time the provision of funds for investment in roads has diminished relative to the growing demand for new capacity and indeed the level of government revenue derived directly from road-related revenue and competing priorities in government service provision.

Road users are subjected to a range of government taxes and charges for access to and use of road networks, imposed by all levels of government to varying degrees. These taxes and charges are identified in Table 4.

6 Ernst and Young (2008)
7 BITRE (2009)b

▼ Table 4

Road-related Revenue Collection ($million, 2005-06)

Source: BITRE (2009d)

SOURCE	REVENUE ($ MILLION)
Australian Government	**15 551**
Fuel Excise	9 124
Federal interstate registration scheme	51
Goods and Services Tax (GST)	4 600[8]
Fringe Benefits Tax (FBT)	1 776
State/Territory Government	**6 126**
Registration charges for light and heavy vehicles	3 911
Stamp Duty	2 004
Licence fees	211
Private Sector	**1 131**
Tolls for use of private motorways	1 131
Total Revenue	**22 808**[9]

The various taxes and charges associated with the road sector are among the most important to government. Fuel Excise is the fourth largest individual source of revenue for the Australian Government, while tax and motor vehicles taxes provide approximately 10 per cent of state government revenue, although the exact amount varies across states and territories.

The array of taxes, charges and expenditures for the road transport sector raises the question of whether these revenue and expenditure streams could be handled more efficiently through a national approach. For the most part, taxes and charges imposed on the transport sector do not encourage efficient use of infrastructure. In particular:

- The rate of Fringe Benefit Tax falls with distance travelled, thereby encouraging more travel;
- Registration charges are fixed costs to the road user and hence higher vehicle use has the effect of reducing the average fixed costs associated with vehicle registration. This also applies to other fixed costs of vehicle ownership, such as Stamp Duty;
- There are also very few examples of registration charges reflecting vehicle fuel use efficiency to encourage shift toward more energy efficient vehicles; and,
- While Fuel Excise varies with vehicle usage, it is non-discretionary and ignores location or time of travel (although vehicle operating costs, including fuel consumption, increase with higher levels of congestion).

8 Forecast based on historical GST growth from 2001-02 to 2004-05.

9 In addition to the revenue shown in this table considerable additional revenue is collected by governments through mechanisms such as: the Commonwealth luxury car tax, import duties and sales taxes on new vehicles, state and territory permit fees for heavy vehicles, insurance levies on Compulsory Third Party Insurance (CTP), revenues from infringements and penalties and parking levies, and local government parking charges and penalties.

High reliance on Fuel Excise as the principal form of revenue derived from road use will face further pressure as a result of the changing nature of road transport. The increased use of alternative fuel vehicles, such as hybrids, may over time result in the diminution of the Fuel Excise revenue base. During 2001, the US State of Oregon commenced a programme of work examining the impacts on the State's Gas Tax revenue base. The review culminated in the Mileage Fee Concept and Road User Fee Pilot Program which recommended the phasing out of existing fees and charges, including the Gas Tax, and their replacement with a State-wide road pricing system. The review further concluded the introduction of congestion pricing in the pilot program produced a 22 per cent decline in driving during peak periods.

In its consideration of road pricing, the Dutch Government dismissed the concept of increasing fuel taxes on the basis that such increases would have no effect on the times and places people drive, and hence it would not have a significant effect on reducing congestion[10].

The vast array of Commonwealth taxes send conflicting signals to road users. The rate of the Fringe Benefit Tax reduces with distance travelled; Fuel Excise is a relatively efficient form of tax collection but its position is likely to be degraded overtime and is not related to location or time of infrastructure use. The range of taxes imposes an administrative burden on users and government which contributes to the overall cost of transport. The use of a single charge would help to promote Australia's international competitiveness by improving administrative efficiency and transparency of fees and charges for all road users.

2.3.2 The Provision of Capacity and Maintenance

Provision of transport infrastructure including roads, is a fundamental responsibility of all three tiers of government in Australia. It is estimated that Australia has some 815 074 kilometres of roadway, ranging from Grade A motorway to cleared paths. The cost of providing and maintaining these assets varies markedly according to the type, location, age and quality of each asset. Issues including isolation and competition for skills and materials can significantly increase the cost of even the most basic assets in many regional and remote communities.

▼ Table 5

Australia's Road Network by Type, 2007

Source: BITRE (2009)b

ROAD TYPE	LENGTH (KM)	PER CENT OF TOTAL
Bitumen or concrete	337 979	41.46
Gravel, crushed stone or other improved surface	293 691	36.03
Formed only	136 876	16.79
Cleared only	46 528	5.71
Total	**815 074**	**100.00**

10 Netherlands Ministry of Transport (2009)

Although the responsibility for the provision of road infrastructure is shared across governments, there are distinct differences in the role provided by each level of government. Local government is responsible for the maintenance of more than 80 per cent of the total Australian road network (652 000 kilometres), while the largest recipient of road-related revenue, the Commonwealth Government, is responsible for 22 500 kilometres of roadway through the Nation Building (formerly Auslink) Network.

▼ Table 6

State Jurisdictional Road-related Expenditure ($ million), 2008-09

Source: NTC (2009)a

EXPENDITURE CATEGORY	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	TOTAL
Servicing and operating	430	132	209	49	7	16	27	10	881
ROAD PAVEMENT AND SHOULDER CONSTRUCTION									
Routine maintenance	69	59	137	46	74	12	30	2	429
Periodic surface maintenance	150	100	143	6	37	4	8	3	451
Bridge maintenance/rehabilitation	100	33	57	5	13	11	2	1	221
Road rehabilitation	345	70	148	49	154	6	4	3	779
Low-cost safety/traffic	183	249	199	15	89	11	1	3	750
ASSET EXTENSION/IMPROVEMENTS									
Pavement improvements	370	214	965	116	132	49	26	58	1930
Bridge improvements	337	181	326	54	200	4	29	5	1136
Land acquisition, earthworks, other extensions/improvement expenditure	1234	596	1643	185	310	16	2	0	3986
OTHER MISCELLANEOUS ACTIVITIES									
Corporate services	83	14	162	31	109	7	3	5	414
Enforcement of heavy vehicle regulations	69	12	14	6	9	-	3	0	113
Vehicle registration	96	105	51	33	69	-	6	3	364
Driver licensing	79	53	31	11	36	-	3	1	214
Loan servicing	48	0	72	0	2	-	0	0	122
Totals	**3594**	**1817**	**4159**	**606**	**1242**	**135**	**142**	**95**	**11790**
OTHER ROAD-RELATED PAYMENTS									
Financial assistance to councils for work on council managed arterials	276	0	0	0	41	-	0	0	317
Payment to councils for contract work on state managed roads	157	11	177	0	2	-	9	0	355
Spending on local access roads in unincorporated areas	2	0	0	1	2	-	40	0	44
Direct spending on council managed local access roads	37	20	0	0	109	1	0	0	169
Any other direct state spending on local access roads	0	0	8	0	3	-	17	0	28

Reforms to the distribution of funding for the maintenance and rehabilitation of road infrastructure should be targeted to better reflect the role of each level of government in road infrastructure management. Critical to this process must be the development of agreed standards of asset availability and associated reform. The reform of revenue collection through a single charging mechanism may provide the opportunity to link the distribution of revenue to the achievement of key policy reforms.

The reform of revenue collection and distribution could also provide the opportunity to modernise, and potentially, rationalise, duplicated administration functions. For instance, considerable opportunity exists for the reform of state-based licensing and vehicle registration systems potentially through a single national system. Under the current system of state-specific fees and charges, the National Transport Commission estimates that administrative functions cost $578 million across all states and territories each year.

2.4 Is it Time for a New Approach?

In a theoretical sense, if we consider road space as a commodity in a market where there is a demand for travel, then just like other commodity markets, price can be used as a way of rationing demand. Currently, in Australia's road sector there is no direct pricing system used to ration demand for finite road space, apart from the limited application of variable, time-of-day, motorway tolls. In simple terms, as long as we are prepared to meet vehicle running costs, we can travel as much as we wish between any origin and destination without directly paying for our use of road space – a finite commodity.

The same argument applies in relation to when we use the network. If we choose to travel in an urban area during peak times, our travel decisions have a greater impact on other road users and society overall. However, as a road user we do not bear those indirect costs.

In most markets, consumers have a general appreciation of the price they expect to pay for the commodity or service in question. Consumers can make informed decisions, based on the value proposition presented relative to the price of the good or service. By and large, prior knowledge of prices does not apply to the use of transport resources. While transport system users who choose to travel during peak periods may incur indirect costs in the form of congestion and delays, the true cost associated with the journey may be hidden due to their fixed nature or indirect payment. Also, transport system charges do not generally vary in response to levels of demand.

As a general concept, road pricing can help solve some of the current shortcomings of our transport system, and help deal with some of the future challenges we face. Pricing can make road users think more carefully about when they use the network, which can result in demand being better matched to supply, using the network more efficiently and getting more out of existing transport assets.

A new approach to access pricing could see the development of a more equitable system that only charges road users according to what they use and ensures the proceeds are invested back into the transport system delivering a direct benefit to road users. Pricing reform also offers the opportunity to redress outdated and inappropriate taxes and charges which do not vary according to how people use the network, and provide a more stable link between road use and investment in the transport system.

Given the general benefits that can be provided by pricing instruments and recent advances in technology, why has the concept not been introduced more widely? A number of practical issues need to be considered:

- What key objectives should pricing instruments fulfil in the context of transport?
- Which locations and regions should they be introduced in?
- What types of vehicles and transport modes should they be applied to, and what current road user charges should they replace?
- How can price signals be applied to complementary transport options, such as public transport, to ensure the most effective use of infrastructure across networks?
- Can a system be designed that is efficient from an economic perspective, but also be capable of producing the desired changes in the travel behaviour of members of the general public?
- How can equity of access across different socio-economic groups and regions be ensured?

These are not easy questions to answer, especially given the complicated regulatory and political environment that characterises our transport systems. Before considering these questions in more detail, it is important to consider road pricing schemes which have already been introduced in other parts of the world, and the objectives they were designed to meet.

3 Infrastructure Market Reforms – Lessons for Transport in Australia

3.1 The Rise of Demand Side Responses in Transport Policy

Recent government forecasts estimate Australia's population will increase beyond 35 million by 2050 and forecasts produced for Infrastructure Partnerships Australia suggest the population will reach 37.8 million over the same period. This dramatic increase in Australia's population will drive considerable economic growth and in turn, demand for transport. Forecasts produced by IBISWorld estimate that demand for freight will triple over the same period to 1,540 billion tonne kilometres by 2056, while demand for passenger transport will double to 2030.

As growth pressures intensify, so too will the requirement for governments to provide supporting investments in transport infrastructure. However, the ability for governments to continue to provide capacity is inhibited by conflicting demands on limited public funds, with many other core areas of government business equally stretched by growth in demand for services including education, health, justice and utilities.

Retrofitting transport alignments in established urban areas also adds significant complexity and expense to developing new road and rail projects. The lack of preserved corridors for transport projects has resulted in a necessary shift to more expensive forms of transport infrastructure, such as tunnelling, in Australia's largest cities. While tunnelling is an important strategy to facilitate the development of new road corridors and support additional capacity, the costs associated with development of this infrastructure are considerably higher than a comparable surface road. The cost and complexity of tunnelling is a handbrake on badly needed projects, most notably the long-planned M4 East Motorway extension in Sydney and the east-west tunnel in Melbourne.

As a result, the capacity to efficiently deliver new road capacity to accommodate increased demand has become increasingly constrained. Compounding the impetus for governments to look to demand-side techniques to respond to congestion and associated economic, environmental and social costs.

Governments throughout the world are progressively accepting the requirement for demand-side management initiatives to deal with increasing congestion problems. Demand-side management schemes have a long history in Asia and Europe. Notably, the Singapore Area Licensing Scheme was implemented over 30 years ago and has been highly successful. Various jurisdictions across every continent are now considering the introduction or extension of similar schemes for city (London), state (Oregon) or national (Netherlands) road networks. Australia's first demand-management pricing strategy was introduced on Sydney's harbour crossings in January 2009.

▼ Table 7

Established International Large Area Road Pricing Schemes

	SINGAPORE	LONDON	TRONDHEIM	STOCKHOLM	GERMANY
TYPE OF SCHEME	Cordon Pricing	Area Pricing	Cordon Pricing	Cordon Pricing	Network Pricing (autobahn only)
DATE OF IMPLEMENTATION	• First road pricing scheme, known as the Area Licensing Scheme (ALS), was introduced in the Restricted Zone (RZ) in 1975 • Scheme was subsequently extended to major expressways with the Road Pricing Scheme (RPS) • In September 1998, the ERP system replaced the manual system for the RZ and expressways • In September 1999, ERP was extended to some key arterial roads beyond the RZ[1]	February 2003	• Cordon based scheme implemented in 1991 • Changed to network system (based on cordons or zones) in 1998[2] • Pricing system scrapped at end of 2005[5]	• Trial system with 19 toll plazas from 3 January to 31 July 2006 • After successful trials the system was continued from mid 2007 [8]	• January 2005
MOTIVATION FOR SCHEME	Regulate traffic in order to increase accessibility (through maintaining target speed).	Reduce traffic, finance transport investments	Finance new, transport-related infrastructure	• Reduce congestion, improve the environment and increase accessibility [9]	• Recover system costs to finance ongoing maintenance, repair and improvements • Promote environmental improvements • Reduce deadheading [12]
CHARGING AREA	CBD and expressways	21 km² area of CBD	Formerly city centre based scheme, now a zone-based system with differentiated prices depending on the time of day.[2]	29.5 km² area of CBD[8]	Entire German motorway network for vehicles greater than 12 tonnes
SYSTEM TECHNOLOGY	RFID based tolling technology - smart card inserted into in-vehicle unit; scanned by on-site gantries around charging area using short range radio	Video camera system Automatic Number Plate Recognition (ANPR) with character recognition software	Tolling technology known as AutoPASS. It is intended that the system will provide a platform for additional functionality in the future (e.g. electronic payment, access control, traffic monitoring, and exchange of information between vehicles and roadside). AutoPASS is now the Norwegian standard for EFC-systems.[2]	Electronic toll collection using microwave technology, supported by Automatic number Plate Recognition	System employs a manual declaration and payment method for infrequent users accessed through roadside toll stations or the internet. For more frequent users, GPS and GSM technology is employed in an automatic electronic system using on-board units.

▼ Table 7 Continued

Established International Large Area Road Pricing Schemes

	SINGAPORE	LONDON	TRONDHEIM	STOCKHOLM	GERMANY
INFRASTRUCTURE	At least 60 overhead gantries on roads heading into charging area	700 camera in 230 positions, mobile units, data centre, pay machines and internet kiosks	20 unmanned and two manned toll booths with cameras for detection of cars without an AutoPass account[5]	18 roadside control points located at Stockholm city entrances and exits[10]	300 gantries and 150 checkpoints for stationary monitoring, 280 vehicles for mobile enforcement [13]
REDUCTION IN CONGESTION	10-15 per cent	Vehicles by 20 per cent, congestion by 30 per cent (reductions greater than expected; resulted in reduced revenue)	Less than 5 per cent (congestion reduction not the aim of scheme)[3]	• 20-25 per cent (original target was 10-15 per cent)	• Number of loaded runs increased by 2 per cent • 15 per cent reduction in number of empty runs • 7 per cent increase in number of containers on rail [13]
ANNUAL OPERATING COSTS	USD$16 million[6]	USD$64 million[7]	N/A	USD$26 million[11]	USD$810 million[15]
ANNUAL REVENUE	USD$80 million[6]	USD$160 million[7]	USD$150 million[5]	USD$105 million[11]	USD$2,860 million[15]
OTHER	• Fees revised every three months • Fees variable according to congestion levels; displayed on billboards at each gate • Revenue goes into a national account; not distinguished from other state revenues	• Revenues were 30 million GBP less than expected due to a greater reduction in vehicle usage then envisaged	• Introduced 2nd generation cordon system in 1998 • Charges vary according to time of day (hourly) • Pricing scheme initially implemented to finance infrastructure; following a change in local government, the scheme scrapped from 2005 although there has been some push to reinstate for congestion purposes • Norway uses same card system among a number of cities which have different pricing regimes	• Following the 2006 trial, inner-city queue times were reduced by 30-35 per cent[9] • Inner-city emissions were reduced by 10-14 per cent [9]	• System has proved difficult to extend to other roads • Charges based on distance travelled and vehicle type • Regarded as the first satellite-based road charging system in the world [14] • On board units provided free of charge; installation paid by truck owner [16] • Approximately one-third of the heavy vehicles using the autobahn are registered in foreign countries

Source: (1) Singapore Land Transit Authority (2009)
(2) PRoGRESS Project (2004)
(3) Waersted (2005)
(4) Christainsen (2006)
(5) CfIT (2006)a
(6) CfIT (2006)b
(7) Litman (2006)
(8) KeyResearch (2009)
(9) Booz Allen Hamilton (2007)
(10) IBM (2007)
(11) ITP (2006)
(12) Michie (2008)
(13) Short (2007)
(14) Satellic (undated)
(15) Replogle (2006)
(16) Kossak (2006)

3.2 Lessons from International Road Charging Schemes

Road pricing schemes developed to date been highly successful in reducing congestion levels and raising revenue for transport system improvements.

3.2.1 Singapore

The Singapore Road Pricing Scheme (RPS) was introduced in 1975 as an Area Licensing Scheme (ALS) for which road users purchased a licence to enter the Central Business District. This was a manual system based on paper transactions and achieved an initial 44 per cent reduction in traffic levels in the Restricted Zone. By 1988 there was a 31 per cent reduction in traffic relative to pre-1975 levels despite a 77 per cent increase in the vehicle population. The ALS applied only during peak periods for access to the Restricted Zone. In 1995 the approach was broadened to include expressways under the Road Pricing Scheme.

In 1998, the scheme became fully electronic with charges based on maintaining traffic flow with two road classification rates: CBD at 20-30 kilometres per hour and expressways at 45-65 kilometres per hour. As traffic speeds increase, charges rates are reduced (and vice-versa) to optimise infrastructure usage.

The enhancement of the scheme through the roll-out of electronic technology was part of a package of measures to reduce congestion across the road network in Singapore. In order to achieve this objective, the Singaporean Government also introduced a park-and-ride shuttle service at the fringes of the CBD to encourage lower car use, as well as increasing expenditure on public transport infrastructure and services.

The decision to strengthen the scheme is a central plank in the government's platform of shifting the emphasis from taxing vehicle ownership to pricing road use. In support of this plan the government undertook a 12 month publicity campaign prior to introducing road pricing and ensured privacy concerns were addressed by wiping transaction records from its central database within 24 hours of the transaction being recorded for payment. Vehicle owners retain a copy of all transactions on a memory chip embedded in a stored-value smartcard[11]. Recent policy has changed the basis of charging from average traffic speed to the 85th percentile of traffic speed. Annual revenue has averaged around S$80 million while operating costs have averaged around S$16 million[12].

3.2.2 London

The London scheme shows that congestion pricing can be extremely effective in raising revenue for improvement of the transport system, and for managing transport demand and externalities. Since the scheme was first introduced in February 2003, the scheme has achieved a 21 per cent reduction in traffic entering the charging zone relative to traffic levels in 2002. In 2006, congestion reduction was broadly in line with the 30 per cent reduction realised in the first year of operation. The scheme has also had a positive impact on reducing emissions and improving road safety, with no overall negative impact on the economy of

11 Chin (2002)
12 Christiansen (2006)

central London. A benefit-cost analysis of the scheme suggests it has generated a benefit-cost ratio of 1.5 with the congestion charge set at five pounds in 2004-05 and a benefit-cost ratio of 1.7 in 2005-06 when the charge was increased to 8 pounds[13].

A separate assessment of the central London scheme concluded that the introduction of charges had increased average travel speeds by 37 per cent. The re-investment of revenues collected through the scheme into public transport contributed to an increase in bus patronage of 14 per cent and underground rail use by 1 per cent. The main issue with the scheme appears to be high costs of administration. For 2004-05, total revenues amounted to 190 million pounds while costs were 92 million pounds (or 48.4 per cent), leaving a net revenue of 97 million pounds for investment in public transport[14].

There is some concern that the dramatic impacts of the London scheme may, to some extent, dissipate with time. Increasing charges is one tool which can mitigate this impact, but there could be limits to how acceptable this is to the public. However, road charging schemes should be considered as part of an overall mix including land use planning to ensure shorter trips and better public transport.

3.2.3 Trondheim

One of the main benefits generated by the Trondheim scheme was a shift in morning peak traffic from the tolled to the non-tolled period. As a financial instrument, the cordon has also been a success. The scheme had low operating costs and made a significant contribution to funding of major road projects around Trondheim.

An important side effect of reduced traffic during peak periods has been the improvement in accessibility for public transport vehicles within the tolled area. However, Lundberg (2002) concluded that there was little overall reduction in the total volume of traffic in the region where road tolling was introduced, although this was not a stated objective of the scheme.

Norway's three largest cities, Oslo, Bergen and Trondheim, implemented cordon tolling systems during the 1990s. In the year following their introduction, two of the three cities had experienced a significant increase in public acceptance of the new tolling regime. High acceptance of the introduction of the schemes was attributed to the demonstration of clear improvements in the service offering associated with the tolls and the use of addition revenue in the improvement of the network. Oslo – which did not promote the benefits of the new system – continued to experience relatively high levels of community dissatisfaction.

Despite the apparent success of the Trondheim scheme in financing transport improvements – including 20 per cent earmarked for public transport, safety and environmental improvements – the local government voted not to extend the scheme beyond 2005 on the basis that road improvements should follow demand rather than the road administration principle of using road tolls to fund extensions of the road network. Following the removal of the scheme, there has been a community-based movement for the reinstatement of a refocussed cordon charge to better support the management of congestion within the city.

13 Transport for London (2007)
14 Litman (2006)

3.2.4 Stockholm

The Stockholm scheme is broadly similar to the London Congestion Charge. Like London, the scheme is focused on the CBD of Stockholm and covers a similar sized geographic area but uses a combination of electronic tolling and Automatic Number Plate Recognition (ANPR) technology, as opposed to number plate recognition only.

Results from the trial in 2006 were positive, with congestion reduced by 20-25 per cent against a target of 10-15 per cent. Reductions in queue times and emissions were also achieved[15]. Following a referendum of Stockholm residents in 2006, the scheme was introduced on a permanent basis in August 2007. Public reaction to the scheme appears to have been largely positive.

3.2.5 Central European Truck Charges – Germany, Austria and Switzerland

Road pricing was introduced on the German autobahn for heavy vehicles in 2005. Despite extensive delays in implementing this system, since commencement the world's first satellite-based road charging system has operated without any notable problems. With reliability above 99 per cent, the system is regarded to be technically superior to other forms of road pricing[16]. The main criticisms of this system to date have related to high administration costs (accounting for around 20 per cent of revenue) and difficulties in extending the system to other roads[17].

Austria and Switzerland have also implemented electronic tolling systems for heavy vehicles. In Austria, a system using microwave technology and tolling gantries was commissioned in 2004. The relative simplicity of this system allowed it to be in operation a year before the more complex German system.

Road pricing in Switzerland was introduced three years earlier, using GPS systems with smartcard technology. Both these systems were implemented with similar aims of raising funds for infrastructure and accounting for the cost of heavy vehicles on the road network. The effectiveness of the Austrian system has been around half of the estimated benefits[18]. On the other hand, the Swiss system has been regarded as a success to date in reducing heavy traffic growth and influencing modal shift to rail[19].

A key issue for all three of these countries has been the rise of transit freight traffic as a result of structural changes in the European economy and the rise of manufacturing in Eastern Europe. The introduction of heavy vehicle road pricing has allowed these European member states to deal with inequities between road use and revenue collection/distribution.

15 Booz Allen Hamilton (2007)
16 CfIT (2006)c
17 Michie (2008)
18 (CfIT 2006)d
19 (CfIT 2006)e

3.2.6 Summary of International Schemes

Road pricing schemes in other countries suggest a number of key lessons to Australia. First, schemes implemented to date have largely been restricted to individual cities or regions. There have been significant political and socioeconomic challenges for developing an all encompassing, network-wide road pricing scheme in other countries. A larger scale scheme would need to recognise the varying transport needs of, and alternatives available to, different cities and regions, and would need to contend with complications arising from different political jurisdictions and current vehicle charging regimes.

Secondly, existing schemes have generally focused on specific transport problems and/or raising revenue for transport system improvements, rather than addressing broader network management issues, such as seeding a more transparent and efficient allocation of revenue and expenditure, or delivering a more equitable charging scheme.

Thirdly, technology no longer appears to be a barrier to the introduction of road pricing. Tolling and location based technology have advanced significantly in recent years. With this technology comes the added potential to implement road pricing schemes across wider geographic areas, which can vary according to different periods of the day or levels of service on the road network. Because of the rapid changes in technology, the costs associated with the use of satellite-based technology are likely to continue to fall dramatically.

However it is important to note the costs of implementation and administration of such schemes can vary significantly by system. The London scheme for instance, is extremely expensive to operate.

The London and Singapore schemes highlight the key policy issues which have generated interest in road pricing. The demand for road space has exceeded the capacity available and the availability of funds, and in some cases, public support to continue to "build our way out of the problem". Past experience, based on this approach, has clearly demonstrated this is not a long term solution. Broader societal concerns associated with the liveability and social amenity of Australia's cities, and increasing concerns arising from climate change have combined to raise public awareness of price as a way to better manage transport demand. Paralleling these developments, rapid advances in technology have indicated that mass-distance-location charging is emerging as a practical policy solution to take forward the policy debate on road pricing.

The significant benefits generated by pricing schemes in other countries suggest that the concept warrants consideration in the Australian context. However, the key lessons from past Australian experience is the need for systems to be compatible across jurisdictions, while international experience tells us that most states are now leaning towards systems that incorporate GPS technology.

3.3 Lessons from Unsuccessful Road Charging Schemes

Although the majority of pricing regimes around the world are considered to have largely fulfilled the aims they set out to achieve, there have been a number of unsuccessful attempts to introduce road pricing systems. Two notable instances are Hong Kong and the Netherlands.

In Hong Kong, work began in the early 1980s on implementing an automated electronic charging system to control traffic[20]. However, after a trial in 1983 held two years before full implementation of the system, the scheme was abandoned due to public concerns over whether the system would reveal a person's identity. The use of new technology and as observed by Lundberg (2002) the pending unification of Hong Kong with China in 1997, fuelled concern over whether the system could be used for the supervision of citizens.

Privacy is a key consideration for the implementation of a national road pricing scheme. International experience from Hong Kong, Oregon, London and other schemes has shown motorists may hold strong views regarding the collection, communication, storage and disposal of travel information associated with:

- Travel time;
- Trip distance;
- Location of travel; and,
- Driver identity.

The unique political circumstances surrounding the introduction of this scheme, and the high uptake of electronic tolling technology in many countries including Australia, suggests privacy issues are surmountable. It may however be necessary for an Australian road pricing scheme to provide a 'de-identified' road pricing option to avoid community concern about privacy. This could be achieved through the use of odometer readings to provide distance-based charges or a combination of various other mechanisms such as the use of generalised 'zonal' locations or rigorous data management practices. In the instance that a distance only charge would apply to the de-identified product, it would be necessary to apply the highest rate (urban peak road-use charge) under the broad national scheme.

Plans existed in the Netherlands to introduce a distance-based road user charge in 2004, with the aim of transferring the cost of owning a car to the cost of actual use. It was intended that this kilometre-based charge would replace part of the Netherlands existing vehicle excise charge. It was also planned that charges would be differentiated according to time of day and place of travel. Two years before the scheme was due to be implemented, a change of political majority resulted in a major revision of government policy. It was decided that a road charging system would not be developed until an adequate road network and public transport system was in place, and the proposed system was discarded.

Despite these problems, the debate in the Netherlands has progressed and political parties have reached agreement on a scheme which will be introduced to the National Parliament in 2010. The system now being considered in the Netherlands has a number of parallels with the concept proposed in this paper. The comparison between the two schemes is discussed in section 6.6.2.

20 Lundberg (2002)

The experience of the Hong Kong and Netherlands highlights the importance of a seasoned public debate and degree of political consensus toward the introduction of a road pricing system. While both schemes were founded on strong policy principles and provided the opportunity to deliver substantial benefits to the community and economy, the implementation of both systems were delayed because of a lack of transparency and clear alignment between the outcomes of the scheme and the community's objectives from national transport policies.

3.4 Evolution of Technology

3.4.1 Systems Utilising Fixed Infrastructure

The road pricing scheme implemented in Singapore more than 30 years ago was based on a manual scheme with paper permits. Enforcement personnel were positioned at control points and observed whether vehicles displayed the correct permits. Given the labour intensive nature of this tolling system, a system based on short range radio transmitters was developed in the early 1990s. This system relied on a smartcard inserted into a transponder within the vehicle, which communicated with overhead gantries at control points and deducted the relevant charge from the smartcard. In cases where funds were insufficient or vehicles did not have cards installed, cameras on the overhead gantries recorded the registration of violating vehicles.

The majority of cordon-style pricing schemes around the world employ a system similar to the one developed for Singapore. One of the few exceptions to this is the congestion charging scheme in London, which uses Automatic Number Plate Recognition (ANPR) technology to record the licences of all cars passing through the cordon, and charges the associated fees against that vehicle's registration.

The technology used in each of these schemes is of very limited potential for use in a wider, whole-of-network pricing scheme. They require significant infrastructure with gantries for either radio transmitters or video cameras which need to be installed at many points around the transport network.

The closest example currently available of a whole of road pricing network using these methods in Australia, is the uniform national protocols for tolling systems. This system is currently operating in all eastern seaboard cities and is available for rollout available Australia-wide. The Australian system has significant advantages over other tag-based systems in that there are multiple suppliers of the tags to the same protocol.

Another relevant technology in Australia is 'Safe-T-Cam', which monitors heavy vehicle movements throughout New South Wales. The system is designed to check vehicle registration, speed and driving hours through video capture based on a gantry system. In principle, this type of system could have broader application to road pricing by monitoring distances travelled by vehicles with a potential to encompass mass and location charging. However, given the need to install gantries across the network, the cost of extending any such system across the entire road network is likely to be prohibitively expensive. There remains a significant difference between an enforcement system, which in theory needs capture rates as low as 60 per cent to be a successful deterrent, and a revenue collection system which needs capture rates of above 98 per cent to be an effective revenue source.

Tag-based systems have the potential to provide additional benefits beyond their immediate application to toll roads. For example, tags can also be used for parking, vehicle registration identification and enforcement activities.

3.4.2 Systems Utilising Location Systems

Given the considerations discussed above, the development of a wholly electronic, network-wide pricing regime means that an alternate system is likely to be required. Location-based systems, global positioning system (GPS) technology or Global Navigation Satellite Systems (GNSS) are relevant considerations in developing a state of the art national road pricing scheme.

GPS and GNSS technology holds some advantages over traditional electronic tolling regimes. It removes the need for physical infrastructure in the network, provides a high degree of flexibility and accuracy, allows for distance-time-location based tolling and also comes with the potential for providing value-added services to the road user. The increasing trend for vehicles to come with standard in-built GPS systems means the cost and ease of implementing this system in the longer term is very likely to be significantly less than that of a traditional gantry system.

GPS based applications for vehicle tracking transfer data from devices in vehicles to centralised computer systems via General Packet Radio Service (GPRS) through mobile phone networks. Recent trials in the United Kingdom have explored GPS mobile phone technology to monitor vehicle movements for potential application in the UK Department for Transport (UK DfT) National Travel Survey; the main issue at this stage is the high cost of data transmission. While this was initially a limiting factor for the vehicle tracking systems, it has become less of an issue in recent years as a result of continuing improvements in mobile phone coverage.

A number of cities have investigated the use of GPS tolling systems. Both Singapore and London have flagged the technology for prospective use in the coming decade. Pilot studies in a number of cities in the United States have also considered its potential use. GPS systems are already commonly used in both the taxi and trucking industries. For example, the German trucking industry has used GPS technology since 2005 in a distance based pricing regime for all trucks using the German road network and a similar system is also used in Switzerland. GPS also provides the basis for the Intelligent Access Programme (IAP) in Australia.

GPS-based solutions provide one option for a large-scale roll-out of location based road charging, but they are not the only option. The use of a trial-based approach to test different technologies prior to the roll-out of a national scheme would provide the opportunity to examine the potential for the use of other technologies, such as telematics.

A common concern of detractors from location-based pricing systems has been the capacity for such systems to provide governments with information relating to the whereabouts of citizens. Recent location based road pricing proposals, such as Oregon, have undertaken several steps to bolster privacy protection for road users. Under the Oregon proposal the provision of privacy protection was seen as a trade-off with the customer service-based audit function, for instance the capacity to challenge billing. The Oregon study identified three system components to support privacy that could be utilised as the basic privacy framework for other future schemes:

- No specific vehicle point location or trip data stored or transmitted;
- All on-vehicle device communication must be short range; and,
- The only centrally-stored data needed to assess mileage fees were vehicle identification, zone distance travel totals for each vehicle and the amount of fuel purchased.

3.5 Public Perception of Road Charging

Past experience shows a common trend in public perception of road charging initiatives. In the pre-implementation phase of road pricing schemes, the experience of other countries has shown a majority of road users and those affected by the charge, are firmly against it. However, in the case of overseas schemes this opposition has tended to dissipate fairly soon after implementation, as network-wide benefits become more apparent.

An example is the London congestion charge. Before the charge was implemented, the plan was widely criticised. The opposition candidate for the Mayor of London position promised to remove the charge if elected. However, within a month of implementation, residents in other areas of London began requesting the charge be employed in their areas. Subsequently, the mayor who implemented the system, Ken Livingston, was re-elected largely on the success of the scheme.

The current Mayor of London, Boris Johnson, has also opposed the extension of the London Charging Scheme, cancelling the planned extension in November 2008. Early in 2009, in the face of public sentiment supporting the scheme, Mayor Johnson softened his position against the use of congestion charges including support for the application of the scheme in the Mayor's Transport Strategy – Public Draft.

Global experience suggests that the general public will be more receptive to road pricing schemes, if the use of revenue from the scheme is transparent and allocated towards transport system improvements. In the case of London, some GBP£90 million per annum ($AUD160 million) has been invested in public transport, walking and cycling infrastructure, ensuring that transport users have sufficient alternatives to vehicular travel. The London scheme also highlights the importance of investment in transport capacity upgrades on both buses and metro-rail, preceding the implementation of the charging scheme providing the necessary alternatives to road users to facilitate mode-switching.

The experience of Norwegian city-based schemes in Oslo, Trondheim and Bergen reinforces the London experience, supporting a critical link between scheme acceptance and hypothesised investment in capacity augmentation. This has also been important to ensuring equity of access to transport users by providing a feasible alternative to private vehicle use.

4 The Policy Context – Is a Road Pricing Scheme Right for Australia?

The July 1991 Premiers Meeting (now the Council of Australian Governments (COAG)), set a new agenda for transport reform in Australia, with the two main planks being the establishment of the National Road Transport Commission (NRTC) and the National Rail Corporation. Both areas of reform were directed toward creating integrated national regulatory environments for road and rail transport.

The continuing commitment to a reform agenda for transport has been implemented through the Australian Transport Council (ATC), the COAG grouping of transport ministers, and this body would be the logical forum for the development of a national road pricing scheme.

In assessing the appropriateness of a national road pricing scheme it is important to assess how such a system would relate to the current transport reform objectives identified by the ATC and the current reform programme being undertaken by the various levels of Australian governments.

4.1 Vision for Australia's Transport Future

Since the formation of the National Transport Commission (NTC), and its predecessor the NRTC, there has been continuous, though modest progress towards the development of a national transport policy. The development of a unified national strategy is a significant and essential reform to ensure the efficiency and effectiveness of the national transport system.

Underlying these reforms should be a firm commitment to delivering the agreed transport vision and policy objectives established by the ATC. The established Australian transport vision states:

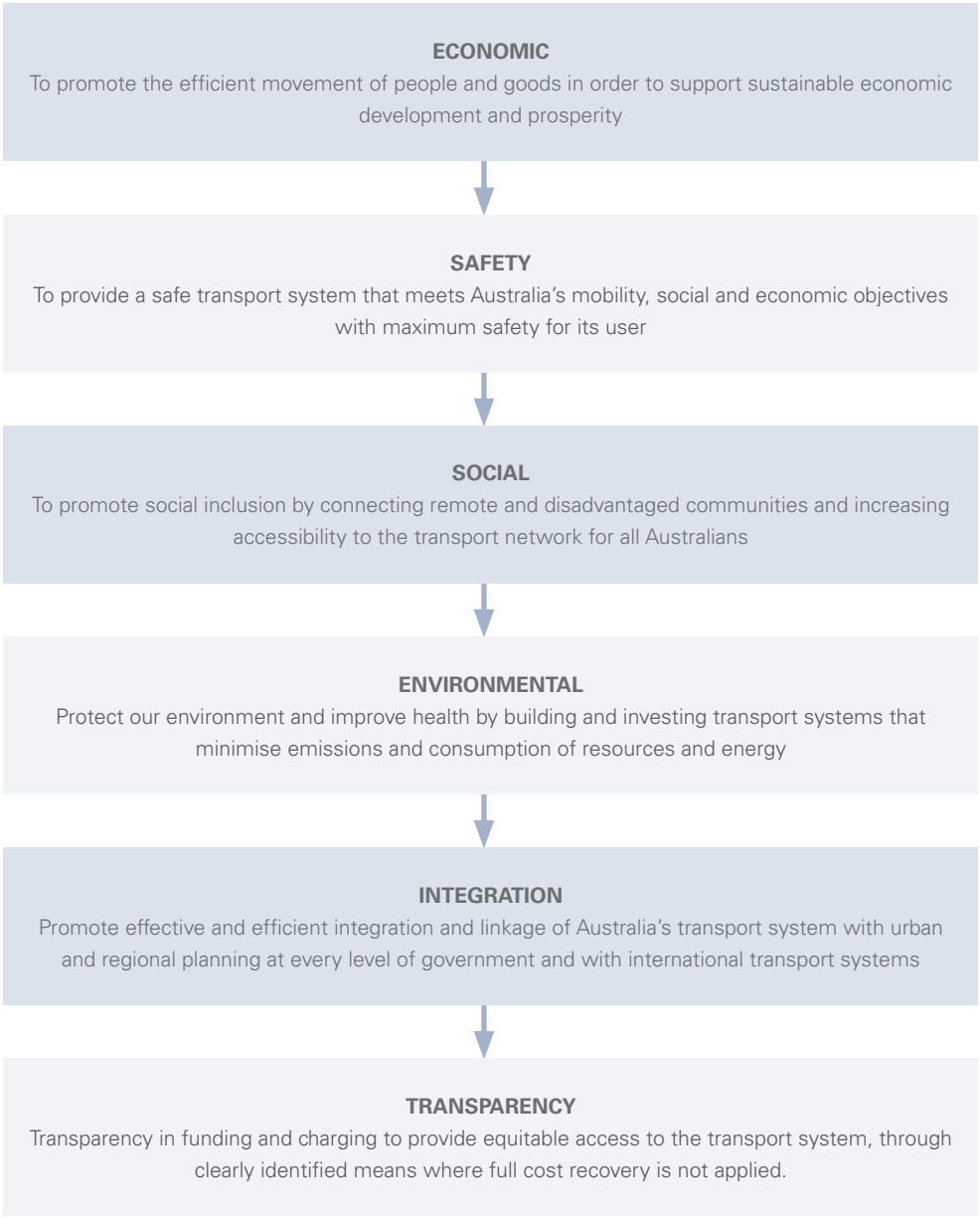
> *Australia requires a safe, secure, efficient, reliable and integrated national transport system that supports and enhances our nation's economic development and social and environmental wellbeing.*

4.1.1 Transport Policy Objectives

In order to determine the appropriateness of a national road pricing scheme for Australia, it is important to assess the capacity of a national road pricing scheme to deliver on established ATC objectives:

▼ **Figure 5**

Australian Transport Policy Objectives
Source: NTC (2009)b



4.1.2 Transport Policy Principles

In order to achieve the established transport policy objectives, the ATC has also identified guiding principles to underpin the delivery of the objectives of the policy framework. The role of road pricing in delivering these objectives must be assessed in order to determine the appropriateness of a scheme in the Australian context:

▼ **Figure 6**

Australian Transport Policy Principles and Their Relation to Road Pricing

Source: NTC (2009)b

4.2 Transport Policy Reform Agenda

In parallel to the transport reform agenda, the Australian Government has embarked on major policy reforms that will affect transport, including:

- National transport reform - Heavy Vehicle Charges and Intelligent Access Programme (IAP);
- Commitment to an emissions trading scheme - the Carbon Pollution Reduction Scheme; and,
- The Review of the Future Taxation System - the Henry Review.

These three policy streams are actively advancing Australia towards a consistent set of national transport regulations and more efficient use of transport.

4.2.1 Heavy Vehicles

Heavy Vehicle Charges

A national heavy vehicle charging regime came into effect on 1 July 1995. An important outcome of the introduction of a nation heavy vehicle charge was the recognition of Fuel Excise as the industry's contribution to road construction and maintenance expenditure. The reform set a nationally uniform set of registration charges for heavy vehicles by vehicle class as the access charge to the network.

Subsequent heavy vehicles charges determinations have built upon the early work of the NRTC. At their meeting in May 2007, in response to the Productivity Commission's report on road and rail pricing, the ATC agreed that the NTC should develop a new heavy vehicle charging regime for implementation in 2009. ATC directed that the new charges determination should ensure the allocation of road infrastructure costs to heavy vehicles should be met in aggregate and that cross-subsidisation across heavy vehicle classes should be removed[21]. In 2008, in line with the COAG reform agenda, ATC agreed to consider the development of a heavy vehicle charging regime based on mass, distance and location[22].

Intelligent Access Programme (IAP)

The Intelligent Access Programme (IAP) was based on developments in technologies surrounding intelligent transport systems including telematics and vehicle tracking systems. The underlying principle for this technology was the ability to send and receive information from Global Navigational Satellite Systems (GNSS), or the Global Position System (GPS) to record a vehicle's location. One of the early applications of this technology in Australia was to improve transport security through the monitoring of trucks carrying high-value commodities. Many operators now use this technology to monitor performance of their vehicle fleets.

21 ATC (2007)
22 ATC (2008)

The development of IAP was progressed through Austroads which conducted a feasibility study on the broader application of IAP[23]. The study concluded that IAP could be both economically and technically feasible and could generate the following benefits:

- Improved road safety;
- Reduction in infrastructure wear;
- Reduction in negative impacts on the environment;
- Better management of public perceptions and expectations of heavy vehicle movements; and,
- Optimisation of road freight policy and on-road enforcement activities.

The system has helped establish the technical feasibility of monitoring vehicle use of the road network by location. The technology also provides a potential connection between use of infrastructure and charging for that use through the application of incremental pricing for higher mass vehicles.

CASE STUDY 1

INTELLIGENT ACCESS PROGRAMME –
LESSONS LEARNED FOR THE DEVELOPMENT OF A ROAD PRICING SYSTEM

In order to minimise the costs and lead times associated with the implementation of a national road pricing scheme, it may be possible to leverage the regulatory framework or technological capability of existing road charging or location schemes.

The Australian Intelligent Access Programme (IAP) is a national programme which uses vehicle telematics (GPS) to monitor truck operator compliance with access conditions set by road authorities in different jurisdictions. Membership of the programme is a precondition for access to Higher Mass Limit (HML) schemes in some Australian states, and the use of non-prescriptive vehicle designs approved under the Performance Based Standards programme in all states. The scheme is administered by a statutory body Transport Certification Australia.

Whilst the system has been designed for ensuring heavy vehicle compliance, it could provide useful lessons for the development of a road pricing system. Many of the challenges that were tackled in the establishment of IAP are likely to be relevant in the context of a charging scheme, for instance developing:

- Common standards for the technology, data communication channels, etc;
- Data storage protocol and privacy considerations; and,
- System governance arrangements, protocols for dealing with state based road authorities.

Australia was the first country to use location-based technology to ensure route compliance and facilitate the uptake of higher productivity vehicles. The lessons learned from this experience, and indeed the system itself, are likely to be very useful in helping authorities transition to a national road pricing system.

23 Austroads (2003)

4.2.2 Road and Rail Pricing Reforms

COAG Transport Reform Agenda

At its meeting in February 2006, COAG agreed to a series of major reforms of the transport sector including:

- Development of proposals for efficient pricing of road and rail freight infrastructure. Undertaken by the Productivity Commission;
- Development and implementation of Performance-based Standards (PBS) for heavy vehicles that enhance freight productivity while reducing road damage;
- Improvement of transport planning and road/rail infrastructure project appraisal processes by adopting the ATC-endorsed National Guidelines for Transport System Management in Australia; and,
- Development of strategies to reduce current and projected urban transport congestion.

The ATC recognised that there would be an advantage in completely replacing the current charging regime for heavy vehicles with a mass-distance-location system. This could result in a number of benefits including better alignment of charges and impacts for users, thereby improving equity and improving administrative efficiency through the introduction of a national heavy vehicle registration scheme.

On 13 April 2007, COAG agreed to a three-phase reform programme (the Road Reform Plan) in response to the Productivity Commission's 2007 Inquiry on Road and Rail Freight Infrastructure Pricing. The Plan included a number of research components looking at incremental charging and mass-distance-location charging.

As part of the charging reform agenda, the ATC is currently considering the feasibility of a mass-distance-location charging scheme to more accurately reflect use of the road network by heavy vehicles.

Productivity Commission Review of Road and Rail Pricing

In response to the COAG[24] decision of February 2006, the Productivity Commission completed a review of road and rail infrastructure pricing. The main conclusions of the review were:

- Heavy trucks had been more than paying their way in aggregate under the heavy vehicle charging system administered by the NTC.
- Competitive distortions between road and rail have been limited and were not a significant source of market inefficiency.

24 COAG 2006

- Efficiency losses are associated with current road charging arrangements through averaging of costs and charges, and a disconnect between road revenue and spending decisions. It was concluded that these provide poor price signals to the transport market, and distort the incentives needed for efficient road use and provision.

- Developments in road pricing technology create the opportunity for use of pricing instruments which offer the potential for substantial efficiency gains.

The implications of the Productivity Commission review for future road pricing policy were:

- Focus of the charging debate to achieve improved equity and efficiency within the road transport industry;

- Recognition of the direct link between use of the road network and charging for that use; and,

- Recognition of the role that intelligent transport systems will play in delivering a more efficient pricing regime across the road network and across road users by better balancing the demand for and supply of road infrastructure.

COAG Urban Congestion Review

Based on overseas experience, the COAG review of urban congestion concluded price-based measures had the potential to moderate demand for road infrastructure when used with other measures such as improved public transport systems. In response to this finding COAG agreed that it would:

- Develop principles and analyse options for variable tolling regimes as a potential congestion management measure (e.g. varying tolls by level of road usage, time of day and/or class of vehicle);

- Consider the costs, benefits and any other feasibility issues for developing congestion pricing mechanisms applicable to a specific corridor or network and suitable for Australian conditions; and,

- Investigate the impact of relevant financial and taxation measures on urban congestion (e.g. FBT, Stamp Duty, payroll tax and Fuel Excise).

At their meeting in May 2008, the ATC agreed to undertake a comprehensive study to improve its understanding of pricing schemes which could be used to manage congestion.

4.2.3 The Impacts of Other Reforms on Transport Policy

The Review of Australia's Future Taxation System

On 13 May 2008, the Australian Government announced a review of Australia's taxation system – the Henry Review. The review panel handed its report to the government at the end 2009. The main aspects to be covered by the review included:

- Improvements to the tax and transfer payment system;
- Enhancing the taxation of savings, assets and investments, incorporating company taxation;
- Enhancing the taxation arrangements on consumption (including excise taxes), property (including housing), and other forms of taxation collected primarily by states;
- Simplifying the tax system, including consideration of appropriate administrative arrangements across Australian jurisdictions; and,
- Interrelationships between these systems as well as the proposed Carbon Pollution Reduction Scheme.

In their background paper for the review, Clarke and Prentice concluded fuel taxes were an imperfect tool for reducing transport externalities including local pollution[25]. However, they argued that from an administrative point of view, Fuel Excise represents an efficient way of raising revenue and could be increased by around 10 cents a litre with other taxes being used as an off-set.

At the same time, Clarke and Prentice argued some taxes applying to the transport sector appeared inappropriate and based on weak grounds for their application. For example, the Luxury Car Tax, which contributed around $464 million to revenue in 2006-07, is difficult to justify in terms of market failure and there is little apparent need for government intervention in this area. From a road safety perspective for instance, the Luxury Car Tax may be seen as counter-productive to the early introduction of more advanced technologies into the vehicle fleet. Clarke & Prentice concluded that:

- Consideration should be given to demand-oriented user charges;
- Current road user charges are geared toward cost recovery and do not help manage travel demand;
- To be successful, road pricing requires an effective public transport system to provide road users with an alternative to private car use in urban areas;
- Electronic road pricing could represent a cost effective approach;
- For cities with high traffic density, cordon pricing may provide an effective intermediate step to full implementation of a road pricing scheme; and,
- Fuel Excise could be a proxy for pricing vehicle emissions, i.e. more fuel efficient vehicles will pay less excise.

An Emissions Trading Scheme - the Carbon Pollution Reduction Scheme

The Australian Government outlined the basic principles of a proposed Carbon Pollution Reduction Scheme (CPRS) in its White Paper of December 2008 and subsequently the proposed CPRS legislation. The main objectives for the CPRS are:

25 Clark and Prentice 2009

- Long-term reductions in Australia's greenhouse gas emissions to 60 per cent below 2000 levels by 2050; and,

- Medium-term emission reductions of between 5 and 15 per cent below 2000 levels by 2020[26].

The proposed CPRS was defeated in the Senate in December 2009. Despite the defeat of the legislation, the government has reaffirmed its commitment to the implementation of an emission trading scheme, in line with the Carbon Pollution Reduction Scheme model.

The government's intention is to commence the CPRS on 1 July 2011. The scheme will have broad sectoral coverage and will include emissions from stationary energy, transport, fugitive, industrial processes, waste and forestry sectors. The scheme will be among the world's first to incorporate transport emissions.

It is expected that the rise in fuel price resulting from CPRS should encourage the development of new vehicle and fuel technologies and encourage road users to reduce their use of fuel. This could be achieved by changes in driver behaviour, using alternative modes of transport, changing travel patterns, car-pooling and improved vehicle efficiency.

The Australian Government has stated it will cut fuel taxes on a cent-for-cent basis to offset the initial impact that the scheme has on fuel price. While this will reduce the impact of the CPRS on users of road transport, the policy will compound pricing disparities between various transport modes and potentially inhibit moves towards a national road pricing scheme.

The impacts of climate change are real and substantial for Australia's infrastructure sector. The industry is committed towards the delivery of long-term emission reductions as part of a national scheme. In order to support the delivery of these reductions, the infrastructure sector supports the commitment to a framework for emission reductions, based on an appropriate price on carbon, which assists to provide certainty to infrastructure planners and developers.

4.3 Reforms in Other Infrastructure Sectors

Pricing instruments have been introduced in other sectors of the economy, including electricity, gas, water and telecommunications, to balance demand for resources with available supply.

The reform of monopoly infrastructure in Australia with a view to promote competition and efficiency commenced in a meaningful way during the 1990s, following the National Competition Policy (Hilmer) Review. The review promoted the use of pricing and other market structures to promote the most efficient use of monopoly assets, moving away from the established reliance on wholly publicly owned service providers. The reforms of this period, especially those relating to regulated network infrastructure, provide insights to the value harmonised and transparent pricing structures can provide for the transport sector.

26 Australian Government 2008

Reforms introduced under the National Competition Policy have led to a 2.5 per cent, or $20 billion, increase in Australia's GDP since 1990. These reforms have boosted Australia's productive growth and played a key role in contributing to exceptional economic expansion, both in historical terms and relative to other countries. The reforms in the electricity, water and telecommunications sector illustrate that the creation of a well-functioning market is often the result of direct government restructuring. Regulation then plays a crucial role in the operation of the market once this structure has been defined. It is critical that regulation facilitates efficient market structures, not act as a substitute.

While the National Competition Policy agenda led to some reforms within the freight sector, the Productivity Commission noted that:

> *Unlike the energy and water sectors, there has not been a comprehensive and integrated national reform agenda for Australia's transport sector. Rather, reforms have traditionally been developed and implemented in a piecemeal fashion across transport modes and jurisdictions*[27].

The need for a unifying reform agenda is greatest within the transport sector, particularly freight. Unlike passenger transport, freight corridors exist to a large extent across state boundaries. For instance, the north-south east coast freight corridors provides for 5 million tonnes per annum in movements between Melbourne and Brisbane, 7 million between Sydney and Brisbane and over 11 million between Sydney and Melbourne.

Current market structures within the freight sector do not always promote or encourage the most efficient use of infrastructure assets. Disparities between fees and charges across jurisdictions impact the competitiveness of modes over the same route in differing ways. Some of the problems with the existing market structures for freight infrastructure assets include:

- Inadequate levels of innovation in pricing reflective of long history of government ownership;
- Underinvestment in capacity and quality infrastructure due to an absence of competition and limited financial capacity;
- A lack of private sector participation in infrastructure planning and delivery; and,
- An excessive regulatory burden and inefficient market structure, as a result of multiple layers of regulation attempting to force efficiency rather than provide incentives.

27 Productivity Commission (2005)

CASE STUDY 2

WATER RESOURCES MANAGEMENT – LESSONS FOR ROAD PRICING

Background

The early development of irrigation schemes in Australia was justified on several grounds including the need to intensify agricultural activities using scarce arable land and rainfall, development objectives including the promotion of rural communities and social grounds like soldier resettlement schemes.

These broader social and political objectives meant there was no formal economic assessment of the benefits of large irrigation schemes and their impact on national economic growth. As a result, poor pricing polices which under-priced water contributed to over-exploitation of water resources resulting in land degradation, rising salinity levels and the degradation of river systems, for example through increased phosphate levels in the Murrumbidgee and Murray River systems.

In 1963, agricultural economist Keith Campbell argued that:

> *"with the adoption of … more sophisticated methods of investment analysis, it is to be hoped that we shall see the abandonment of the pseudo-economic procedures which have been used in the past to evaluate the financial feasibility of irrigation development … Particularly objectionable from the standpoint of financial accounting are analyses which proceed on the implicit assumption that the government …should pay the full costs of certain irrigation facilities, which are therefore left out of the calculations."*
>
> *Subsequent economic assessment of irrigation schemes in Australia concluded that "significant economic losses exist and can be attributed to over-expansion of the basin-wide irrigation system and misallocation of the available water supply due to inconsistent pricing policies"*[28].

Water Reforms

A series of major reforms have been introduced in the water sector over the past decade or so, and best practice water pricing was a key element of the National Water Initiative in 2009. Under this scheme, governments have committed to achieving consistency in:

- Pricing policies for water storage and delivery across sectors and jurisdictions; and,
- Approaches to pricing and attributing the costs of water planning and management.

Lessons for the Transport Sector

A parallel reform in transport infrastructure investment has been the development and adoption of more sophisticated methods of investment analysis such as those included in Infrastructure Australia's guidelines and the ATC's national guidelines. These methods have replaced traditional engineering-based procedures which have been used in the past founded largely on engineering concepts of time savings, crash costs and changes in vehicle operating costs to assess the financial feasibility of road projects.

However, from the standpoint of economic efficiency, recognition has only recently been given to the costs of externalities imposed on society through the private use of infrastructure and the costs of pollution attributable to road use. In parallel with the inappropriate pricing of water, in the case of roads, there has been no recognition of the higher value which different road users groups would be prepared to pay for less congested roads. The comments made about water provision in 1963 by Keith Campbell appear to be relevant to transport today.

28 Randall 1981

4.4 The Role of Pricing in Future Australian Transport Policy

There has been a significant shift in the development of transport policy over the past decade. Among other issues, the Australian Government has become increasingly involved in urban transport issues. This can be seen through the evolution of national highways.

Under the National Roads Act of 1974, the National Highway System originally terminated at the fringes of Australia's capital cities. With the introduction of the Australian Land Transport Development (ALTD) Act in 1988, the "national route" was extended to include access through capital cities to provide a national link. Later this saw the inclusion of tollways under the NHS with the Gateway Bridge in Brisbane and later the M7 in Sydney. The ALTD Act was then replaced with the Auslink Act in 2005, which reinforced the Commonwealth's role in funding both road and rail infrastructure, including access to major ports and terminals. Through Infrastructure Australia and the Building Australia Fund, Commonwealth funding for transport infrastructure was further extended to include funding and potential long-term ownership through equity investment in public transport and other assets in 2009.

In policy terms, increasing emphasis is now being placed on the use of price as a regulatory mechanism. This has been demonstrated by the development of heavy vehicle charges and their evolution toward a mass-distance-location charging regime. There is also increasing recognition of the need to include demand management within the general mix of policy options available to government for improving the use of infrastructure.

The current review of taxation suggests that while measures now used to price the demand for transport through the taxation system may represent a relatively efficient mechanism to raise revenue, they may not be an effective mechanism to balance the demand for and supply of transport infrastructure nor promote an efficient transport sector.

Hence, the review appears to be placing more emphasis on direct rather than indirect pricing options. The messages emerging from the review appear to complement the proposed CPRS, which places strong emphasis on price signals to contain the forecast growth in emissions. It would be preferable for a national road pricing scheme not to focus too heavily on carbon emission reduction. This view is reinforced by the experience of California, where discounts provided to low emission vehicles under a road price aided the rapid adoption of low emission vehicles, but did not assist in the reduction of other significant costs associated with congestion.

Together, these policy developments suggest that road pricing could play an important role in achieving multiple policy objectives for the transport sector.

5 Delivering National Transport Policy Objectives through Road Pricing

Previous sections of this paper have considered examples of road pricing schemes in other countries and the relevance of pricing to the state and federal policy environment. Bearing this background in mind, this section seeks to answer the following questions:

- What are the main benefits offered by different approaches to pricing road transport in Australia?

- What are some of the potential downsides of these schemes?

This section considers, in qualitative terms, a number of options for a new road user charging framework and the extent to which they could help progress Australian Transport Council (ATC) transport policy objectives. Six specific pricing options are considered in relation to their capacity to achieve the ATC objectives:

- **Registration charges** – mechanisms to regulate general access to road networks, varying by vehicle class.

- **Fuel Excise** – tax imposed on fuel use on a per litre basis which contributes to general government revenue.

- **Cordon pricing** – a localised, fixed charge for travelling into a specific urban area, for the purpose of reducing demand for access to that location. Cordon pricing is usually levied on all types of vehicles, and is essentially a flat charge or tax on using the infrastructure located within a specific region.

- **Congestion pricing** – a fee which is varied according to traffic volumes or time of day, and applied to a specific area or road, or across a group of roads in an urban area. Congestion pricing can be used to manage transport demand across an urban network and is usually applied to most vehicle types.

- **Heavy vehicle charging** – a distance or mass-distance based charge imposed on freight vehicles only, for use of urban and rural road networks. The main purpose of a heavy vehicle charging scheme is to better align heavy vehicle use of the road network with the cost of providing and maintaining the network. Advances in intelligent transport systems and global navigation satellite systems are allowing the extension of mass-distance charging to include location.

- **National road pricing** – a network-wide road pricing system (encompassing both urban and rural roads), involving a combination of fixed and variable distance based access charges. A national road user charging scheme represents an extension of cordon pricing to encompass whole networks. It would represent a direct user pays approach to the use of infrastructure to cover capital and maintenance costs, as well as the cost of externalities (i.e. noise and emissions).

5.1 Registration Charges

Registration charges imposed by state and territory governments are, in practice, access charges to use of the road network. In 2006-07, total registration related vehicle taxes and charges collected by these governments amounted to $5.915 billion[29] with an estimated breakdown comprising:

- Vehicle registration fees: $3.911 billion; and,
- Stamp Duty on vehicle registration: $2.004 billion.

In the same year, funding of road related expenditure by state and territory governments was $6.11 billion[30]. In aggregate, revenues raised by state and territory governments from road users almost balance expenditures on roads.

While registration charges are administratively efficient in collecting revenue for road use, the main issue with registration fees relates to the fixed amount charged by vehicle class. While registration charges do vary within vehicle classes in some states (see Table 8), there is only limited recognition of distance travelled. One example, annual registration charges for vintage vehicles are reduced significantly to reflect the low kilometres travelled. However, for the general category of light vehicles, lack of recognition of distance travelled for registration charges means that low kilometre travellers cross-subsidise high kilometre travellers. Hence, it can be argued that registration charges have no real impact in curbing travel behaviour.

▼ Table 8

Registration Charges by State and Passenger Light Vehicle Type (2008-09)

Source: RACQ Fact Sheet (2009)

CAR TYPE	QLD	NSW	VIC	WA	SA	TAS	NT	ACT	Average
Small	$263.00	$245.20	$178.00	$201.35	$125.00	$181.85	$162.40	$245.20	$200.25
Medium	$380.35	$275.40	$178.00	$265.35	$223.00	$204.85	$231.40	$275.40	$254.22
Large	$514.80	$392.20	$178.00	$313.35	$310.00	$246.85	$298.40	$393.20	$330.85
Method	Cylinders	Weight	Flat fee	Weight	Cylinders	Cylinders	Engine Cap	Weight	-

Notes:
- Small car is defined as a 4 cylinder 2 litre car weighing approximately 1,100kg.
- (Medium) family car is defined as a 6 cylinder 3.5 litre car weighing approximately 1,500kg.
- Large car is defined as a 8 cylinder 5 litre car weighing 1,800kg.

29 ABS (2008)b
30 BITRE (2009)c

5.2 Fuel Excise

Fuel Excise has a long history in Australia, being introduced soon after Federation to fund the development of Australia's road network. The direct relationship between excise and road funding continued until 1959 when hypothecation of revenues from fuel taxation was abolished. At that point, Fuel Excise became a general source of taxation revenue.

In 1982, a surcharge of 1c a litre on Fuel Excise was introduced to fund the Bicentennial Roads Program. This arrangement remained in place until the Fuel Tax Inquiry of 2001, where the informal link between excise and road funding was abolished[31]. The current rate of Fuel Excise is 38.143c a litre and in 2007-08 petrol and diesel excise contributed $13.63 billion to revenue and an estimated $13.27 billion in 2008-09[32].

There are two main issues with using Fuel Excise to price road use. First, it is relatively rudimentary because it does not vary according to either location or time use. Second, under current arrangements, there is no link between road use contributing to revenue through Fuel Excise and road expenditure.

5.3 Cordon Pricing

Cordon pricing is principally a congestion pricing scheme applied to a defined area. Once the infrastructure is in place, the main benefit is that it is relatively easy and efficient to collect revenue.

The impact of cordon pricing on policy objectives varies with the type of cordon pricing scheme implemented. It may lead to more efficient use of infrastructure, provided users have the option to change their travel behaviour, in which case it could have a positive impact on environmental objectives. Various cordon pricing schemes have been implemented to promote the use of more fuel efficient vehicles, including in London and Bologna, Italy.

A cordon price is a transparent form of revenue-raising in that users know they are being charged for their decisions to use road infrastructure by location and potentially time of day (e.g. Trondheim). At the same time, the application of revenue may or may not be linked. In the case of Trondheim, the use of funds to improve transport infrastructure has been transparent, with positive results.

5.4 Congestion Pricing

Congestion pricing refers to a number of pricing structures which reduce congestion by influencing driver behaviour. The time of day pricing on Sydney's harbour crossings is an example of congestion pricing, as is the variable charge imposed by Singapore's Area Licensing Scheme.

31 Australian Treasury (2001)
32 Australian Treasury (2009)

In terms of the ATC's objective of reducing congestion, both the Singaporean and London schemes have achieved a positive impact in terms of promoting more efficient movement of people and goods. Congestion pricing could also generate environmental benefits through factors including improved travel times, reduced vehicle kilometres travelled and promoting mode shift to more environmentally sustainable forms of transport.

CASE STUDY 3

VARIABLE TOLLING ON SYDNEY HARBOUR CROSSING

The introduction of variable tolling on the Sydney Harbour crossings (Bridge and Tunnel) appears to have met the objectives set by the New South Wales Government's Roads and Traffic Authority (RTA), that is, to ease congestion and to change motorists' behaviour to travel outside peak time. Based on preliminary data in the table below the RTA concluded:

> *"…motorists have adapted well to the changes and traffic volumes reflect a marked increase in people travelling before the peak period, with numbers falling again during the peak period between 6.30am and 9.30am on all crossings, including the Ryde and Gladesville bridges, when compared to the same time last year."*

▼ Table 9

Impact of Variable Tolling on Sydney Harbour and Ryde-Gladesville Crossings

		CROSSINGS (TUESDAY)				
	CHARGES AND TRAFFIC VOLUMES	05:30-06:30	06:30-07:30	07:30-08:30	08:30-09:30	09:30-10:30
	TOLL ($)	2.50	4.00	4.00	4.00	3.00
Sydney Harbour Crossings	29/01/2008	4050	10237	11667	10361	7415
	27/01/2009	4287	9097	10646	9468	8043
	Percentage change	+6%	-11%	-9%	-9%	+8%
Ryde & Gladesville Bridges	29/01/2008	2754	6289	6942	5759	4864
	27/01/2009	2808	5928	6290	5707	5282
	Percentage change	+2%	-6%	-9%	-1%	+9%

For all time periods on the day-to-day comparison, total traffic for Sydney's harbour crossings was five per cent lower in 2009 compared with 2008, and for the Ryde/Gladesville crossings, total traffic fell by 2.2 per cent lower. Part of this change in traffic volume could be attributed to the economic downturn. However, part of the greater decline in traffic levels for the Sydney Harbour Crossings would appear to support the RTA's position that the introduction of variable tolling contributed to some change in people's travel behaviour. The New South Wales Government has committed to using the revenues collected from the variable tolling system of the Sydney harbour crossings on improving public transport.

The longer term issue for managing demand for the Sydney harbour crossings is whether the short term response of road users will be sustained, or whether demand will return to trend. The question for road network operators is the extent to which prices need to be increased in order to change travel behaviour.

Long term and widespread use of toll roads in Australian east coast cities and high uptake of tolling tags by motorists means much of the infrastructure is already in place and variable charges could be imposed to better manage demand for that infrastructure. However, this would require re-negotiation of existing commercial agreements with private operators and consideration of broader network management for traffic diverting away from toll roads.

In thinking broadly about public infrastructure assets, urban roads are unique in that they operate at maximum capacity only for a few hours on five out of seven days. Congestion pricing seeks to rectify this problem by 'spreading' the demand for the road over a longer period through pricing mechanisms, achieving a better utilisation of the asset.

Congestion pricing is highly effective in dealing with highly specific transport problems in urban areas, but can be considered weaker on broader objectives, such as social inclusion (unless revenue is spent on transport for communities outside urban areas), integration (it can influence travel decision making, but only in relation to specific routes and areas) and transparency (charges only apply to a section of the network, and are not specifically related to cost recovery).

Given Australian urban sprawl and significance of cross-urban trips, it could be argued that location-specific congestion pricing would have only limited effect in meeting the ATC's broader objectives of improving transport efficiency and reducing the negative impact of transport on the environment.

For instance, the Melbourne East-West Link Needs Assessment concluded:

> *"…over the coming decades, strong growth is expected to continue in Melbourne's outer suburbs … These patterns of growth will create increasing demand for cross-town commuting and freight movements, placing greater strain on Melbourne's cross-city links."*

Congestion pricing has the capacity to assist in the delivery of COAG's transport objectives, including:

- Improvement of the economic efficiency of the urban network;
- Reduction in road trauma through promoting mode switching to public transport;
- Improved environmental outcomes through the reduction of less air pollution, lower noise emissions, and less toxic run-off to dams and water courses;
- Improved transparency in directly charging for road use; and,
- Improved social amenity and liveability of communities and urban areas.

However, the application of road pricing must occur in such a way to balance the benefits against the challenges to its effective implementation, for instance:

- Multiple city-based congestion schemes may add to driver confusion;
- Ensuring consistent, reliable and usable information to road users, allowing informed travel decisions ; and,
- Regressive taxation impacts – lower socioeconomic groups may be impacted by reduced access to transport due to new road-related charges.

5.5 Heavy Vehicle Charging Scheme

If developed, the principal objective of a distance or mass-distance-location based heavy vehicle charge would be more efficient recovery of the disproportionate costs and externalities associated with that class of vehicle.

A variable heavy vehicle charging system is likely to satisfy other important transport policy objectives such as transparency, safety and enhanced environmental outcomes. This would be achieved by developing a clear set of pricing arrangements which reflect the relative impact different vehicle classes have on infrastructure use.

A variable heavy vehicle charging system is also likely to have a positive impact on road safety. Safety benefits could be achieved by leveraging off an IAP-style specified route compliance system. This type of system could also generate environmental benefits by facilitating a greater uptake of higher productivity freight vehicles. Heavy vehicle charging could also promote social inclusion and integration benefits by providing new revenue streams for local councils, as well as the use of higher productivity vehicles in remote areas, in turn reducing transport costs.

While variable heavy vehicle charging offers a wide range of potential benefits, there are practical issues which have previously presented barriers to the implementation of the scheme, for instance how the costs of development and implementation will be met and the availability of cost effective technology options.

While the implementation of tracking technology is small relative to vehicle capital costs, a full rollout for all 533 000 heavy vehicles registered in Australia and the potential costs associated with the development of fixed infrastructure for a national scheme could be substantial.

There are also a number of technical challenges associated with measuring vehicle mass, which requires more specialised on-board vehicle technology compared to vehicle tracking applications like IAP. Further, given the average age of Australia's vehicle fleet (10.3 years in 2004), retro-fitting is likely to be expensive and a barrier to widespread acceptance and adoption.

In a study on the acceptance of road pricing for heavy vehicles in Europe, Stewart-Ladewig & Link (2005) concluded that industry support for a new charging system would be improved if:

- There was a transparent way of defining the charge;
- A distance-related charge applied to all vehicle classes, including private vehicles;
- There was some form of compensation for increased commercial transport costs;
- The system included interoperability between technical charging systems; and,
- Revenues raised through road charges were allocated back to the road network.

The study also emphasised the importance of implementing a nationally based scheme rather than a jurisdictionally based scheme.

5.6 National Road User Charging

By varying road user charges for all vehicles according to mass-distance-location and time variables, a national road pricing scheme could be used to better manage demand for infrastructure. Revenues generated from road pricing could be used to fund a range of transport-related requirements in terms of both infrastructure and non-infrastructure measures to improve transport efficiency, including public transport.

A national scheme could comprise a two tiered approach – improved cost recovery for the provision and maintenance of roads infrastructure and a component applying to travel within urban areas to incorporate the cost of externalities like noise and emissions in the travel decisions of road users. From this perspective, such a scheme has the potential to satisfy all key objectives and could achieve broader transport objectives such as social integration through improved access to public transport.

The main difficulties of this approach relate to implementation. While there is potential to leverage tolling technology in urban areas, the key challenge arises in extending the scheme to achieve national coverage, which would require location based technology. This raises similar issues to those discussed above for heavy vehicle charging. A national system would also be politically complex given current taxation arrangements. These and other issues relevant to implementation of a national road pricing scheme are discussed in the next section of the paper.

5.7 Considerations for Structuring a National Road Pricing Scheme

The likely impact of the different approaches to road pricing on the governments' objectives for transport are summarised in Table 10. This table provides a comparative assessment of the type of impact of those measures. For example, a flat registration charge across all light vehicles types, without consideration of engine efficiency is seen as having a negative impact on environmental objectives.

From a comparison of the various approaches, a national road pricing scheme would appear to make the greatest contribution to meeting policy objectives relative to other options. However, the extent to which a national scheme would assist in achieving those objectives may depend on the:

- **Basis for determining the road user charge** – for instance, distance, the use of influencers of route choice, influencers of departure time, influencers of vehicle type and influencers of trip frequency.

- **Balance between fixed and variable charges** – with more weight being given to the variable component, it could be argued that users would become more conscious of their travel decisions rather than undertaking journeys because of the high annual sunk costs of operating a vehicle (i.e. if the car sits there, owners think that it should be used to "recover" the sunk costs of registration and insurance).

- **Determination, pricing and inclusion of externalities** – bearing in mind the Australian Government's decision to introduce an emissions trading scheme.

- **Relationship between road pricing and existing taxes, fees and charges** – including existing fees and charges at all levels of government the private sector, e.g., Stamp Duty, Luxury Car Tax, Fringe Benefit Tax, sales tax, Fuel Excise and road tolls.

- **Relationship between revenues from road pricing and investment in transport infrastructure and services** – including:

    - Location of road use as the revenue source and location of expenditure – mismatches between the two may be unacceptable to the general public;

    - The extent of redistribution of revenues to support objectives of improved accessibility and social inclusion of remote communities;

    - Investments to reduce the need to travel through removing demand drivers;

    - Use of revenues for expenditure on broader transport requirements, such as public transport, rail freight, etc;

    - Road pricing as a general infrastructure funding mechanism including funding non-transport infrastructure requirements such as for health and education; and,

    - The extent to which road pricing contributes to infrastructure funding rather than being used as a source of general revenue.

- **Private and public costs of implementing a national road pricing scheme** – the scheme must provide an efficient form of revenue collection, minimising dead weight costs incurred by government and road users.

- **Equity impacts of road pricing** – across road user groups and mechanisms this can address.

- **Administrative efficiency of the scheme** – the capacity of the system to minimise revenue leakage and thereby enhance effectiveness.

- **Interaction between a national road pricing and the government's broader reform agenda** – including taxation, use of technology and acceptance by both public and private sectors.

▼ Table 10

Impact of Measures on Australian Transport Policy Objectives

ATC OBJECTIVES	REGISTRATION CHARGES	FUEL EXCISE	CORDON PRICING	CONGESTION PRICING	HEAVY VEHICLE CHARGING	NATIONAL ROAD USER CHARGING
Economic	-	+/-	+	+	+	++
Safety	0	0	+	+	+	+
Social inclusion						
Remote communities	0	-	0	0	+	+
Accessibility	0	0	-	-	0	0
Environmental						
Emissions	-	+	+	+	+	+
Energy use	+/-	+	+	+	+	+
Integration						
Within transport	0	0	0	0	+	+
Transport and land use	0	0	+	+	0	+
Transparency						
Charging	+	-	+	+/-	+	+
Funding	+/-	-	+/-	+/-	+	+

Key:
+ positive impact
o no significant impact
- negative impact
-/+ positive or negative impact depending on scheme implementation and management/use of funds

6 The Structure of an Australian National Road Pricing Scheme

In finalising the structure of a new road pricing regime to promote the achievement of the Australian Transport Council's (ATC) transport policy objectives, government must consider five fundamental questions:

- **Coverage** – should a scheme be developed on a national basis with uniform charges, or on a state-by-state, city basis using a common framework?
- **Revenue outcomes** – what effect should a scheme have on current road user charges and government revenue?
- **Changes to established revenue streams** – how should current road user charges be changed?
- **Investment of revenue from a road pricing scheme** – how should surplus revenue be spent?
- **The potential structure of an Australian road pricing scheme** – what type of framework should be adopted for a road pricing system?

6.1 Coverage of the Scheme

Australia has had a long history of fragmented and inconsistent transport regulation, which creates a challenge for the development of a national road pricing scheme. Despite recognising the need for a national set of transport regulations as far back as 1991, it is instructive that Council of Australian Governments and ATC are still working towards this objective. The disjointed nature of current road user charges for light vehicles remains a key issue and again demonstrates the need for a single set of charges that gives consistent signals to road users.

The development of a national transport market that promotes competition through consistent revenue collection, licensing and weight management regulations should be the central focus of the move to a national road pricing regime. That is, in order to achieve a national approach to road pricing, a consistent set of charges should be developed and applied across all states and territories. Different schemes with different price settings would be a backward step and counter to the objective of achieving a more efficient transport system.

There is potential to realise further efficiency gains through the development of a nationally based approach to the administration of vehicle registrations and licensing, in contrast to the current situation of different state-based schemes characterised by duplication and lack of mutual recognition in the ownership and use of vehicles.

Fortunately reforms are currently underway which are moving Australia deliberately, albeit slowly, towards a single national transport market place. National road freight reforms are well progressed – registration charges have been harmonised and we are moving towards a national network of routes for higher productivity vehicles and a move to a single licensing authority for heavy vehicles. A challenging issue in the reform agenda is the agreement by the ATC to proceed with the introduction of a mass-distance-location charging regime for heavy vehicles, which could pave the way for a national road pricing scheme for all vehicles.

In order to support network management objectives and reduce evasive 'rat run' journeys by motorists, a road pricing system for urban areas would ideally cover the entire network. Further, the application of a national road price could be complimented through the use of quality-of-service pricing for key corridors, such as privately operated corridors[33].

6.2 Revenue Outcomes

It is important that the scheme's revenue considerations do not overshadow the schemes ability to facilitate a more efficient transport network, however revenue impacts are self evidently an important consideration in the schemes structure.

In considering the revenue approach under a road pricing scheme, government must first determine whether to structure the scheme to achieve an overall revenue increase, reduction or a revenue neutral structure. A critical factor in this decision is the desire to use the scheme to fund Australia's significant and growing shortfall of transport projects.

Forecasts prepared for Infrastructure Partnerships Australia indicate over the next forty years investment in transport infrastructure will need to increase four-fold. Policymakers must consider whether Australia's capital investment is sufficient to meet short, medium and long-term transport requirements. It is apparent that current investment levels are below what is required to ensure efficient delivery of services, providing the case to increase infrastructure funding. The identification of new revenue streams to find this increase is a key policy challenge.

International experience has shown a strong link between community acceptance of road pricing schemes and the hypothecation of revenue to network augmentation. The success of an Australian scheme would therefore be integrally linked to the ability of the scheme to fund transport infrastructure investments.

On this basis, road pricing should be set at a level that increases the revenue base to allow this expanded capacity. For transport, such funds should not be restricted to reinvestment in the roads sector, but must also include other forms of transport that contribute to a more efficient and sustainable transport system overall, particularly public transport. In the urban context, this is important in providing road users with a viable option for modal shift and improving equity of access across different socioeconomic groups.

33 Infrastructure Partnerships Australia has further explored the use of quality of service pricing in the paper Urban Transport Challenge: Driving Reform in Sydney's Roads available from www.infrastructure.org.au.

The revenue implications for governments should be considered against broader changes in the tax system and changes to the responsibilities of government, for instance:

- Hypothecation of revenues for investment in transport infrastructure;
- Variations in the revenue collection functions and capabilities of government, including the transfer of funds between the Australian Government and the state and territory governments; and,
- Changes in the expenditure requirements of governments.

In 2006-07, road-related revenue totalled more than $22.8 billion across all jurisdictions and including private sector tolls. This revenue level is substantially greater than the $12.14 billion that was spent on road-related infrastructure in that same year. Therefore under a revenue neutral structure and assuming full hypothecation of scheme revenue to transport infrastructure, a further $10 billion would be made available for infrastructure investment under a national road price.

Assuming full revenue hypothecation to transport infrastructure, a national road price structured to deliver revenue at a level consistent with historical road-related expenditure could be delivered under a revenue negative scheme. However, under this structure road pricing would not substantially assist in meeting the financing gap.

While a revenue neutral scheme design may ultimately result in increased public acceptance of a new road user charge, given that it will not influence the overall tax burden of government, the linking of road-related revenue reform to that of the broader review of taxation, being undertaken by the Review of the Future Taxation System, could reduce the significance of this consideration.

Alternatively, a revenue positive road pricing scheme would offer the capability to finance additional transport infrastructure development beyond that available under the prevailing revenue model.

In order to secure acceptance by the community and governments, the introduction of a national road user charge and its replacement of the current road taxes and charges, should as a minimum result in the collection of revenue sufficient to cover all existing road maintenance and development expenditure. However, in order for a national road pricing scheme to contribute to the development of additional road and transport infrastructure, it would be preferable that a scheme be structured so as to derive revenue equal to that of all road-related revenue currently collected by all Australian governments, excluding the Goods and Services Tax, Fringe Benefits Tax and privately collected motorway tolls.

It is inevitable that the introduction of a national road pricing system will result in changes in road-related expenditures for governments. For instance, the removal of the need for administration related to existing fees and charges, such as registrations, will remove the requirement for governments to provide these services. Conversely, the new system will develop new administrative costs associated with its development and implementation.

6.3 Changes to Established Revenue Streams

A fundamental aim of a new road pricing scheme should be the formation of better links between road use and the recovery of associated costs. The introduction of a national road price must be accompanied by fundamental reform of the existing fees and charges associated with the road sector.

A key weakness of the current set of charges relating to road use is their disconnection from direct road use. The various taxes, fees and charges that currently apply to road use often have contradictory impacts on road use and inhibit competition, for instance:

- **Fuel Excise** – provides a relatively efficient form of revenue raising as increasing demand for transport generates increased revenue streams, however, a key problem is that Fuel Excise is not related to location or time of day use. There is no relationship between Fuel Excise paid by users and infrastructure spending. An emerging issue for the Australian Government is the potential impact of more fuel efficient vehicles and alternative fuels (including hybrid, electric and fuel cells) on revenue from Fuel Excise.

- **Registration charges** – provide access to the road network. Although we now have a national approach to heavy vehicle charges, registration charges for light vehicles (<4.5 tonnes Gross Vehicle Mass) vary across jurisdictions. A flat fee based approach to registration does not provide the user with any incentive to reduce travel or move to more fuel efficient vehicles – the highest component of the registration charge in New South Wales is the motor vehicle tax which can account for around 85 per cent of the cost of registration.

- **Stamp Duty** – applies to vehicle ownership transfers and varies across jurisdictions which could hamper cross-jurisdictional transfers.

- **Fringe Benefit Tax** – payable on vehicle use, which can have the effect of encouraging vehicle use to lower the Fringe Benefit Tax rate associated with high vehicle use.

CASE STUDY 4

A SAMPLE OF VEHICLE CHARGES AND OPERATING COSTS

For a typical urban journey in Sydney, total taxes and charges (excluding GST) represent between 17-21 per cent of total trip costs, depending on the vehicle type as shown in the Table below. The estimates exclude the capital cost of vehicle, opportunity cost and depreciation and are based on an annual average distance travelled of 15,000 kilometres[34]. With fuel at $1.20 per litre, total taxes payable to the Australian Government amount to 49.05/litre (40.8 per cent) comprising 38.143c per litre in excise and 10.91c per litre in GST.

A similar result holds for Melbourne where taxes and charges range between 12 and 15 per cent of total trip costs.

▼ Table 11

Current Taxes and Charges Applying to a Typical Intra-urban Journey in Sydney and Melbourne

COSTS	SCENARIO 1: CAMPBELLTOWN TO SYDNEY (57.7 KM)		SCENARIO 2: BURWOOD TO MELBOURNE (14.1 KM)	
	HOLDEN COMMODORE	TOYOTA COROLLA	HOLDEN COMMODORE	TOYOTA COROLLA
Stamp Duty	$1.51	$0.90	$0.31	$0.18
Total fuel costs	$9.36	$6.53	$2.29	$1.60
Proportion: Fuel	$7.03	$4.91	$1.72	$1.20
Proportion: Excise	$2.33	$1.63	$0.57	$0.40
Tyres	$0.84	$0.69	$0.21	$0.17
Servicing	$1.08	$0.69	$0.26	$0.17
Rego	$1.52	$1.07	$0.58	$0.58
Insurance-CTP or equivalent	$1.60	$1.60	-	-
Premium	$1.17	$1.17	$0.37	$0.37
MCIS levy	$0.43	$0.43	$0.04	$0.04
Insurance-comprehensive	$2.86	$2.59	$0.84	$0.74
Tolls	$8.80	$8.80	$5.56	$5.56
Total trip cost	$27.59	$22.89	$10.46	$9.41
Taxes and charges (ex GST and tolls)	$5.36	$3.60	$1.50	$1.20
Percentage taxes and charges (excl GST)	20.90%	17.60%	14.30%	12.80%
Cost of Existing Taxes and Charges	**9 c/km**	**6 c/km**	**11 c/km**	**9 c/km**

34 NRMA (2008)

6.4 The Investment of Revenue in Transport Infrastructure

A national road pricing scheme naturally suggests a common clearing house and a centralised administration for apportioning revenues based on network usage. The question that then arises as to what criteria should form the basis of infrastructure expenditure.

A central objective of a national road pricing scheme should be creating a closer linkage of transport infrastructure investment to the collection of revenue from the road transport sector. A transparent, multimodal, long-term investment plan for the nation is therefore critical.

Without a comprehensive transport infrastructure plan, motorists and the community could easily view a national road pricing scheme as just another taxation instrument. Hypothecation of revenue is therefore essential and was a critical factor in making the London, Singapore, Stockholm and Norwegian road pricing schemes palatable to the general public. The London experience also demonstrates the importance of investing in transport system improvements before a pricing scheme is rolled out, as well as after. A price premium for urban areas will trigger major changes in behaviour and facilitate a mode shift to mass transit. It is therefore logical, and indeed necessary, that the public transport and rail freight systems have the capacity to absorb these changes in travel behaviour, or risk frustrating both the objectives of the scheme and indeed governments own transport policy objectives.

Centralising the administration of both road pricing and infrastructure investment on the basis of the source of road use raises two issues:

- Efficiency of expenditure on marginal projects as opposed to projects with a higher benefit cost ratio (i.e. the "over-funding" risk, whereby the scheme could generate funds for projects which would not normally be considered worthwhile).

- Equity of access for people in regional and remote areas – the Community Service Obligation issue (i.e. the risk of "under-funding" where revenue might not support minimum road maintenance activities).

On the other hand, infrastructure funding could be centralised through an infrastructure fund (such as the Building Australia Fund), which could determine the redistribution of revenues through an objective determination of investment priorities. In this case, a board comprising the Australian, state, territory and local governments should determine the allocation based on the economic evidence, environmental factors, demographic changes and community needs.

6.5 Other Considerations

6.5.1 Road User Equity Considerations

The development of a well designed national road pricing scheme based on distance travelled would improve equity outcomes across society by:

- Increasing the accountability of road users for the impacts arising from their road use;
- Removing the upfront fees and charges that act as barriers to vehicle ownership – thereby reducing the impacts of social isolation; and,
- Reducing the current disproportionate fees and charges that apply to some heavy vehicles.

A national road pricing scheme coupled with broad reform of taxes and charges imposed on the road transport sector offers the opportunity to redress the current inequity borne by road users through highly regressive fees and charges. By shifting to a distance-based taxation system, there is a potential to contribute to the broader economic welfare of the community.

In essence, the introduction of a national road pricing scheme will introduce a fairer system that will see people who drive less pay less than under the status quo. The ability to derive new revenues to fund public transport and new road projects will also improve access for people who do not currently enjoy suitable public transport options. A national road pricing scheme offers a step change that could drive a fairer, more sustainable approach to transport infrastructure funding over the long-term.

6.5.2 Relationship to Other Transport Modes

The principle aim of a road pricing scheme must be to ensure the most efficient use of the entire transport network, including road, rail, maritime and air transport. It is therefore critical to consider not only the impacts of such a scheme on the road network, but also on complementary transport modes.

The introduction of a national road pricing scheme will play a critical role supporting mode switching in both freight and passenger transport. It is therefore critical that the application of fees and charges to these transport modes, such as public transport ticketing prices or rail access charges, give due regard to their impact on the achievement of these broader transport aims, that underscore the structure or a national road price.

In the freight sector, the structure of road pricing scheme must recognise the impact of the scheme on the relative competitiveness of road freight with other transport modes, notably rail and sea freight. Pricing reforms to promote competitiveness between transport modes, through the incorporation of externalities, have been promoted by the freight sector for many years. The introduction of a road pricing scheme provides the opportunity to progress these objectives through examining the most appropriate basis for fees and charges across all freight modes.

The relationship between road pricing and public transport is also a fundamental consideration, particularly during peak periods. For road pricing to drive the desired modal switch, public transport must have sufficient capacity to accommodate patronage growth

and consideration must also be given to complementary fare-setting methods, perhaps through peak period or multiple journey discounts.

The reform of public transport pricing and ticketing has long been identified as a priority for governments across Australia. Despite the existence of considerable public support and political will for the reform of ticketing, there has been limited success in some jurisdictions. Continued reform of public transport ticketing to promote fare simplification and rationalisation is critical and should be considered in a process which complements the move toward a national road pricing scheme.

The implementation of a road pricing scheme, based on a more accurate reflection of the true costs of road use, would also offer the potential for a fairer system of public transport pricing, which balances the desire for the full utilisation of available capacity with true costs of providing public transport.

6.5.3 Technology

Recent technological advances suggest there are no insurmountable technical constraints on introducing a national road pricing scheme for Australia in the short to medium term. Developments in heavy vehicle charging suggest that road freight could provide the springboard for a comprehensive location-based approach to road pricing.

Clearly, the selection of a technology for road pricing must follow the determination of the policy principles of the scheme. That is, the use of a particular technology must be judged on its capacity to deliver the aims of the scheme – rather than the opposite, whereby the principles of a scheme are compromised to facilitate the use of particular technology.

The selection of the most appropriate technology will need to balance a range of practical considerations as well as the capacity of the scheme to deliver on the ATC's transport policy objectives, including:

- Cost for industry/motorists;
- Costs for government;
- Effectiveness; and,
- Relative simplicity of use.

The procurement of the most appropriate technology platform must be focussed on outcomes and provide the opportunity for service providers to develop innovative, leading edge solutions which satisfactorily deliver the scheme's objectives at the best value for money and reliability.

While there may be a capacity for a national road pricing scheme to leverage existing urban and other tolling standards and technology, the costs associated with the development of fixed tolling systems would likely act as a barrier to this technology providing the basis for the national scheme.

6.5.4 Road User Information and Communication

Effective communication with road users during scheme development and post-implementation phases will, in large part, determine the success of these reforms. Government will need to work closely with industry, road-user groups and the community to drive a deep understanding of the requirement for change and the principles that will underpin the scheme's structure and design.

The success of comparable reforms around the globe has relied on a strong relationship between reform and investment of the proceeds in new infrastructure. Therefore, the development of a transparent and accountable system to direct this investment must form a primary component of the scheme's design and debate. Demand management, like infrastructure investment, must be part of a cohesive package of measures to support demand growth in order to ensure their success.

It will be essential for these issues to be considered within the public debate on a road pricing system for Australia. An initial step in this direction could be facilitated by the provision of seed funding for projects to trial road pricing on some key routes. While this may be useful in gauging public reaction, it may not provide an accurate measure for two reasons:

- A feasible public transport option would need to be in place so that road users have an alternative to private car use; and,

- Road users may take short term measures to "avoid" the road price on the basis that it is "just a trial".

During the implementation and eventual normalisation of a national road pricing system, communication of scheme structure and design must be central to the ongoing management of the scheme. The provision of information regarding charge rates, such as those for differing regions or times-of-day, will be critical to altering driver behaviour and achieving the aims of the scheme.

Unlike road use, consumers of most commodities or services know the price of a good or service before the point of transaction. Road users will want to have some understanding of how much they would actually pay to make a journey at any given time before embarking on the journey.

From an economic view, the ideal urban road pricing system would vary according to traffic volumes, that is be fully variable (dynamic) to traffic levels, rather than based on a pre-determined scale. However, the more dynamic a system is, the more complicated and opaque it becomes from a user point of view and could be difficult to implement on a national scale.

6.6 The Potential Structure of an Australian Road Pricing Scheme

6.6.1 Structure of a National Road Price

The Australian Government in negotiation with the states, territories and local government as well as industry and road users, should move to the short-term reform of existing fees and charges associated with road use, including the introduction of a location and distance based road user charge for all vehicle classes.

The structure of the charge should recognise the:

- Need to improve competitiveness, efficiency and transparency of road-related fees and charges;
- Increasing impacts on road wear and tear due to greater vehicle mass; and,
- Increasing costs of externalities associated with rising levels of congestion.

In order to support these themes, a national road pricing scheme should be structured to provide two fundamentally different regimes, the first relating to heavy vehicles (over 4.5 tonnes) and the second for light vehicles. These schemes would both provide distance based charges, with three separate tiers of charges, a base rate and premiums for use of the urban network and the use of the urban network in peak periods.

If road pricing is seen to have a role in progressing a more sustainable and efficient transport system, then consideration needs to be given to a possible implementation path that includes the reform of current taxes and charges paid by road users.

Incremental implementation of a more active system would provide the opportunity for:

- The development, proving and piloting of technology solutions;
- Investment in the development and reform of public transport infrastructure and services to support mode switching; and,
- Communication of the scheme's structure to road users.

The transition period would need to parallel reform of current taxing regimes by state, territory and Federal governments in order to move toward a consistent set of price signals for road use.

Heavy Vehicles

In recognition of the relatively greater impact of these vehicles on the road network and the current phase of reforms to heavy vehicle fees and charges, a variable road use charge based on mass-distance-location for heavy vehicles would ideally be undertaken as a first step towards a general Australian road pricing scheme.

The scheme should recognise three key variables:

- **Distance** – a rate per kilometre travelled based on mass and location.

- **Mass** – a sliding scale of charges should apply for vehicles based on the gross vehicle mass during travel. The potential for onboard, real-time assessment of vehicle mass to facilitate these charges should be examined.

- **Location** – as a first step towards a demand management based charge a three tier tariff system should apply to travel:

    - **Base Rate** - a flat charge across the network should be applied to manage demand and to fund transport infrastructure including capital and maintenance expenditure.

    - **Urban Rate** – a higher rate in capital cities and major urban centres to improve the efficiency of use of infrastructure by providing a mechanism to internalise the external costs of transport (i.e. congestion and emissions). This charge would initially relate to major capital cities, including Sydney, Melbourne, Brisbane and neighbouring South East Queensland, Perth and Adelaide, however consideration should be given to an appropriate mechanism for the introduction of other locations over time.

    - **Peak Rate** – a time-of-day based charge for urban areas to provide a congestion charge for use during high demand peak periods. This charge would relate to the areas covered by the Urban Rate.

A longer term reform opportunity would be the application of differing per kilometre rates to heavy vehicles for the use of freeways and major arterials as compared to local roads. Through the application of this additional tariff, heavy vehicles could be encouraged to use designated corridors (such as freeways) therefore reducing the impact of freight movements on local roads and neighbourhoods.

Light Vehicles

Reform of road user charges that relate to light vehicles should principally provide for the simplification and harmonisation of existing taxes, fees and charges as well as the management of externalities, including congestion, in urban areas. The application of a common charge across all light vehicles would assist in the administration of the scheme and provide transparency for road users.

Stage 1

The current network of tollways in Melbourne, Sydney and Brisbane could provide a framework for improved network management through a fully dynamic or variable tolling regime (as per the newly introduced variable tolling arrangement for the Sydney Harbour crossings). However, two main issues here remain:

- The need to re-negotiate current commercial agreements with private toll road operators; and,

- Partial coverage of the network by toll roads and the potentially negative impacts of road users switching to congested unpriced roads.

Stage 2

Similar to the structure of the heavy vehicle road price, a medium-term structure for a road user charge for light vehicles would consist of a location and distance based scheme. Under this approach, mass would not be included as a tariff class, in recognition of the relatively limited impact of light vehicles on the maintenance requirements of road infrastructure.

Under this scheme, a three tier tariff similar to that for trucks incorporating different Base, Urban and Peak rates of charges would apply.

As technology evolves over the long-term there may be the capacity to further refine an early broad brush approach to better align price with quality of service (i.e. differential pricing according to road surface, performance standards, service levels etc).

CASE STUDY 5:
WHAT COULD A VARIABLE ROAD PRICE FOR LIGHT VEHICLES LOOK LIKE?

The price per kilometre that motorists might be charged under a road pricing scheme is difficult to determine without modelling specific options, but some basic figures can be derived by looking at selected transport statistics and current levels of road revenue and expenditure. For instance, the prices paid by road users could be quite low under most circumstances (e.g. for travel on rural roads) and higher in others (for travel on certain urban roads during peak hour).

While, the figures provided in these scenarios provide a useful benchmark as to the potential costs for households and vehicle owners, the actual usage figures under a road price would vary depending on time and location of use as well as potentially the characteristics of the vehicle, such as engine efficiency.

The table below provides a broad indication of what road user prices might look like under five hypothetical scenarios:

- **Scenario 1 and 2:** demonstrate potential road user charges if a scheme were structured to recover the existing road related expenditure, i.e. assuming that revenue shortfalls (e.g. loss of Fuel Excise) are foregone or recovered by some other means outside the transport system.
- **Scenario 3, 4 and 5**: The second half of the table considers what costs might be charged if the objective of the system was to provide full recovery of revenue, taxes and charges (including estimates of FBT and GST) currently collected from road transport, i.e. if the system was designed to be revenue neutral or revenue positive (BITRE 2009d).

▼ Table 12

Scenario Road User Prices

SCENARIO 1: RECOVERY OF CURRENT ROAD EXPENDITURE ONLY	
Total road expenditures (2006-07)	$11.371 b
Road expenditures attributable to passenger cars, LCV's and motor bikes (1)	$9.565 b
Recovery of road expenditures attributable to vehicles (passenger cars, LCV's, motor bikes)	4.6 c/km
Average annual road use charges per passenger vehicle (2)	$644

SCENARIO 2: RECOVERY OF CURRENT ROAD EXPENDITURES AND COST OF EXTERNALITIES	
Road expenditures attributable to passenger cars, LCV's and motor bikes (1)	$9.565 b
Estimate of externality costs attributable to capital city congestion from light vehicle use (BITRE 2007) (3)	$0.99 b
Average road user charge (including externalities)	5.1c/km
Average annual road user charges per passenger vehicle including externalities(2)	$711

SCENARIO 3: FULL RECOVERY OF TAXES AND CHARGES (EXCL FBT AND GST) AND COST OF EXTERNALITIES ATTRIBUTABLE TO LIGHT VEHICLES	
Revenues attributable to passenger cars, LCV and motor bikes (1)	$14.379 b
Estimate of externality costs attributable to capital city congestion from light vehicle use (BITRE 2007) (4)	$0.99 b
Total light vkt metropolitan areas in 2005 (BITRE 2007)	120.13 b
Average road user charge (including externalities)	7.9 c/km
Average annual road user charges per vehicle (2)	$1 106

CASE STUDY 5: CONTINUED

SCENARIO 4: FULL RECOVERY OF TAXES AND CHARGES CURRENTLY COLLECTED FROM ROAD TRANSPORT	
Average taxes and charges currently collected from road transport (2006-07) - Including FBT ($1.776 billion) - Including GST ($4.60 billion estimate based on 2001-02 to 2005-06)	$22.588 b
Assumed revenues attributable to passenger cars (pcs), LCV and motor bikes (1)	$20.422 b
Total vkt (2006-07) by passenger cars, LCV and motor bikes	205.96 b
Average road user charge	9.9 c/km
Average annual road use charges per vehicle (2)	$1 386

SCENARIO 5: FULL RECOVERY OF TAXES AND CHARGES AND COST OF EXTERNALITIES ATTRIBUTABLE TO LIGHT VEHICLES	
Revenues attributable to passenger cars, LCV and motor bikes (1)	$20.422 b
Estimate of externality costs attributable to capital city congestion from light vehicle use (BITRE 2007) (3)	$0.99 b
Total light vkt metropolitan areas (BITRE 2007)	124.04 b
Average road user charge (including externalities)	10.4 c/km
Average annual road use charges per passenger vehicle including externalities (2)	$1 453

LCV light commercial vehicle
Vkt vehicle kilometres travelled
(1) Road cost recovery from heavy vehicles under PAY-GO approach averaged around 20 percent of total road expenditures (Second Determination), based on average taxes and charges collected from road transport between the above years, this equates to $1.806 b. GST and FBT estimates attributable to light vehicles based on proportionate share of total vehicle registrations which is around 95%.
(2) Based on 14 000 km as the average annual distance travelled by passenger cars with 60 per cent of travel in metropolitan areas.
(3) Assuming light vehicles contribute around 90 percent of pollution costs in capital cities.

These scenarios provide estimates in the range of 4.6 – 10.4 c/km. This provides a preliminary indication of the magnitude of charges that road users might pay under a pricing regime.

However, it is essential to recognise that charges are likely to be most effective if they incorporate a number of different elements e.g. a per kilometre base charge paid by all road users, supplemented with an additional charge for certain roads within urban areas to manage transport externalities. This approach is likely to be more effective from a transport efficiency perspective, but needs to be balanced against the need to keep the design of the system as simple as possible. Road users will not respond to pricing signals unless they are easy to understand.

If road use charges were based on a revenue neutrality basis, then this could generate an additional $10.857 billion in funds for additional infrastructure investment.

Substantial additional revenue could be generated by an even slight increase in the road use charge. For example, if the road use charge were increased from the estimated weighted average (metropolitan and non-metropolitan) of 10.4c/km to 11.0c/km for passenger vehicles, then the increase in revenue for infrastructure spending derived from passenger vehicle use alone would increase by around $1 billion.

6.6.2 Comparison of an Australian Road Pricing Scheme with the Dutch Scheme

While there is no precedent of a national road pricing system to which a prospective Australian scheme could be compared to the road pricing system which will be put before the Netherlands Parliament in 2010 forms the basis for some comparison. Table 12 provides a comparison between the structure of the road pricing concept recommended in this paper and that proposed for the Netherlands.

▼ Table 12

Comparison between Netherlands and An Australian Road Pricing Scheme

	NETHERLANDS	AUSTRALIA
Policy Objective	Removal of current fixed taxes and charges paid by road users to be replaced by a per km charge. Abolition of: • Motor vehicle tax (determined by vehicle weight and fuel type); • Provincial surcharges; and, • Vehicle purchase tax: 40 per cent of net book value of the car.	Reform of current State based taxes and charges (including stamp duties payable on new cars and vehicle transfers) and replaced by a variable distance based charge.
Focus	Vehicle use rather than on vehicle ownership. Other factors include emissions and fuel type.	Vehicle use rather than on vehicle ownership.
Structure	Two-tier tariff: • Base charge; and, • Rush hour surcharge to apply on busy routes during rush hours.	Three-tier tariff: • Base charge; • Urban network charge to incorporate externalities associated with use of congested roads; and, • Peak urban charge to reduce congestion.
Infrastructure fund	Revenues from the per kilometre charge to be hypothecated to a transport infrastructure fund for investment in construction and maintenance of roads and expansion of public transport.	Revenues from the per kilometre charge to be hypothecated to a transport infrastructure fund for investment in construction and maintenance of roads and expansion of public transport.
Associated reforms	Review of working hours and introduction of more flexible work times to allow commuters to avoid travel during rush hours.	Broader reform of taxes and charges paid by all sectors of society (e.g. business, PAYE, etc).
Revenue	Neutral at national and provincial levels.	Revenue neutral – variations in consolidated revenue should be offset by broader taxation reform process.
Implementation	• Stage roll-out between 2012 to 2018 • Trials: 60,000 vehicles • Heavy vehicle: (> GVM 4.5 tonnes) • Light vehicles: phased introduction based on random selection of registration plate numbers.	Similar approach to the Netherlands.
Privacy	Location protected through information basis for charging of kilometre travelled and rate.	Similar approach to the Netherlands. A central consideration in the final structure of the scheme. Special concessions should be made to reflect privacy concerns however these must not undermine the basic policy structure of the scheme.
Technology	Satellite and GSM.	To be determined by competitive tender following policy determinations.

7 Conclusion

The purpose of this paper is to facilitate an informed debate about the merits of a national road pricing scheme in Australia. If effectively implemented, a national road pricing scheme could offer Australia access to a world leading transport management tool, providing a dividend far beyond the role of road pricing in driving revenue from road transport.

The current national debate about the role of infrastructure pricing in driving behaviour change is timely; and is overlaid with a historic underinvestment in transport infrastructure, record urban congestion and a massive forward requirement for new transport infrastructure projects.

The concurrent Federal reviews of both taxation and transport policy provides a once in a generation opportunity to consider the nexus between these two policy areas; and the ability for a fundamental overhaul of taxation to support a new transport planning and pricing paradigm for Australia.

The rise of demand management schemes as a key component of effective transport policy is increasingly recognised throughout the world. Across the globe, political considerations which have frustrated informed debate about the role of road pricing schemes in the past, is declining. There is now growing consensus that a balance between capacity augmentation and demand management is required to provide for long-term transport requirements.

In considering the structure of a road pricing scheme for Australia, it is critical that the aims and objectives of the scheme correspond with the objectives of the Australian Transport Council, which form the basis of the national transport policy. Government should consider six fundamental issues in the design of a national road price:

- **Coverage of the scheme** – should a scheme be developed on a national basis with uniform charges, or on a state-by-state, city basis using a common framework?
- **Revenue outcomes** – what effect should a scheme have on current road user charges and government revenue?
- **Changes to established revenue streams** – How should current road user charges be changed?
- **Other considerations** – what other practical issues need to be considered?
- **Investment of surplus revenue from a road pricing scheme** – How should revenue be spent?
- **Potential structure of an Australian road pricing scheme** – What type of framework should be adopted for a road pricing system?

The infrastructure sector recognises the substantial variation in impact between heavy vehicle and light vehicle use on the road network, as well as progress towards charging reform for both classes of vehicle. It is therefore prudent that the introduction of a road pricing scheme recognises the respective impacts of these vehicles and is structured to ensure vehicles that most heavily impact on the system meet their costs.

Beyond the recovery of the costs of construction and maintenance of the network, consideration should be given to the use of a road price to internalise a range of externalities from vehicle use, including air pollution and the impacts of congestion. Critically, the structure of a national road price should feature a time of day congestion charge to recognise the substantial additional impacts that arise as the result of vehicle use during peak times of day.

Obviously, the recommendations contained in this paper suggest a radical departure from past practices and present significant technical, policy and political challenges. But the scheme design outlined in this research also offers Australia the ability to break the back of its transport management and funding challenges - offering a break-through solution which could put Australia's transport infrastructure back on track for the decades ahead.


AUSTRALIA

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14

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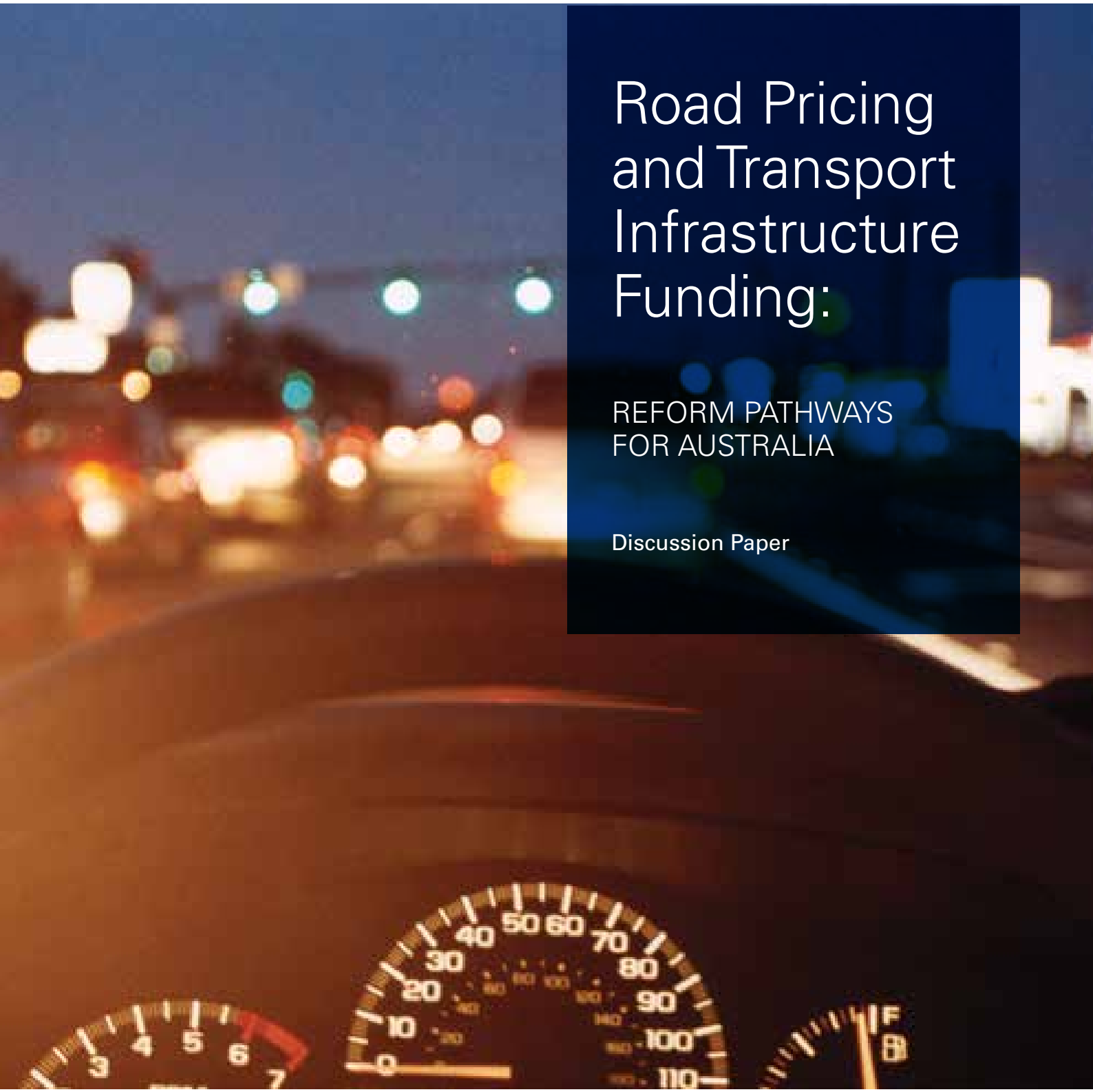

Road Pricing and Transport Infrastructure Funding:

REFORM PATHWAYS FOR AUSTRALIA

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TRANSPORT REFORM NETWORK

The Transport Reform Network (TRN) is an initiative of stakeholders from across the transport and infrastructure sectors interested in the fundamental reform of transport in Australia.

In broad terms, the TRN's mission is to seek a better way of planning, managing, funding and financing land transport in Australia to ensure it delivers optimum and sustainable economic, social and environmental outcomes for all Australians.

CONTENTS

Executive Summary

A lack of long-term investment in transport means that as a nation, we extract less than we should from the transport infrastructure we have, and we invest less than we should in the transport infrastructure we need.

Stronger investment and new approaches to funding are required to deliver the growing list of transport projects that are needed across Australia to improve the community's mobility and safety. Reducing congestion in our cities and delivering productivity and economic growth all rely heavily on an efficient, integrated and safe transport network. Achieving these outcomes will inevitably require substantial reform to the status quo.

Funding immediate project priorities will require increased government revenues, a wider application of user pays, smarter thinking about value capture and innovative private funding, in addition to options such as reinvesting the proceeds from the sale of public assets, to create immediate capacity for urgent priority transport projects. But over the medium-term, fundamental reform will also be needed, because the current charging and investment system is inequitable to road users, and unsustainable for taxpayers.

Australia's motorists already pay a substantial burden in taxes and charges for use of the road network. For this reason, this paper does not contemplate charging motorists more, but rather, it considers how the existing revenue envelope can be collected more fairly, and invested more efficiently. A revised road user charging system should only be implemented as part of genuine reform and not be imposed on top of the current system.

Reforming transport pricing will be a complex policy and political issue. For this reason, it is important the debate is methodical, thorough and transparent. Winning support for substantial reform will require a transparent diagnosis of the problem, and a deliberate consideration of the benefits and impacts of alternative options.

This is why the paper has been developed by Infrastructure Partnerships Australia (IPA) and Deloitte, in association with Australia's leading motoring clubs, the Australian Automobile Association (AAA), the National Roads & Motorists' Association (NRMA), the Royal Automobile Club of Queensland (RACQ), and the Royal Automobile Club of Victoria (RACV). The paper does not endorse a particular model or imply that the proposals are the policy of the participating organisations, rather it seeks to instigate genuine reform.

Jointly, the group represents the users, owners, regulators and providers of the nation's transport network; and jointly, we are calling for a formal, national and transparent process that considers the options, and resolves the pathway, toward enduring solutions to Australia's transport challenge.

This paper does not consider commercial and heavy vehicles, in light of the separate but complementary reform process that is being advanced under the Council of Australian Government (COAG) Heavy Vehicle Charging and Investment (HVCI) reform process.[1]

Is the current system broken?

Under the current approach, motorists are taxed for road use through a disconnected two part tariff, comprising of fixed, state-based access charges (such as registration and licence costs)[2] and the Commonwealth's consumption-based Fuel Excise.[3]

This paper makes a case that the current road charging approach is ineffective, and requires substantial reform because:

1. the revenue model is increasingly unsustainable;
2. the pricing model lacks transparency and does not price efficient use of the network; and
3. the investment priorities are poorly aligned with the needs of network users.

We find that the current system of transport network pricing is no longer fit for purpose. The system of road pricing embeds inequities, cross subsidies and distortions and has been the result of organic growth, rather than developed as part of a well-considered strategy or plan. However, it is acknowledged that this system has achieved validity through familiarity.

Revenue model

The existing approach to revenue is unsustainable because a broad shift toward more fuel efficient vehicles and alternate fuel types, alongside a fall in the relative value of Fuel Excise revenue since the early 2000s, has hollowed out the revenue collected by the Australian Government. As shown in Figure i overleaf, Fuel Excise revenue as a proportion of GDP has fallen from 1.69 per cent in 2001-02 to 1.16 per cent in 2010-11, further complicating the funding challenge faced by Australia's governments.

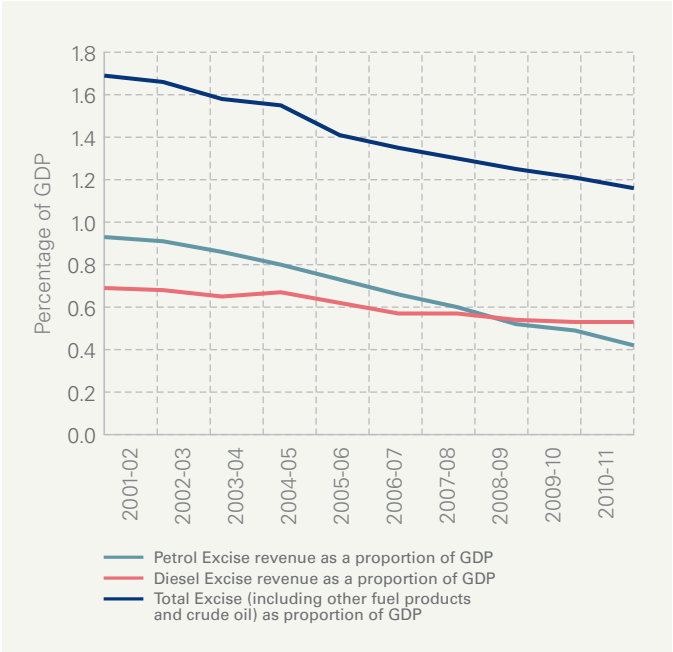
1 The COAG Road Reform Plan (CRRP) was rebranded Heavy Vehicle Charging and Investment (HVCI) process in 2012. The broader reform options of the CRRP were significantly informed by the Productivity Commission's 2006 Public Inquiry into Road and Rail Freight Infrastructure Pricing. This paper refers to the COAG HVCI as the programme currently in place – however, many of the actions discussed were undertaken under the CRRP process and are referenced to CRRP accordingly.

2 Registration charges represent those in place during the reference year used for the paper, 2011, but may have changed in subsequent years and do not include additional charges levied at the point of registration such as Compulsory Third Party insurance or vehicle safety checks.

3 Fuel Excise is currently levied at $0.38143/litre on gasoline, diesel, ethanol, biodiesel and blends of these fuels. The charge is levied on motorists at the fuel pump but not normally displayed as a component of the overall fuel price. Producers of ethanol receive grants equivalent to the excise rate under the Ethanol Production Grants (EPG) programme for ethanol produced and supplied for transport use in Australia from locally derived feedstocks; this excise reimbursement can then technically be partially or fully passed on to the end consumer. Similar 100 per cent grant rebate schemes exist for biodiesel and renewable diesel production. Automatic indexation of Fuel Excise against the Consumer Price Index ceased in 2001.

▼ FIGURE i

FUEL EXCISE REVENUE BY TYPE (AND TOTAL) AS A PROPORTION OF GDP



Source: IPA analysis, Commonwealth Budget Paper – 2001-02 to 2010-11

Pricing model

The current approach entrenches inefficiency, because it does not include a transparent mechanism to efficiently allocate capacity on the existing road network. The excessive demand for capital city motorways during the morning peak, and the under-utilisation of these corridors during other times, is an everyday example of how existing pricing arrangements fail to manage traffic demand.

For example, a reformed model might provide commercial vehicles with a discounted access charge to make journeys outside of the commuter peak, increasing the efficiency of both the freight and passenger transport tasks, without expensive and avoidable investments in new lanes that are only used for a few hours each day.

Road pricing reform is made more attractive by the opportunities that exist to permanently and materially improve the efficiency of the broader transport network, ultimately making the system fairer and more transparent for users.

Investment

A further opportunity from a broad reform of road user charging will accrue through the direct connection between usage, revenue and subsequent investment.

Under the current system, road related fees and charges are collected by two levels of government, while investment in maintenance, renewal and expansion is spread across all three tiers of government; resulting in an opaque and complex system that disconnects revenue from, and expenditure in, the transport network. For example, the current approach sees road users charged some $20.4 billion in road related taxes and charges; but sees only $16.9 billion reinvested into roads and bridges.[4] Taking just the Federal level, the investment shortfall is more stark – in the reference year used for this paper around $13.2 billion of revenue was raised through Fuel Excise, but Commonwealth investment in land transport stood at around $5.6 billion. The current system also fails to recognise that local governments bear substantial responsibility for road delivery and maintenance but have no direct mechanism to generate revenue to support investment. Improved investment alignment will deliver outcomes that better meet the needs of network users.

Principle and options

Clarity about the objectives of road pricing reform will be a central and defining feature in the selection of potential models; and critical in establishing the public case for change.

International experience of effective reforms to road pricing has relied on clear identification of the objectives of reform with a clear discussion of the costs of inaction.

This paper uses its analysis to articulate the principles that should underpin the selection of a reform model for Australia; those principles include a system that can:

1. allocate the costs and benefits of road use fairly and efficiently across users, based on their impact and level of use;
2. provide revenues that are sufficient to fund new transport projects;
3. provide revenues that are sufficient to fund the maintenance of the network;
4. secure the funding stream for the transport network, giving certainty about the long-run funding capacity and allowing for rational investment strategies; and
5. improve the performance of the transport network by actively balancing supply and demand.

This paper also considers that a key basis for reform should be a pricing system where the total contribution from road users is initially maintained at existing levels, but with a fairer system that ensures high end users contribute their fair share, with low-impact users contributing less.

4 Reference year 2009-10.

Road pricing scheme design

This paper considers the core structure of a number of operating road pricing systems around the world, including London, Switzerland, Germany and New Zealand, amongst others.

These models range from single purpose, limited congestion charging schemes (for example, the London or Singapore congestion schemes) through to rationalised charging systems that apply across the entire road network (such as the Swiss heavy vehicle fee system). The paper then considers each of these structures against their ability to meet the objectives we have identified, in the section above.

While this paper does not seek to endorse a particular model, we select an approach we term the Universal Road User Charging model (URUC), for detailed examination within the paper.

The URUC is based around a charging structure that prices the following aspects of user behaviour:

- **Mass:** The mass of a vehicle has a direct relationship to that vehicle's impact on the road network, through higher wear and tear as well as other factors (such as safety, impedance of other road users, among others). The URUC would allow for a fairer contribution from higher mass vehicles, reflecting the increased costs that they impose.
- **Distance:** The URUC is structured to efficiently connect the amount charged, with the amount consumed. This offers a range of benefits, principally in terms of equitable charging, ensuring that high end users make a contribution reflective of their use.
- **Location:** The URUC recognises that road users impose and receive different costs and benefits, dependent on where they access the road network. Currently, consumption is accounted for in the Fuel Excise, but the excise obviously cannot recognise the differential in costs when a litre of fuel is consumed on a capital motorway, compared with an unsealed regional road.
- **Time:** Time is a fundamental component of the URUC, because it allows for a charging scheme that is able to respond to and manage congestion. For example, the URUC would allow for differential prices in urban areas during the peak, providing a signal for discretionary journeys to occur at other times, and providing a meaningful way to drive up public transport patronage and maintain the functionality of capital city road networks.

Based on these parameters, our modelling found that in the broadest terms, a rural user in a small car could expect to pay 4.57c/km, which is around half the current average user charge per kilometre of circa 9.9c/km. Meanwhile, a user driving the same car in an urban area during the morning peak could pay up to 18.99c/km (consisting of a 4.57c/km distance based component and a 14.42c/km time and location based component) – taking account of their relatively higher impact on congestion and higher costs imposed on the economy.

User impacts

A key aspect of this paper is that it applies the theoretical concept of the URUC to a series of hypothetical, 'real-world' users. The modelling of how the URUC concept could apply in practice allows for a debate based around familiar journey types, allowing the broader community to consider the model discussed in this paper.

The modelling of hypothetical users begins to answer the personal concerns that road users might have about the direct impacts of reform.

The modelling suggests that the greatest cost upsides will accrue to road users in non-capital cities and the regions. Indeed, 'Peter', a Regional Victoria based hypothetical user studied in the paper, would enjoy direct cost savings of circa 70 per cent on one of his two vehicles, despite being the highest consumer of vehicle kilometres. This reflects the substantially lower impacts of a non-capital city user, principally using his vehicle in non-congested segments of the road network.

'Graham', another of our hypothetical case studies, drives an Audi to his CBD office in Sydney from the suburbs each day. On that vehicle, Graham would see his road user charges increase by circa 45 per cent, reflecting the much greater impact he imparts on other road users and the broader economy. This cost could be partially offset however, by a 36 per cent reduction in Graham's costs on his second vehicle, which is used infrequently and principally for shorter, local journeys (such as dropping children to school, shopping or weekend sport).

Our third hypothetical user, 'Leanne', enjoys a substantial gain under the URUC despite living in a capital city. Leanne, a nurse who owns a single small vehicle, lives in the outer suburbs of Brisbane, and by virtue of her role, principally works night shifts, travelling to her non-CBD workplace in the early evenings and returning before the AM peak. Overall, Leanne would see her share of road taxation fall by around 23 per cent, reflecting her lower cost of use on the road network at off-peak periods, and her choice of a smaller vehicle.

The assumptions, methodology and results of this modelling are detailed in chapter six, allowing for a transparent analysis of our conclusions and findings.

This modelling only considers the user price impacts, and does not consider, monetise and apportion the broader efficiency gains on the network, through lower congestion, increased journey time reliability and better asset condition, amongst other wider benefits.

We do not model the demand mitigation or price sensitivity of users, but it is reasonable to assume that the approach of the URUC would offer the opportunity to substantially alter current demand requirements, as users who face a negative pricing impact adjust their usage through public transport, changing their journey profile or making informed choices about vehicle type and size.

Pathways for reform

The utility and desirability of a reformed transport charging system has been the subject of discussion over recent decades, but to date this has not resulted in any meaningful consideration, beyond its potential application to heavy vehicles (through the Heavy Vehicle Charging and Investment programme).

It is increasingly apparent that the current approach is diminishing in its funding capacity, and of limited use in balancing the signals for efficient expansion, maintenance and usage of the broader transport network. This is not a niche area of government policy, or an abstract application of economic theory; rather it is a fundamental challenge that is entrenched into the price of the goods and services that we consume and produce. Failure to reform will risk increasing urban and freight congestion, and a sustained erosion of the abilities of Australia's cities and regions to compete in global markets.

We do not see the kind of model explored in this paper as immediately possible. The concept of road user charging reform has been discussed in Australia since at least 1991, but to date this discussion has been ad hoc and without an ongoing process to interrogate options and resolve a reform pathway.

This paper finds that successful reform will ultimately require strong political leadership, but also recognises that a deep, detailed and honest process to clearly identify the case and pathway for reform is fundamental to achieving a more sustainable and fairer system of road charging and investment.

This is why the principle recommendation of this paper is the development of a scrutable, transparent and public process, led by the Productivity Commission, to allow the options, challenges and opportunities posed by road user taxation reform to be explored, resolved and progressed toward a more efficient and transparent road pricing system.

RECOMMENDATIONS

This paper accepts that the scale of reform needed to deliver a fairer, simpler and sustainable model for taxing and funding road transport will require deep public debate and detailed consideration by transport policymakers.

Therefore, this paper's recommendations are divided into two sections.

The principal recommendation argues for the commissioning of a formal inquiry process through the Productivity Commission.

This process recommendation is designed to ensure that the options raised in this paper (and other models) advance through a detailed and national review. This is important, because it will provide a formal process that allows all stakeholders and jurisdictions to submit their views and interrogate the challenges presented by whole of network road pricing reform.

The paper's secondary recommendations concern themselves with more modest, complementary reforms that should be pursued in advance of (and to better enable) a later transition to a rationalised, equitable and transparent system of user charges across Australia's road network.

The paper has been structured in this way to provide policymakers with a logical, sequential and actionable framework to finally advance meaningful solutions to the national transport challenge.

PRINCIPAL RECOMMENDATION

1. **The Australian Government should direct the Productivity Commission to establish a detailed Public Inquiry into the funding, regulation and pricing of Australia's road transport market, and related impacts in the broader transport market.**

   This Inquiry must consider the capacity of the existing structure of road charging to fund future investment requirements; and the limitations of the current framework to achieve more efficient use of the transport system.

   The Public Inquiry should evaluate the potential for new pricing mechanisms to better address funding, equity and demand management on the road network. It should ultimately recommend the principles for a new, optimal structure and a clear reform pathway for Australia's governments.

SUPPORTING RECOMMENDATIONS

In advance of a broad and national consensus towards change, the following suite of enabling reforms and actions should be pursued. Each of these reforms is designed to simplify cross-border inconsistencies and/or advance public understanding of road pricing and increase the public appetite for reform.

2. **State-based registration and administration charges for light vehicles should be progressively harmonised, eventually leading to a single national pricing structure for light vehicle registration.**

   Under current arrangements, the fees and charges imposed on light vehicles, such as licensing and registration, differ substantially between states. Reform toward a nationally consistent road pricing system would be simplified by immediate steps to harmonise fixed cost access charges across the states and territories.

3. **State-based regulations for light vehicles should be progressively harmonised, delivering a single regulatory regime for light vehicles across Australia including registration, safety and licensing.**

4. **Consistent and detailed data should be collected to inform decisions on, and design of, any future road pricing mechanisms.**

   Australia's jurisdictions already collect substantial data about actual road use and user impacts. This data should be made available to the Productivity Commission and others to provide a detailed and long-term data set to inform and guide the development of reform pathways.

5. **Australia's governments, motoring clubs and broader industry stakeholders should formally partner together to increase the public's awareness and understanding of the flaws and challenges posed by the existing system of road regulation.**

   Substantial changes to the regulation and taxation of, and investment in, the road transport sector will require policy bravery and leadership from governments, motoring clubs and other stakeholders. Consideration should be given to how stakeholder groups can be integrally involved in the Productivity Commission process, to promote a dispassionate and collaborative process to resolve and implement the scale of changes countenanced in this paper.

6. **Large scale trials of road pricing should be developed and deployed to concept test different scheme design options. This process should be commenced in concert with the Productivity Commission review; allowing these trials to inform and shape the Productivity Commission's Public Inquiry process and final report.**

   It is likely that the Heavy Vehicle Charging and Investment process would provide an ideal "pathfinder" trial for the operation of a broader scheme that would ultimately include all road vehicles.

   Data from the Heavy Vehicle Charging and Investment trial (and subsequent trials with other vehicle classes or regions) would provide valuable insights into the efficacy of technologies and charging models in shaping demand and altering motorist behaviours. This data and experience would then inform design of the system for other vehicle classes, such as privately owned light vehicles.

1 Introduction

1.1 SCOPE

This paper considers the policy, regulatory and other levers that are available to fundamentally change the way Australia's transport market is regulated, priced and funded.

The paper starts by considering the current model, identifying a substantial and accelerating disconnection between the way Australia's roads are priced and how they are funded.

The paper then considers how a new, more transparent and fairer system of charging, based on the mass, time, distance and location of a vehicle's use of the road network, could offer opportunities to better manage, fund and invest in Australia's transport sector.

The paper also models user costs for a range of hypothetical 'real-world' users, allowing the public debate to move beyond an abstract theory, toward a greater understanding of the practical impacts and positive opportunities that could be offered through the type of reform developed in this paper.

Finally, the paper presents a series of actionable recommendations that should be pursued to advance reforms to Australia's transport network.

1.2 BACKGROUND

The need to 'solve' Australia's transport infrastructure shortfall is an issue of consensus between Australia's policymakers, the business sector and the community.

The growth in inefficient traffic congestion; the lack of available funding for new transport projects; the lack of clear connection between road-related incomes and expenditures; and the entrenched but invisible inequity of the current system – all point to a strong policy case for substantial change.

However, the consensus across the community about the need for better transport outcomes has not yet evolved into a sustained and mature debate about the options that exist to deliver better outcomes.

That is why this paper has been developed as a collaborative project between Infrastructure Partnerships Australia (IPA) and Deloitte, together with Australia's leading motoring associations – the Australian Automobile Association (AAA), the National Roads & Motorists' Association (NRMA), the Royal Automobile Club Queensland (RACQ), and the Royal Automobile Club Victoria (RACV).

This paper provides a single voice from the operators, providers and users of Australia's transport infrastructure, calling for a genuine and nationally-led process to allow all Australians to consider and resolve the way forward

As this paper outlines, the current charging and investment system is demonstrably failing to meet the expectations and requirements of the nation's economy, taxpayers and commuters.

While theoretical policy options to reform road pricing have been discussed with varying degrees of depth for some decades, to date there has been little analysis of the price and service impacts on the user, that is to say, the motoring public.

This paper seeks, in part, to demystify the debate about transport pricing reform by providing real-world examples of the price impact on 'hypothetical' real-world users.

It also considers the policy underpinnings of operating road pricing systems in other jurisdictions across the world; drawing on international experience to define a series of foundation principles that should form the basis of a road pricing system in Australia.

We recognise that a range of possible road pricing approaches could satisfy most or all of these principles. However, for the purpose of this paper, we develop a single option which we term the Universal Road User Charging (URUC) model.

Finally, the paper resolves a high level pathway that would allow this defining national issue to finally be advanced through a formal process of consideration, adoption and implementation.

Rather, we recognise the valuable work that is being pursued by HVCI and acknowledges that this process for heavy vehicles is likely to provide the foundation for later reforms to the charging for other vehicle classes.

Consideration of toll roads and the charges levied for their use are excluded, recognising that a future road charging scheme should be structured in a way that does not discourage either private sector investment or disadvantage existing, facility based tolling concessions.

1.3 REFORM CONTEXT

This paper acknowledges a range of prior and ongoing research and advocacy projects that consider pricing reform.

In particular, we refine and develop IPA and SAHA International's (2009) paper *Urban Transport Challenge: A discussion paper on a role for road pricing in the Australian context.*

We also recognise the contribution of the final report of the Commonwealth Government's *Infrastructure Finance Working Group,* whose first recommendation was that "governments should implement targeted measures such as user charges to enhance price signals to better balance supply and demand, and to increase the funding available for infrastructure investment."

The paper notes the recommendations advanced in the *Review of Australia's Future Tax System (*Henry Review), which highlighted the efficiency of price signals to manage congestion.

We also acknowledge the important path finding role that the HVCI process will play in time. Further details of that process are outlined immediately right.

Finally, we note the contribution and collaboration of the Transport Reform Network. The Transport Reform Network, established in 2012, provides a broad forum to articulate the need for reform to the way road usage is charged for and transport infrastructure investment is funded.

Heavy Vehicle Charging and Investment

In response to the findings of the Productivity Commission Review of Road and Rail Freight Infrastructure Pricing released in 2007, the COAG agreed to a three-phased reform programme (Road Reform Plan). The Plan included a number of research components looking at incremental charging and mass-distance-location (MDL) charging. In its response, the Australian Transport Council (ATC) agreed to a series of key reforms to the current heavy vehicle charging regime including to: introduce mass and distance charging; ensure recovery of infrastructure maintenance costs from heavy vehicles; and ensure that the cross-subsidisation across heavy vehicle classes is removed.

At the ATC meeting of May 2008, it was agreed that a work programme be developed to the research building blocks to enable COAG to further consider the potential merits of a move to mass, distance and location based charges for heavy vehicles. In 2009, COAG considered an initial report into key road reform elements, including heavy vehicle road use and costs. COAG determined that there was sufficient evidence to support a feasibility study.

The Feasibility Study involved a multi-jurisdictional approach and has considered various forms of direct charging, including fuel only, distance and distance-location options. The Feasibility Study was completed in 2011 and findings were recently presented to COAG for consideration.

Reported findings from the Feasibility Study suggest that the net economic benefits of a more direct charging are low or negative, principally as a result of the high potential costs associated with implementation. Findings suggest that a broader focus on reform of road funding, provision and use would result in benefits well in excess of those from reform of heavy vehicle pricing alone.

In 2012 the COAG Road Reform Plan was rebranded as the HVCI process.

1.4 STRUCTURE

This paper is structured as follows:

- **Section 2** discusses the structure of the current charging system, the weaknesses of that system and considers objectives of road pricing reforms.
- **Section 3** considers the case for road pricing reforms in Australia.
- **Section 4** explores the principles, objectives and options for road pricing reform in Australia before selecting a charging framework for evaluation.
- **Section 5** describes the process followed to estimate charges under a selected model.
- **Section 6** analyses the potential impact that the selected model could have on network users.
- **Section 7** considers future pathways for the road reform process in Australia.
- **Section 8** concludes the paper and outlines a number of immediate and medium term recommendations.

2 Is the current system broken?

Far from being a new concept for Australia, direct user charging played a foundation role in developing Australia's early colonial road network.

Australia's first tollway, a bridge crossing South Creek at Windsor in New South Wales, was commissioned in 1802.

This began an accelerating process of tolled roadways, with the first major corridor, the 25 kilometre Hawkesbury Road turnpike, commissioned in 1811. By the late 19th century, Sydney had a number of tolling plazas across the metropolitan and broader road network, which funded the maintenance and development of the road system.

This focus on direct charging largely fell away through the 20th century, particularly as tramways and other mass transit options began wide operation and the tax transfer system became more sophisticated.

In contemporary Australia, motorists in Sydney, Melbourne and Brisbane are accustomed to paying direct, point of use charges for access to various motorways in those cities. But beyond these relatively few direct charges on capital city tolled road corridors, the pricing of road access and consumption has become much less visible to the user.

Under current arrangements, road related revenues are derived from an array of flat state-based taxes, including registration, vehicle stamp duties and licensing fees, and the Commonwealth's Fuel Excise Tax. *The Review of Australia's Future Taxation System (Henry Review)* found that the current system is unsustainable because it offers diminishing revenues to government. Moreover, it also correctly identified the utility of fundamental transport taxation reform, in terms of the ability to better manage road network congestion.

The current approach also fails to provide clear signals to transport network users. In Australia, public transport patronage remains stubbornly low, while the economic and social costs of road congestion continue to rapidly escalate. The Federal Government estimates that urban congestion costs the national economy more than $14.2 billion in 2012, a figure that will exceed $20 billion by the turn of the decade.[5]

Clear minded reform to the way road access is taxed offers Australia's governments an opportunity to rebase the system. On the one hand, rational pricing could provide a mechanism to restore declining road related income, in turn allowing for greater investment; while on the other hand, reform to pricing would allow transport policymakers to influence and shape peak demand.

Although the use of the road network appears 'free' at the point of use, motorists are creating impacts on other motorists, the community, the environment and the economy. These external impacts, known as 'externalities', might include the wear and tear on the road surface, the impedance and delay of other (potentially higher value) journeys through congestion, vehicle occupant and pedestrian safety, or the emission of greenhouse gases.

The current approach does not reflect these additional costs to the motorists, meaning that high-end users are effectively subsidised by low-cost users.

For example, a motorist with a low external impact, say driving on a quiet country road, is effectively subsidising a motorist driving to their CBD office during peak hour.

If you assume a similar vehicle type, both motorists are paying similar fixed costs to access the road network, even though the broader external cost from the city peak hour motorist is much higher.

The same is true of two city motorists. For example, a motorist who uses their vehicle infrequently, or for shorter journeys, such as driving from home to a neighbourhood park-and-ride railway station, is also in effect subsidising the high-end motorist who drives to and from work each day.

5 Bureau of Transport and Regional Economics, 2007, Estimating urban traffic and congestion cost trends for Australian cities, Working paper 71

2.1 THE CURRENT ROAD USER CHARGING FRAMEWORK

Any broad taxation reform is routinely accompanied by justifiable concern from those affected, and understandable caution from policymakers, who are ultimately accountable to the electorate. For that reason, it is important that the debate about road pricing reform begins with a detailed understanding of the structure of costs and incentives which exist under the current approach, and why change is required.

The current system acts as a relatively unsophisticated two-part tariff – comprising a combination of fixed access charges and a consumption-based charge. The fixed charge components include state-based fees, like registration, licensing and stamp duties on vehicle purchases; while the consumption-based tariff is comprised of the Commonwealth Government's Fuel Excise. Table 2.1 gives a high level overview of the two-part tariff which forms the basis of the current light vehicle charging regime in Australia.

▼ TABLE 2.1

CURRENT AUSTRALIAN FIXED AND CONSUMPTION BASED CHARGING FRAMEWORK

FIXED ACCESS CHARGES	CONSUMPTION BASED CHARGE
Registration – depending on the state, these can vary by type of vehicle, vehicle weight or vehicle usage. Paid as an annual fee. Some states also offer discounts for certain concession classes.	**Fuel Excise** – set nationally, paid per litre of fuel purchased (currently 38.14c per litre), paid at the point of sale – but not decoupled from the full cost of fuel.
Stamp duty – depending on the state, varying by vehicle value, paid on initial purchase of the vehicle or subsequent transfer.	
Other charges such as vehicle transfer administration fees (paid on change of ownership) and number plate fees (paid on first vehicle registration).	

Source: Deloitte

The fixed charge components of road pricing can also vary greatly across jurisdictions. Table 2.2 below, shows the substantial variation in the fixed costs of registration across vehicle types and jurisdictions with each jurisdiction taking a different approach to charging for vehicle size or type.

For example, light vehicles in New South Wales attract different registration rates, depending on weight and registered use (e.g. private or commercial). Larger and commercial use attracts higher fees than smaller or private vehicles. Meanwhile, Victoria has a much lower, flat charge irrespective of vehicle type, but includes discounts for hybrid vehicles. Queensland's approach applies a flat fee, similar to Victoria, however Queensland includes an additional cost dependent on the number of engine cylinders.

This is illustrated in Table 2.2, where light commercial vehicles (LCV), which typically have fewer cylinders than larger private vehicles, despite being heavier, are charged less than medium to large sized private vehicles.

▼ TABLE 2.2

SAMPLE OF REGISTRATION CHARGES BY STATE IN 2011

	SMALL	MEDIUM	LARGE	COMMERCIAL
NSW	$266.00	$313.00	$447.00	$664.00
VIC	$191.60	$191.60	$191.60	$191.60
Qld	$328.90	$492.30	$669.80	$328.90

Source: Deloitte

Road use is not free

Many road users currently view the use of roads as 'free'. While most road users understand that they pay a fixed registration fee for the use of their vehicles and many are aware of the Governments' Fuel Excise levy, few understand the real cost (economic, financial and environmental) of the use of their motor vehicles – in essence motoring is 'free at the point of use'.

The user-pays concept is readily understood when it comes to other assets, such as water or electricity – motorists are also exposed to user pays approaches through tolling arrangements for some individual roads in major state capital cities.

Pricing based on time of day or peak demand is also well understood, through peak train fares and peak and off peak electricity pricing.

However, these concepts have not translated to the pricing of the broader road network. Instead, with flat pricing mechanisms for vehicle use – once the fixed costs of ownership and taxation are paid, users are incentivised to 'buy more to save more' because the marginal cost of usage diminishes with every additional kilometre travelled.

In effect, on a per kilometre basis, a vehicle becomes fractionally cheaper to the user with each kilometre they travel.

2.2 WEAKNESSES IN THE CURRENT ROAD USER CHARGING FRAMEWORK

There are a range of weaknesses that mean the current road user charging system will require substantial change in the near future.

For Australia's governments, the most pressing weakness is the falling proportional revenue that is generated from the Commonwealth Fuel Excise. For motorists and the economy, the opportunity to deliver a sustainable model to fund road and rail network investment, reduce congestion and deliver a fairer and more transparent system, while increasing the productivity of the road network, will be of increasing attractiveness; particularly as the existing approach continues to decay.

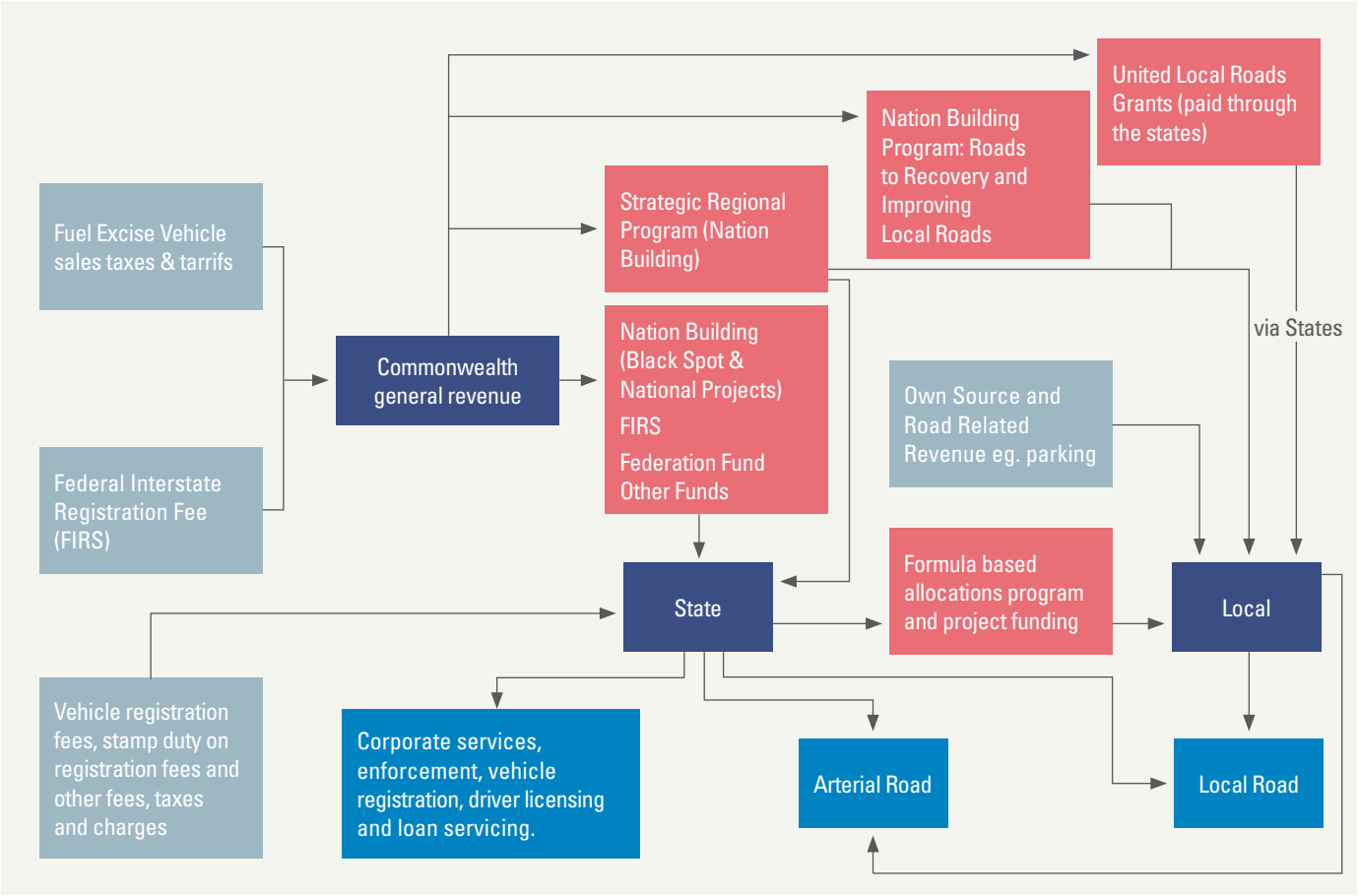
An opaque system of revenue and investment

In 2009-10, Australia's motorists collectively contributed circa $20.4 billion in road related taxation, across all levels of government. This was comprised of some $13.2 billion from the Fuel Excise;[6] a portion of which was returned to selected road users through the fuel tax credit scheme.[7] In the same year, the states and territories collected $7.2 billion through annual motor vehicle registration fees, traffic improvement and number plate charges, and stamp duties collected from the sale of new and used vehicles.[8] The total of $20.4 billion collected does not include GST from petrol and car sales or customs duty; it also excludes Luxury Car Tax.

Existing mechanisms for road revenue and investment see the majority of taxes collected flow through to Commonwealth and state consolidated revenue. The path for returning funds to road operations, maintenance and capital investment is complex and convoluted, heavily limiting taxpayers and consumers visibility of what proportion of, and where, revenue is deployed back into the network. The complexity of current road funding arrangements is illustrated in Figure 2.1.

▼ FIGURE 2.1

OVERVIEW OF CURRENT ROAD FUNDING ARRANGEMENTS[9]



Source: COAG Road Reform Plan, Funding and Implementation Issues Paper

6 Commonwealth of Australia (2011) 2011-12 Australian Government Budget — Budget Paper No. 1, Statement 5: Revenue

7 In 2009/10, fuel tax credit payments amounted to $5.1 billion. The various schemes include the fuel tax credits scheme, product stewardship for oil programme and the cleaner fuels grants scheme (Australian Taxation Office, Annual Report 2009-10). Light vehicles, including vehicles used for business, are generally not entitled to fuel tax credits.

8 Commonwealth Grants Commission (2012), 'About Fiscal Equalisation: Motor Taxes' (website), http://www.cgc.gov.au/fiscal_equalisation/the_commissions_methods/motor_taxes (Accessed 23/01/12)

9 COAG Road Reform Plan, *Funding and Implementation Issues Paper*, 13 April 2011

Both the collection of road related revenue and subsequent expenditure on the road and broader transport network are opaque and confusing. Motorists in Australia have too little visibility of the existing taxes and charges; and there is also a lack of visibility about how these revenues are expended. Indeed, of the $20.4 billion collected from motorists in 2009-10, some $16.9 billion was invested back into roads and bridges.[10] That being said, simple reforms that only balanced revenue from, and expenditure in, Australia's road network would not be possible without much broader reform to government service delivery, because it would leave a corresponding unfunded impact on government budgets.

The status quo is unsustainable, because it means falling revenues and increasing demand for transport

It is widely accepted that the current approach to road pricing is unsustainable. A range of bodies, including *Infrastructure Australia,* the Productivity Commission, the National Transport Commission and the Commonwealth Treasury (among many others) have concluded that the system requires substantial change.

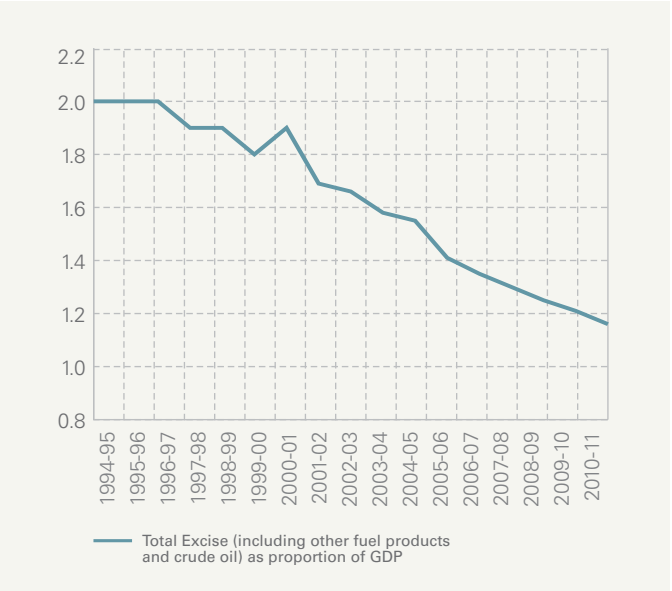
The Henry Review correctly concluded that the current taxation settings for the nation's roads would prove unsustainable in the longer-term.[11]

The Henry Review attributed the decline in Fuel Excise revenue to the cessation of indexation in 2001, which has been compounded by other causes, such as increasing efficiency of the vehicle fleet.

Figure 2.2 shows the declining level of Fuel Excise revenue between the mid-1990s and 2010-11, the trend over that period has seen fuel revenues decline from around 2 per cent of GDP to less than 1.2 per cent in 2010-11.

▼ FIGURE 2.2

TOTAL EXCISE (INCLUDING FUEL PRODUCTS AND CRUDE OIL) AS A PROPORTION OF GDP

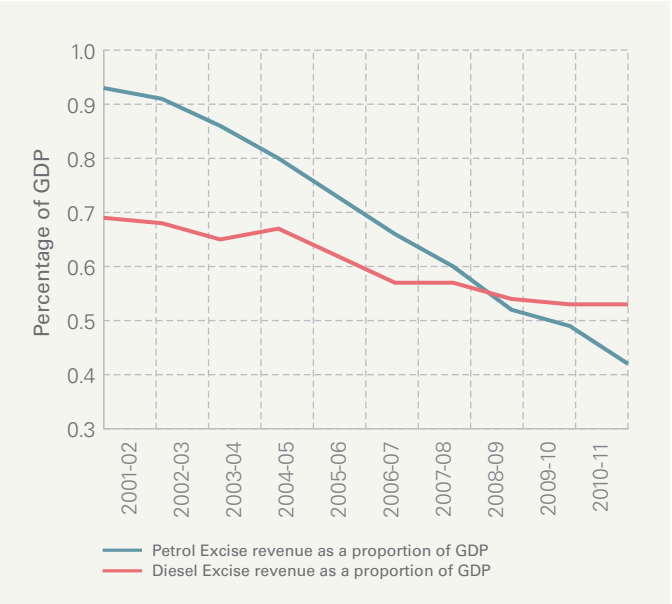


Source: IPA analysis, Budget Paper 1, Commonwealth Budget 2011-12

When petrol and diesel are considered in isolation the relative decline in revenue becomes even more apparent, with petrol excise revenue as a proportion of GDP having more than halved between 2003-04 and 2010-11. The decline of diesel and petrol excise revenue is shown in Figure 2.3.

▼ FIGURE 2.3

FUEL EXCISE REVENUE BY TYPE AS A PROPORTION OF GDP



Source: IPA analysis, Commonwealth Budgets – BP1, 2001-02 to 2010-11

10 National Transport Commission (2011), Annual Report 2011. Total includes expenditure on local roads, a portion of which is funded via local council rates, which are not included in revenue estimates.

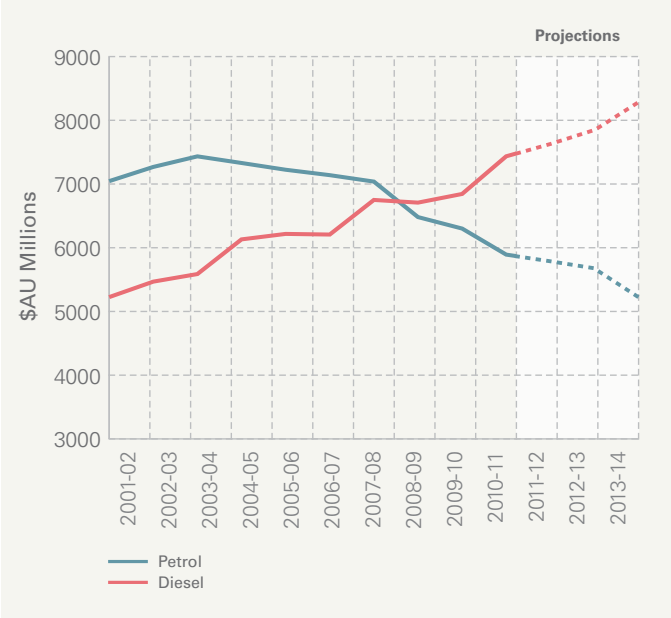
11 Henry Review, Part One, Page 53.

Figure 2.3 lends further credence to the role of increased vehicle efficiency and alternative fuels, given the much more substantial fall in petrol excise revenue over diesel. Assessment of the actual revenue generated from Fuel Excise also shows a decline in the petrol derived portion of the tax, but an increase in the portion derived from diesel – reflecting a relative shift in the fuel mix used by motorists (of all vehicle classes) toward diesel.[12]

Figure 2.4 shows the real revenue to the Commonwealth Government from Fuel Excise year-on-year since 2001-02 showing the fall in petrol excise – projected revenue is shown with a dotted line.[13]

▼ FIGURE 2.4

FUEL EXCISE REVENUE BY TYPE, 2001-02 TO 2013-14



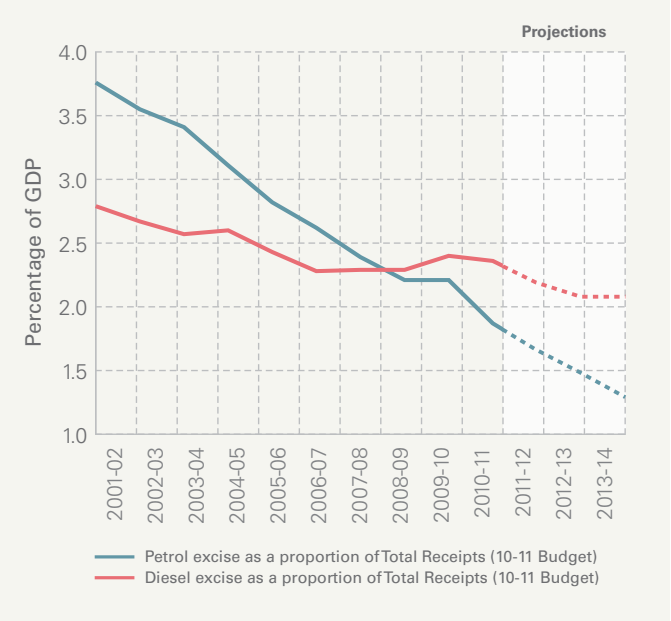
Source: IPA analysis, Commonwealth Budgets – BP1, 2001-02 to 2010-11

It is worth noting that this decline in revenue occurred during a period of substantially increasing demand for both vehicle ownership and use. In 2004, Australia had 13.5 million registered vehicles using the road network. By 2010, that number had surged to more than 16 million registered vehicles. This increase in the number of vehicles saw a corollary increase in consumption of road space, with the number of Vehicle Kilometres Travelled (VKT) surging from 199 billion VKT in 2004, to more than 226 billion VKT by 2010.

Revenue from Fuel Excise has also fallen dramatically as a proportion of total Federal Government receipts since indexation of Fuel Excise ceased in 2001, as shown in Figure 2.5. The fall in receipts from petrol excise as a proportion of total receipts has been particularly striking, falling from 3.76 per cent in 2001-02 to a projection of just 1.31 per cent in 2013-14, while the volume of domestic gasoline sales have remained relatively static ranging between 18,600 and 19,200 megalitres over the same timeframe – as shown in Figure 2.8.[14]

▼ FIGURE 2.5

FUEL EXCISE (BY TYPE) AS A PROPORTION OF TOTAL RECEIPTS 2001-02 TO 2013-14



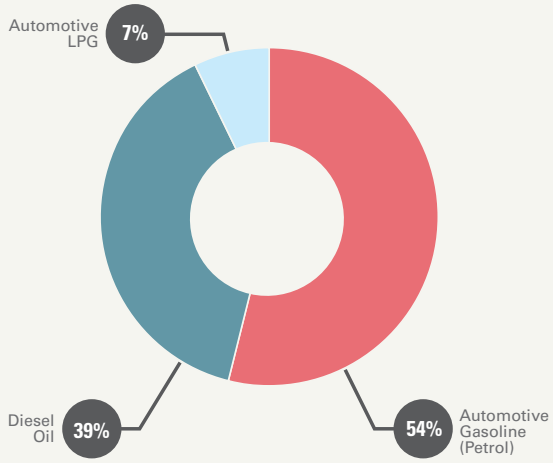
Source: IPA analysis, Commonwealth Budgets – BP1, 2001-02 to 2010-11

12 Department Resources, Energy and Tourism, Australian Petroleum Statistics, Release 90 – Jan 2004 to Release 186 – Jan 2012.
13 Commonwealth Budget 2011-12, Budget Paper 1.
14 Department Resources, Energy and Tourism, Australian Petroleum Statistics, Release 90 – Jan 2004 to Release 186 – Jan 2012.

Figures 2.6 and Figure 2.7 show petroleum product sales for 2001-02 and 2010-11 demonstrating the transfer from gasoline based fuels toward diesel over the decade.

▼ FIGURE 2.6

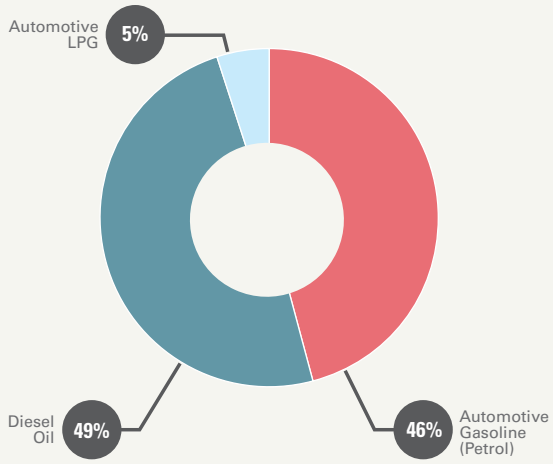
AUTOMOTIVE PETROLEUM SALES (BY TYPE) – 2001-02



Source: Department Resources, Energy and Tourism, Australian Petroleum Statistics, Release 90 – Jan 2004 to Release 186 – Jan 2012

▼ FIGURE 2.7

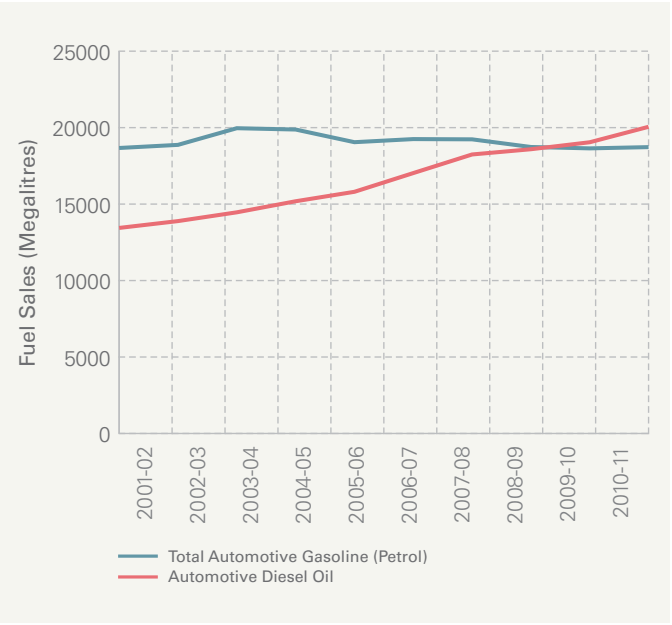
AUTOMOTIVE PETROLEUM SALES (BY TYPE) – 2010-11



Source: Department Resources, Energy and Tourism, Australian Petroleum Statistics, Release 90 – Jan 2004 to Release 186 – Jan 2012

▼ FIGURE 2.8

FUEL SALES BY TYPE – 2001-02 TO 2010-11



Source: Department Resources, Energy and Tourism, Australian Petroleum Statistics, Release 90 – Jan 2004 to Release 186 – Jan 2012

Each of these figures above support the view that the current structure is unsustainable and requires substantial change. Beyond the unsustainable decline in Fuel Excise receipts, there are other serious deficiencies in the way road access is currently priced.

The current system is unfair, and does not incentivise efficient use of the transport network.

The congestion challenges in Australia's major cities are the result of insufficient capacity to meet demand. As with any capacity constraint, there are two essential responses; either the addition of new capacity (such as through building a new lane or motorway) or by managing demand (for example by making it more expensive to drive when demand is high).

Until now, transport policymakers have focussed on a 'supply only' response, either building new capacity or simply allowing inefficient congestion to intensify.

In considering that change is inevitable (because of the falling revenue base described above), there is an opportunity to rebase the current system of road pricing to rectify the substantial inequities, cross subsidisation and inefficiencies that are created or compounded by the status quo.

Inequity or fairness is a central question in reconsidering the structure of transport pricing in Australia. Reform of the scale envisaged in this paper will undoubtedly generate a deep consideration of the winners and losers under any new model; however it must also generate greater transparencies of the shortcomings of the current approach, and options that exist to make it fairer.

For example, within a city, two light passenger vehicles impose similar impacts on other users and infrastructure through comparable consumption of road space, irrespective of their drive train or fuel type.[15] However, under the current pricing arrangements, two otherwise identical vehicles with different drive trains (i.e. one electric or hybrid and one internal combustion engine vehicle) attract markedly different levels of road use taxation, principally because the electric or hybrid vehicle uses substantially less fuel, thereby lowering its Federal taxation contribution.

This subsidy is often extended by varying degrees of discount or premium on fixed state-based charges, as governments seek to encourage lower emission vehicles or offer concessions to particular user groups. For example in Victoria owners of hybrid vehicles can expect to receive a $100 discount on vehicle registration fees, compared to owners of vehicles with internal combustion engine power plants[16] – in addition to the already lower Fuel Excise payments, due to lower consumption of fuel.

A strong public policy argument for incentivising more fuel efficient vehicles does exist, but the current pricing structure also leaves a substantial inequity, because the driver of the more fuel efficient vehicle has contributed lower charges than the owner of the less fuel efficient vehicle, even though their impact on congestion and infrastructure is similar. A restructured pricing framework, which takes into account the time and location of use, could provide the policy levers to address this inequity.

Inequities also exist in the context of journey location, where a litre of fuel used to power a vehicle in Melbourne's CBD attracts the same taxation as a litre of fuel used on the Bruce Highway in Queensland – yet the litre of fuel used at peak hour in Melbourne, Sydney or Brisbane is likely to have a greater impact on other users through urban congestion.

The current system does not incentivise efficient use of road space across periods of high and low demand

Significant road investments in major urban areas, together with expert management of network pinch points by road agencies, have each helped to alleviate the impacts of congestion and 'sweat' the existing network,[17] but there are practical limits to a supply side only approach.

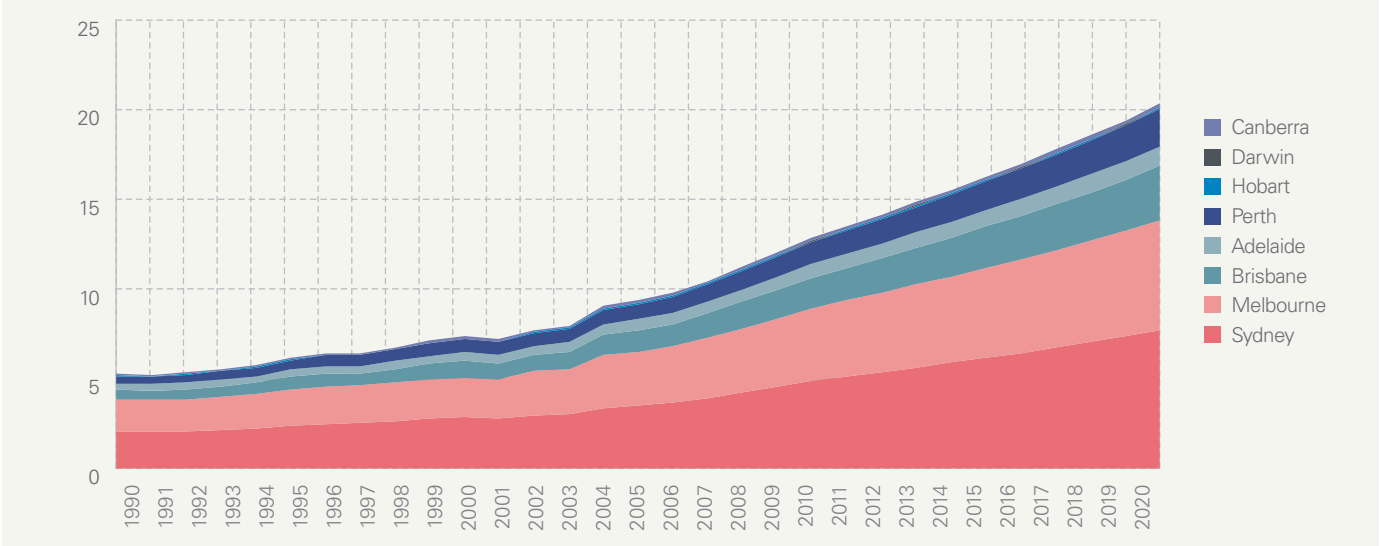
Figure 2.9 shows the Bureau of Infrastructure, Transport and Regional Economics (BITRE) projections for the total avoidable social costs of congestion in Australian urban areas from 1990 to 2020; demonstrating that the failure to adequately address urban congestion is a significant economic burden on Australia.

Current road usage means that inefficient road congestion occurs during peak and shoulder periods, with substantial excess capacity during periods of low demand (such as late evenings and early mornings).

A 'hands on' approach to demand management through price signals based on the time and location of use would allow policymakers the opportunity to spread demand throughout the day, getting much greater efficiency from the road network and delaying the need for inefficient investment in new capacity that may only be required for a few hours per day. However, the benefit of reform would also allow for a much fairer system of revenue collection, based on the time, distance and location of use.

▼ FIGURE 2.9

PROJECTED AVOIDABLE COSTS OF CONGESTION BY CITY 1990 -2020



Source: BITRE, Working Paper 71, 2007.

15 Certain vehicle features such as length and performance may have an influence on the congestion impact they impart on all users – however, two otherwise identical vehicles with distinct fuel types (i.e. one plug-in electric vehicle and one petrol engine vehicle) could be expected to have a similar impact on other users when competing for finite road capacity.

16 VicRoads Vehicle Registration Fee Schedule - http://www.vicroads.vic.gov.au/Home/Registration/FeesFormsAndFAQs/Fees/VehicleRegistrationFees.htm - accessed 22/06/2012.

17 See section 3: Why reform road pricing?

The case for change

From this section, we can see that there is a compelling case for substantial reform because:

1. the existing structure for how revenue is collected and investment directed is complex and opaque;

2. the status quo is unsustainable because it means revenues are falling as demand for transport and the corollary infrastructure investment requirements are increasing;

3. the current system is unfair, and does not incentivise efficient use of the transport network; and

4. it does not incentivise efficient use of road space across periods of high and low demand.

2.3 TRANSPARENT CHARGING REQUIRES EQUALLY TRANSPARENT EXPENDITURE

Moving to a transparent and well-conceived system of direct road user charging offers transport policymakers the opportunity to positively resolve the frailties of the existing system.

A direct system of charging for access to the road network could be structured to achieve an array of outcomes, such as rebasing transport revenue, providing direct price signals to manage congestion and incentivise public transport use, or potentially, to price other externalities, such as vehicle emissions.

The need to increase revenue has often been a key motivator for rationalised user pricing in other jurisdictions. For example, the German Heavy Goods Vehicle charging scheme generates around $5 billion per year; while the London Congestion Charge generates gross revenues of circa $400 million per year.[18]

While there is a very real need for Australia's governments to consider revenue opportunities, it must be noted that significant revenues are already collected from road users, not all of which is reinvested back into the road network.

The experience in other jurisdictions has shown that rationalised road pricing systems increase the transparency of charging, with a corollary expectation from the public that there will be corresponding increases in the transparency of expenditure from a rationalised scheme. Under a 'customer focussed' approach to road funding, as part of a direct charging model, users could reasonably expect their contributions to be invested into the land transport network by being hypothecated (earmarked) to transport capital investment.

A direct approach can also provide fairer arrangements for road use through creation of a stronger signal for users between what they contribute and how they use the transport network. Flat forms of pricing, like fixed registration charges and stamp duty, result in inefficient use of roads, as they can encourage road users to use the network as much as possible – including people who could have substituted a car journey with a public transport trip.

Key points

- Around $20.4 billion is collected annually from road users in taxes. This exceeds spending on roads and bridges, which amounted to $16.9 billion in 2009–10.
- The vast majority of funds collected from road user charges become part of consolidated revenue and the path for returning funds to road operations and maintenance is highly complex and convoluted.
- There are a range of costs that are not, and cannot be, efficiently priced using the traditional 'fuel tax and rego' model, such as the costs of urban congestion as well as the impacts of road-wear caused by some vehicles.
- Direct road charging models can help manage problems associated with the transport system; they can also provide a 'customer focussed' mechanism which strengthens the argument for road related revenue to be reinvested in road infrastructure and public transport.
- A rational approach can also provide fairer arrangements for road use by creating a stronger link between charges and how the transport network is used; giving users' effective signals to better understand their own impact on the network and on other users.

18 US Department of Transport (2009) International Scan: Reducing Congestion & Funding Transportation using Road Pricing

3 Why reform road pricing?

In considering the case for bold reform, it is worth considering the winners and losers and how momentum toward reform might be marshalled and sustained.

Where rational pricing regimes have been achieved in other countries, they have usually done so in the context of mounting congestion and dwindling efficiency across the transport network, which together create a 'burning platform' to encourage change. Australia is now entering similar preconditions, with widespread commentary and frustration in Australia's major cities showing that a 'something needs to be done' view is already well established across the public.

Moreover, the best estimates of Australia's governments show that without change, the customer impact of congestion will broadly double in the decade to 2020.

This means that a well-led, independent and national policy reform process, such as the one outlined in this paper's principal recommendation should be receptive to our policymakers, as the personal frustration and economy wide impacts of transport network congestion and investment continue to grow.

Indeed, the public may welcome an honest discussion about how changed pricing models might offer solutions to complex challenges, such as funding or maintaining roads, funding public transport and promoting a fairer allocation of costs and benefits across the transport network.

3.1 FUNDING DEVELOPMENT OF THE TRANSPORT NETWORK

In Australia's three largest capital cities, there is a long-standing experience with direct user charging to fund road network assets. Australian road users more broadly are also likely to understand that direct user charging extends the capacity to fund the construction, maintenance and operation of roads that would otherwise not exist, or would substitute other funding priorities from the stretched public purse.

Many feasible and desirable transport infrastructure projects have been identified to ease road and rail network congestion, particularly in Australia's three major capital cities. Examples of major transport projects include Sydney's $10 - $15 billion *WestConnex* motorway; Melbourne's East West link; or the completion of new CBD rail links in Melbourne (Melbourne Metro), Brisbane (Cross River Rail), and Sydney (the second harbour crossing).

Global experience has shown that rationalised road pricing schemes, particularly those which price congestion, rely on the hypothecation of revenue to transport network investment to ensure public acceptance of the system.

Both the London Congestion Charge and the German Heavy Vehicle Charging scheme use forms of hypothecation to land transport as mechanisms to provide additional network capacity. In London, net revenues from the Congestion Charge are hypothecated to public transport provision.[19] Under the German scheme, 50 per cent of revenue is allocated to roads, 38 per cent to rail and 12 per cent to waterways.

In both cases, hypothecation was seen as a major factor in underpinning public and industry support. They also generated new funding for investment in transport networks – in London, net revenue (£173.5 million 2011)[20] is invested in areas such as bus network augmentation, cycling facilities, roads and bridges that have served to make public transport an effective alternative to motor vehicle use in the Charging Zone.

As discussed in other areas in this paper, in Australia there is currently an asymmetry between the revenue collected and expended on the road network; however this paper notes if this asymmetry were corrected, governments would have to make up the revenue shortfall outside of transport, through additional charges in other areas of revenue collection.

Nevertheless, a system where transport user charges fund overall network expansion may serve to drive a greater public understanding of the trade-offs between user cost and the quality of service and capacity delivered by the transport network.

19 House of Commons Library Standard Note, SN01480, *Hypothecated taxation*, September 2011.

20 Transport for London, *Annual Report and Statement of Accounts 2010/2011.*

3.2 FUNDING NETWORK MAINTENANCE

Australia's governments expend between $5.6 billion and $7 billion dollars each year on maintaining the condition and quality of road assets.[21] However, in spite of this sizeable annual investment, the backlog of required road maintenance is substantial and worsening.[22]

The need to expand network capacity during the 1990s led to a shift in expenditure away from maintenance of asset quality (such as pothole repairs, sealing and edge repairs) toward rehabilitation (restoring road pavements to original design standard after failure – including large scale patching and reconstruction). A broader shift towards capital investment in the road network, at the expense of maintenance, since the early 2000s has seen a growing backlog in the maintenance task across the network. According to BIS Shrapnel an average of 50 to 70 per cent of the annual total roads spend was allocated to maintenance from the mid-1970s until 2002-03. Since then a shift toward capital investment has seen the proportion fall to a historical low of 35 per cent in 2008-09, and a subsequent slight recovery[23] in 2010-11, largely due to flood-related repairs. The consequence is a maintenance task that is currently not being met, compounded by a protracted period of sub-optimal investment and a series of extreme weather events.

A rational, customer focussed approach to road pricing has the potential to both expose this under-investment and also provide an enhanced revenue stream to address the backlog. Reforms to road user charging mechanisms could provide a more transparent pricing and funding framework – allowing network suppliers to better articulate the true cost of provision. By providing a more direct link between usage and charging, under a customer focussed model, road users would be better placed to insist on minimum maintenance standards across the network. Equally, a whole of network rational approach would provide valuable data for road suppliers to accurately understand usage and condition of assets – providing empirical data to inform asset managers and better allocate maintenance funding for a best of network outcome.

Australia's significant and network wide maintenance deficit and the potential for a rational pricing structure to expose and (at least partially) address that backlog, could be considered as a catalyst for a move toward reforms in the structure of road charging.

3.3 FAIRER ALLOCATION OF COSTS AND BENEFITS

The existing configuration of Fuel Excise and fixed state-based charges results in an imbalance in the allocation of costs and benefits in the transport market. The combination of high fixed charges and consumption taxes that are only marginally linked to usage means that some users are effectively subsidising others. Principally, but not exclusively, lower mileage users of the network where a greater proportion of their total charges comprise fixed components are effectively subsidising heavier users. The result can be a misalignment between what users pay and how they benefit – particularly when considered on a total cost per kilometre basis.

Equally, time and location of usage is not adequately accommodated in the existing pricing structure.[24] Meaning users in remote or low traffic areas may be effectively subsidising users in high traffic areas through an indirect contribution towards funding additional capacity to accommodate peak urban demand and thereby sharing the burden of indirect economic costs of congestion to which they do not contribute. Drivers of more modern or more fuel efficient vehicles may also pay lower overall road taxes through discounts for hybrid vehicles, or a smaller amount of Fuel Excise because of lower consumption per kilometre – despite a comparable contribution to other externalities like congestion and cost of road provision. This does not mean a new structure should seek to disincentivise more fuel efficient vehicles or alterative drivetrain technologies, but should acknowledge that greater fuel efficiency is only part of the solution to existing road problems.

Although unlikely to be an immediate catalyst for change – due to the embedded nature of the imbalance – a fairer allocation of costs and benefits may become a driver over time. With a projected increase in congestion and the shifting dynamics of fuel use and fuel types, these imbalances may grow over time. While adjustments to the current composition of road use taxation could partially address this imbalance – for example through an adjustment to the balance between fixed charges and excise or variations to the taxation for particular fuels – these modifications are unlikely to be enduring or comprehensive. A change to the framework of road user charging could be a viable option to better align the costs of road use to the benefits.

3.4 FUNDING STREAM SECURITY

In combination with a shortfall in the quantum of funding directed to land transport, the security of the funding stream is a further challenge of the existing charging framework. Transport investments are necessarily long-term, often with an intergenerational productive lifespan and an investment commitment in delivery that can cover multiple budget cycles.

The current approach to funding land transport infrastructure has become increasingly less able to meet the demands of the travelling public and businesses. A growing list of essential transport projects that are required, and a maintenance backlog that needs to be addressed, is compounded by a shortage in funding capacity and limited visibility of the forward funding pipeline. The structural origins of that shortage were explored in detail in Section 2.

Multiple reports and bodies – including the Henry Tax Review, the Productivity Commission, the Infrastructure Finance Working Group and the HVCI process – have identified both the need to increase the level and surety of investment flowing into transport infrastructure and the opportunities to harness rational pricing and user pays approaches to achieve it.

There is compelling evidence to suggest a requirement exists for the establishment of a long-term funding structure for transport infrastructure construction and maintenance; a structure that would extend beyond the relatively short-term budget cycles of

21 BIS Shrapnel, Road Maintenance in Australia 2011 – 2026, 2011 and Infrastructure Partnerships Australia, Road Maintenance: Options for Reform, 2011; Commonwealth Grants Commission, 2011; BITRE, 2011; Australian Local Governments Association, Study of local roads funding in Australia 1999-00 to 2019-20, 2010.

22 Engineers Australia, Australian Infrastructure Report Card 2010 and BIS Shrapnel, Road Maintenance in Australia 2011 – 2026, 2011.

23 BIS Shrapnel, Road Maintenance in Australia 2011 – 2026, 2011.

24 A motorist using the network at a peak time, in a high traffic location, could reasonably expect to use more fuel per kilometre than the same vehicle in an uncongested area; due to the stop start nature of congested traffic and the fuel used while stationary – thereby paying more Fuel Excise per kilometre travelled. However, this is an indirect and inefficient price on congestion.

governments and a system that is sufficiently flexible to address current shortfalls, but that also provides long-term stability of funding. A well-structured road user charging scheme could partially or completely address this weakness by providing a secure funding stream that better reflects the costs of provision and maintenance.

3.5 IMPROVING BUSINESS PRODUCTIVITY

Businesses face both direct and indirect impacts of deficiencies and inefficiencies in the transport market. In particular, congestion can have substantial adverse impacts on business productivity. Direct impacts such as additional fuel, labour and vehicle running costs can be compounded by substantial negative impacts on downstream logistics chains – together reducing the benefits of locating operations in, or close, to large urban centres.[25]

These downstream and indirect impacts can be divided into three categories:

- logistics related and business process related productivity impacts;
- market scale and market accessibility impacts; and
- business costs of worker commuting.[26]

In addition to the costs of business delay due to congestion, the costs of trip variability can be substantial. The growth of 'just-in-time' operations has increased the need for predictability in supply chains – where unplanned delays from unreliable travel conditions have considerable impacts causing firms to build in un-productive buffers to delivery schedules or carry expensive on-site inventory buffers. For example, where a logistics chain relies on scheduled delivery, failure to make a delivery due to unexpected traffic delays can require the need for rescheduling and may attract penalties for shippers.

Australian businesses and the broader economy already experience substantial costs due to congestion. Table 3.1 shows the projected annual avoidable costs of congestion impacts on business in Australia in 2020. Across Sydney, Melbourne and Brisbane nearly half (45.5 per cent) of the overall avoidable costs of congestion can be attributed to the impacts on business totalling $7.69 billion per annum in 2020 – including over $2 billion in costs to the economy as a result of business trip variability.

▼ TABLE 3.1

BUSINESS PRODUCTIVITY IMPACTS – 2020 (AVOIDABLE) COSTS OF URBAN CONGESTION (BILLIONS)

	BUSINESS DELAY	BUSINESS TRIP VARIABILITY	TOTAL BUSINESS (AVOIDABLE) COST 2020	TOTAL PROPORTION OF OVERALL (AVOIDABLE) COSTS	2020 OVERALL CONGESTION (SYDNEY, MELBOURNE AND BRISBANE)
Sydney	$2.55	$0.96	**$3.51**	45.26%	**$7.76**
Melbourne	$2.09	$0.75	**$2.84**	46.38%	**$6.12**
Brisbane	$0.99	$0.35	**$1.34**	44.27%	**$3.03**
Total (across Sydney, Melbourne and Brisbane)	**$5.63**	**$2.06**	**$7.69**	**45.49%**	**Total $16.91**

Source: IPA analysis, BITRE, Working Paper 71.

3.6 IMPROVING NETWORK PERFORMANCE

Deterioration in the performance of the road network is perhaps the strongest potential driver of reform to road user charging frameworks. Urban congestion in Australia is projected to have an impact of more than $20 billion per annum in avoidable social costs by 2020[27]. Congestion is also an issue of frustration for road users – in the 2011 IBM Commuter Pain Survey, congestion related factors rated highly as a frustration amongst Australian commuters, with 57 per cent of road users citing stop-start traffic and 36 per cent citing low traffic speeds as a daily frustration on their commutes.[28]

Transport challenges that have eventually contributed to reforms in other jurisdictions have gone beyond motorists being delayed for a few minutes by traffic congestion on isolated occasions, but have been characterised by increasing frustration and lost productivity experienced over a number of years. For example, in London in 2002, 50 per cent of businesses perceived the impact of peak-time congestion to be either critical or very bad for their business. This perception was based on pre-charging average network speeds within the Charging Zone of around 15 km/h (for vehicles in the AM peak) – speeds which had been steadily falling since the 1980s.[29]

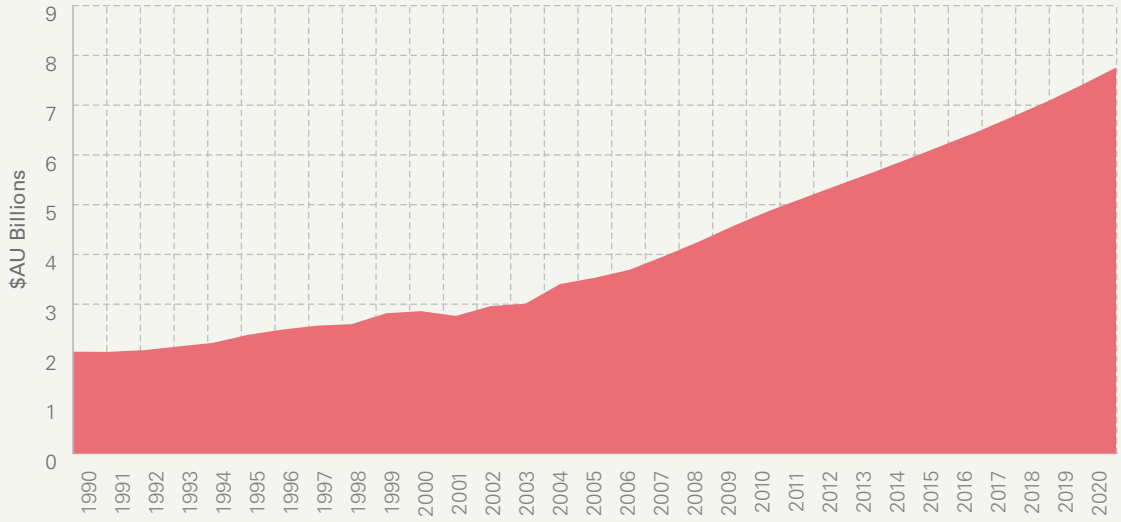
25 European Conference of Ministers of Transport, Organisation for Economic Co-operation and Development (OECD) 2007, Managing Urban Traffic Congestion, page 156-158.
26 Ibid.
27 Bureau of Transport and Regional Economics, 2007, Estimating urban traffic and congestion cost trends for Australian cities, Working paper 71
28 IBM (2011) Commuter Pain Study (Online) http://www-03.ibm.com/press/au/en/pressrelease/33560.wss (Accessed 26/03/2012)
29 Transport for London 2003, Impacts Monitoring – First Annual Report, Central London Congestion Charging Scheme. Available at: http://www.tfl.gov.uk/assets/downloads/Impacts-monitoring-report1.pdf.

Peak spreading, flexible working arrangements and technology have all played an important role in extracting greater supply from road networks without necessarily investing in new road capacity. Australian cities exhibit relatively concentrated peak periods, with 60 per cent of commuters departing for work between 0700hrs and 0900hrs and 53 per cent leaving between 1600hrs and 1800hrs. Other cities around the world have been typically better able to spread peak demand; just 12 per cent of commuters work after 1800hrs in Perth and Brisbane, as opposed to 65 per who stay after 1800hrs in New Delhi, 64 per cent in Moscow and 48 per cent in Madrid.[30]

The comparatively concentrated peaks experienced in Australian cities suggest improved utilisation of the existing capacity could be achieved through peak spreading, however the effectiveness of these behavioural responses is likely to decline over time as a result of growing populations and increasing travel demand. Incentivising peak dispersal through pricing (either as a discrete tool or as part of a broader charging regime) is widely used by other utilities providers such as telecommunications and energy networks, and is one area of road pricing reform that could be considered to extract greater usage from the existing road network.

NETWORK PERFORMANCE: SYDNEY

Projected avoidable costs of congestion: Sydney 1990-2020



Source: BITRE, Working Paper 71.
The social costs of congestion in Sydney have grown from $2.045 billion in 1990 to $5.392 billion in 2012 and are projected to stand at $7.755 billion by 2020.

Figure 3.1 shows results from annual surveys of travel speeds undertaken by the Roads and Traffic Authority of New South Wales between 1990 and 2010. This data suggests that speeds on major roads in Sydney have generally remained constant over the period of examination. While some speeds have decreased, others have also increased as a result of increases in road capacity. This is in light of strong growth of traffic volumes over the period of analysis, suggesting the need for more effective management of the available road space.

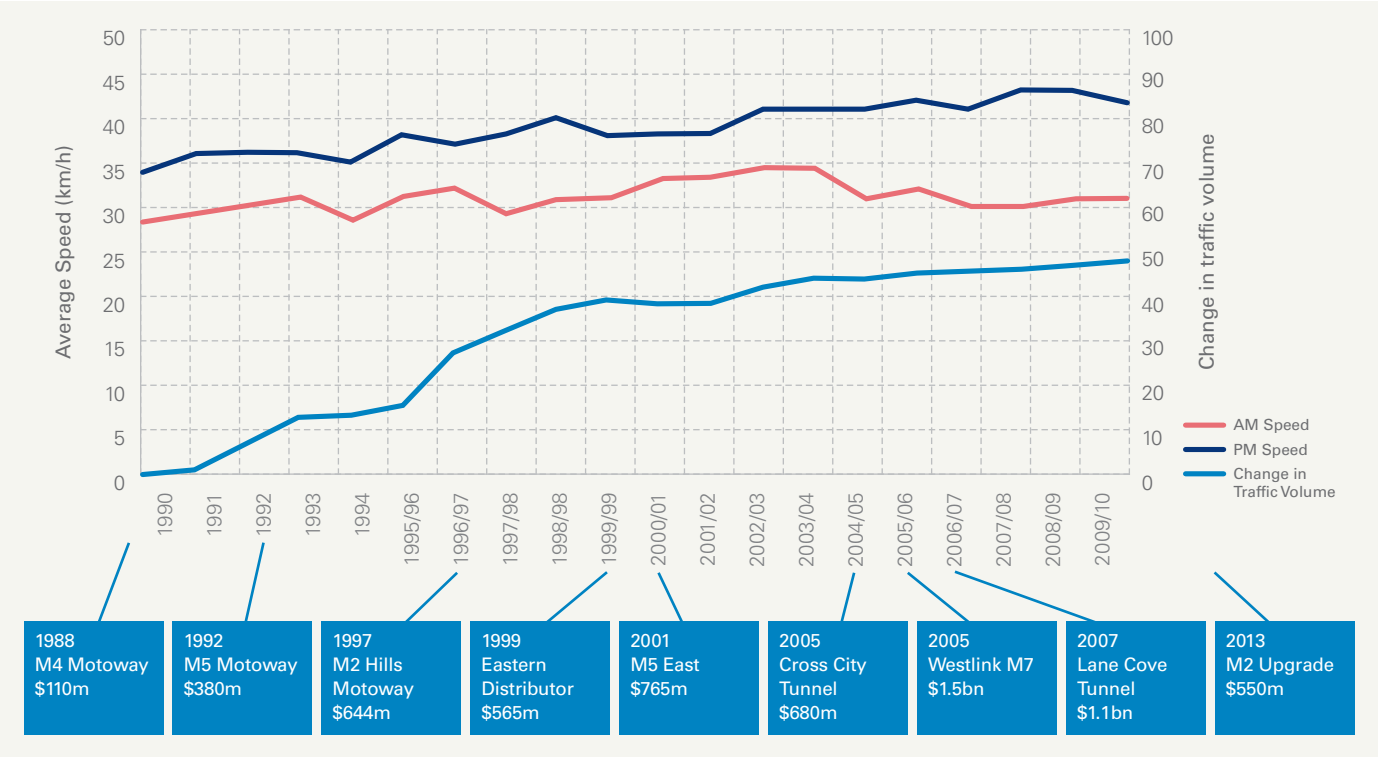
However, it is important to note the number of significant road link construction projects which occurred over the period of examination. These projects, and their cost of construction, are also shown in Figure 3.1. This illustrates the significant investment in infrastructure needed to maintain these road speeds in an environment of traffic volume growth – with close to 50 per cent growth in traffic volume in the two decades to 2009-10. The impact on the seven major routes may also in part be due to traffic diverting along minor traffic routes, possibly leading to greater congestion across a broader area of the secondary road network.

Detailed data for all seven routes published in the New South Wales Auditor General's 2011 Report to Parliament shows severe and growing congestion challenges on specific corridors as shown in Table 3.1. The M4, Military Road and Victoria Road all had average AM peak traffic speeds of at, or below, 25km/h in 2011 and the M5/Eastern Distributor corridor has seen AM peak speeds fall from 40km/h in 2007 to just 34 km/h in 2011.

30 Ibid.

▼ **FIGURE 3.1**

SYDNEY TRAFFIC TRENDS LINKED WITH ROAD CONSTRUCTION PROJECTS[31]



▼ **TABLE 3.2**

AVERAGE SPEED TREND FOR SEVEN MAJOR SYDNEY ROADS 2007-11

YEAR ENDED 30 JUNE	ACTUAL SPEED (km/h)				
	2011	2010	2009	2008	2007
Morning Peak Speeds					
F3/Pacific Highway/F1	**33**	34	35	35	35
M2/ Lane Cove Tunnel/ Gore Hill Freeway	**36**	39	36	31	38
M4/Parramatta Road/City West Link	**25**	28	29	28	25
M5/ Eastern Distributor	**34**	35	41	34	40
Pittwater Road/Military Road/F1	**25**	25	26	26	27
Princes Highway	**29**	31	30	28	28
Victoria Road	**24**	26	21	23	22
Combined seven routes	**29**	31	31	30	30
Afternoon Peak Speeds					
F3/Pacific Highway/F1	**54**	53	50	52	45
M2/Lane Cove Tunnel/Gore Hill Freeway	**60**	65	66	61	47
M4/Parramatta Road/City West Link	**39**	35	39	40	38
M5/ Eastern Distributor	**51**	54	56	48	50
Pittwater Road/Military Road/F1	**35**	34	38	39	38
Princes Highway	**32**	32	32	36	35
Victoria Road	**31**	34	33	32	31
Combined seven routes	**42**	42	43	43	41

Source: New South Wales Auditor General, Auditor-General's Report to Parliament - Volume Eight, 2011, page 60.

31 NSW RTA (2009) Annual Speed and Traffic Volume Data in Sydney

Perceptions of congestion in Sydney

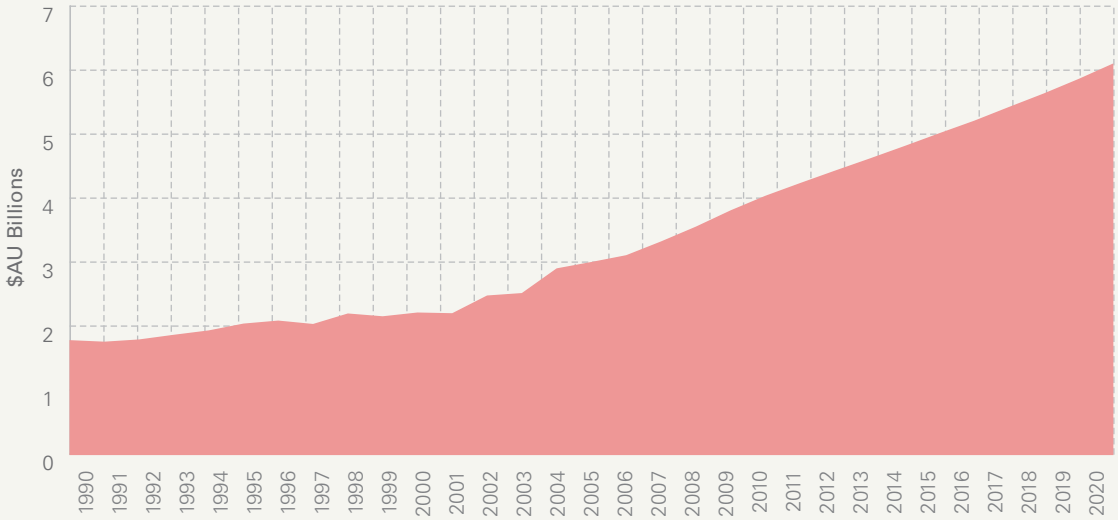
According to the IBM Commuter Pain Survey (2011), as many as 85 per cent of Sydney drivers find aspects of their commute frustrating, with stop-start traffic cited as the biggest frustration. The slow speed of the commute is also a frustration for 40 per cent of Sydney drivers. The IBM survey reveals that 53 per cent of Sydney drivers feel that roadway traffic has become worse in the last three years and 41 per cent of Sydney drivers have been stuck in traffic for one hour or more in the last three years. This has resulted in as many as 84 per cent of Sydney drivers experiencing travel stress. Congestion in Sydney has acted as a relatively blunt demand management tool - in the last three years 27 per cent of drivers indicated that roadway traffic has been so bad that they turned around and went home and 39 per cent decided not to make a driving trip in the last month.[32]

32 A decision not to make journey due to congestion factors may be a rational one with limited or no economic impact; such as where the trip purpose is discretionary or the service requirement being accessed through the trip can be fulfilled by some other means. However, it may also impart a direct financial cost on the user and/or an economic cost on the broader community.


BUS
LANE
BUS
LANE

NETWORK PERFORMANCE: MELBOURNE

Projected avoidable costs of congestion: Melbourne 1990-2020

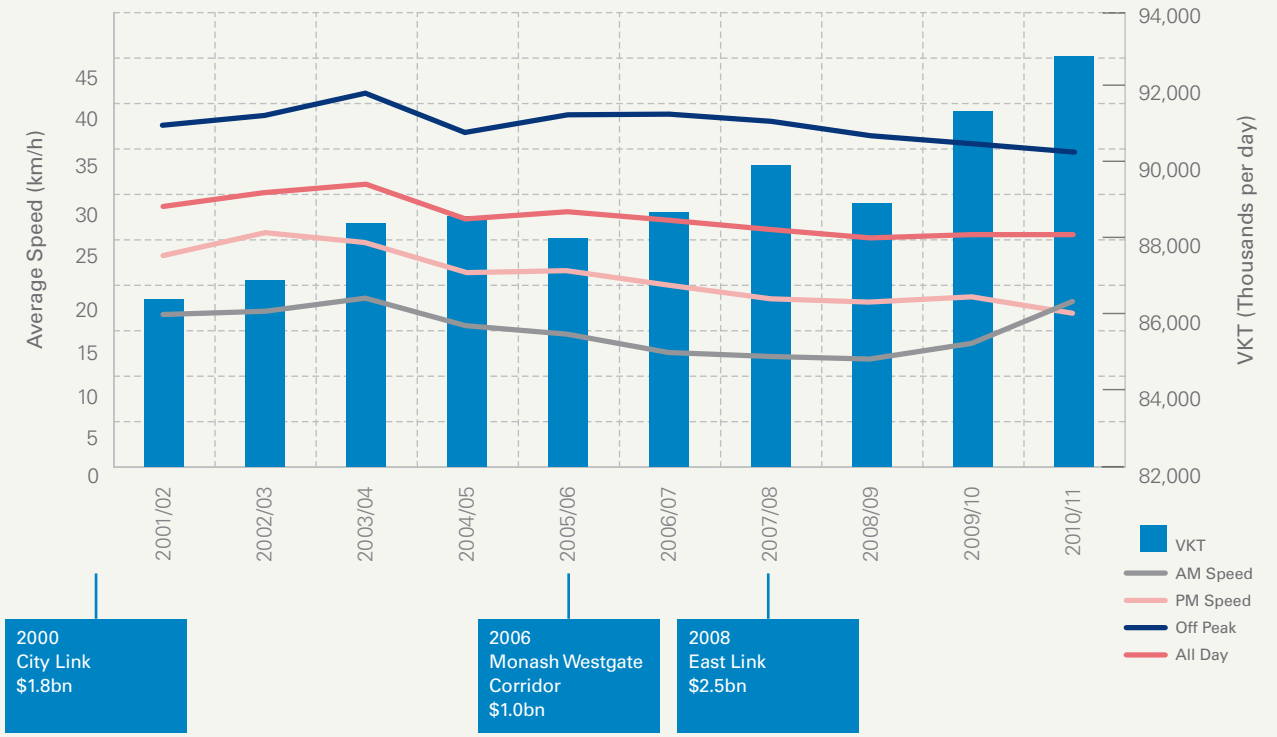


Source: BITRE, Working Paper 71.
The social costs of congestion in Melbourne have grown from $1.797 billion in 1990 to $4.447 billion in 2012 and are projected to stand at $6.123 billion by 2020.

Figure 3.2 shows travel speed data for Melbourne over the last 10 years. This shows a predominant pattern of declining travel speeds in recent years. Whilst a number of new motorways and several major interchange projects have been delivered over this period, the capacity enhancements in Melbourne have not been as significant as in Sydney. The recent increase in AM peak travel speeds may be the result of the opening of the East Link toll road. Consistent with the Sydney scenario, additions to the network have slowed the rate of decline in average speeds by providing new capacity in the context of substantial growth in traffic volumes during the decade to 2010–11.

▼ **FIGURE 3.2**

MELBOURNE TRAFFIC TRENDS LINKED WITH ROAD CONSTRUCTION PROJECTS [33]



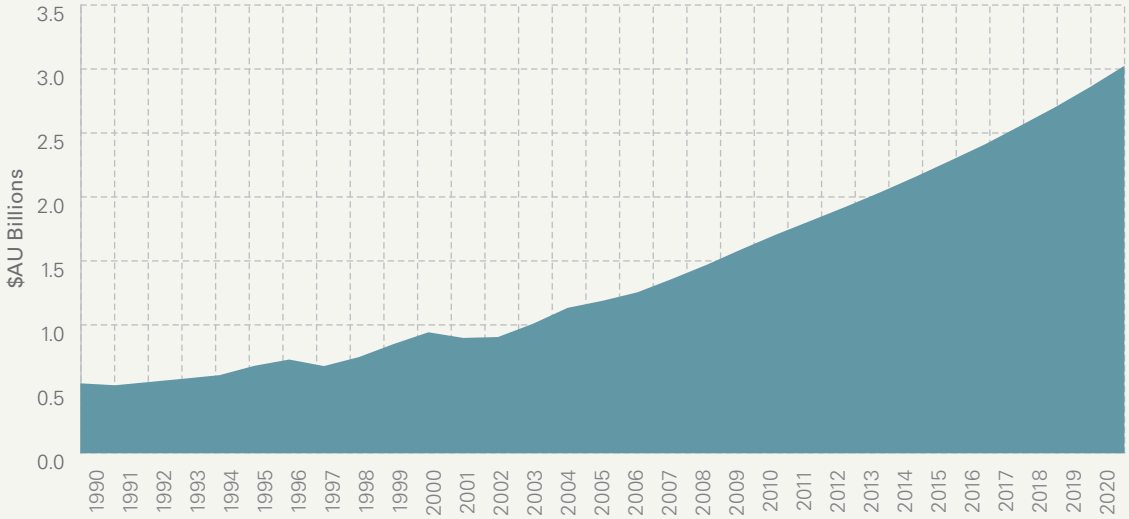
Perceptions of congestion in Melbourne

The IBM Commuter Pain Survey (2011) found 83 per cent of Melbourne drivers find aspects of their commute frustrating, citing stop-start traffic as the biggest frustration. The survey found that average commutes in Melbourne covered 18 kilometres and took 32 minutes at an average speed of 34 kilometres an hour. Twenty-two per cent of motorists in Melbourne said the road traffic had been so severe they had turned around and not completed their journey and 34 per cent decided not to make a journey because of traffic conditions in the last month.

33 VicRoads (2011) Traffic system performance monitoring bulletins

NETWORK PERFORMANCE: BRISBANE

Projected avoidable costs of congestion: Brisbane 1990-2020

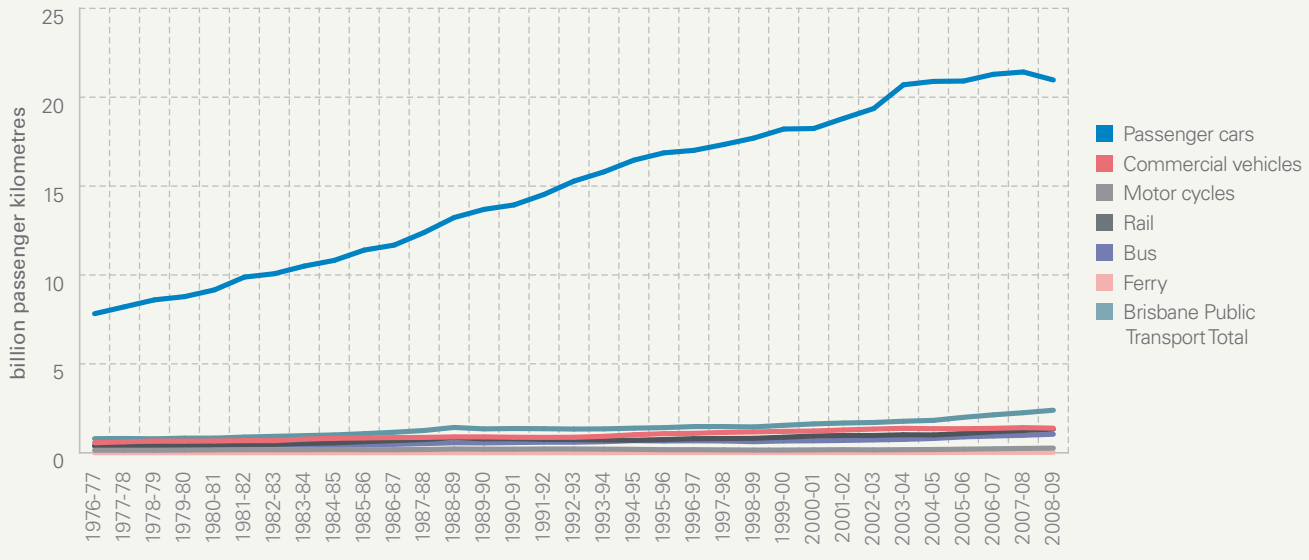


Source: BITRE, Working Paper 71.
The social costs of congestion in Brisbane have grown from $545 million in 1990 to $1.926 billion in 2012 and are projected to stand at $3.027 billion by 2020.

In Brisbane/South East Queensland, recent work by the RACQ suggests that speeds on many key arterials have reduced whilst speeds on other parts of the network have increased as a result of motorways and other road improvements.[34] Longer term trends in South East Queensland are difficult to establish with existing data. Figure 3.3 shows the growth in passenger vehicle use, compared to other modes, in Brisbane between 1976 and 2009, demonstrating the long-term trend in private vehicle use growth.

▼ FIGURE 3.3

TOTAL PASSENGER KILOMETRES BY CAPITAL CITY – BRISBANE, 1976-2009

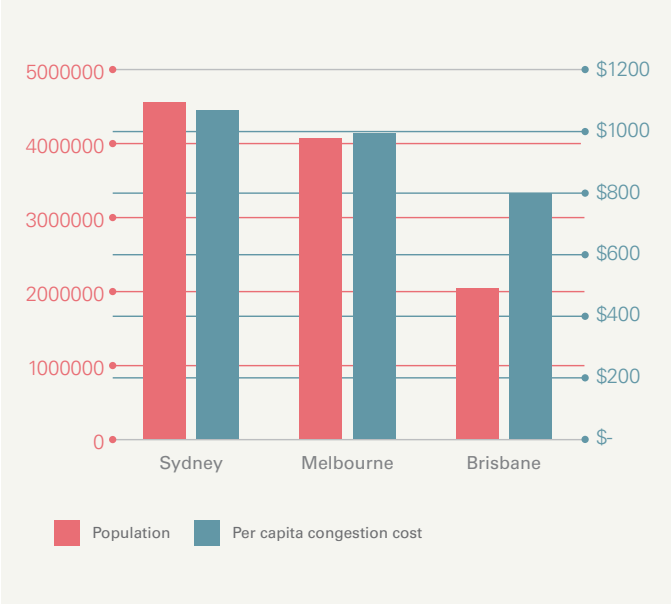


Source: IPA analysis of BITRE, Infrastructure Yearbook 2011, Statistical Report, 2011

34 RACQ (2010) Travel Time Survey, Report prepared by RACQ Traffic and Safety Department

▼ FIGURE 3.4

PER CAPITA COSTS OF CONGESTION



Source: IPA analysis of Australian Bureau of Statistics 3220.0 and BITRE Working Paper 71

Whilst Brisbane currently experiences less congestion compared to Sydney and Melbourne,[35] rapid population growth and a doubling of the road freight task from 2006 levels by 2026 are expected to place increasing pressure on the region's transport network in the future.[36] When congestion is assessed on a per capita basis, the extent of the impact of congestion in Brisbane is exposed. While Brisbane has less than half the population of Sydney and Melbourne, per capita congestion costs run at about 80 per cent of Sydney and around 85 per cent of those experienced in Melbourne (see Figure 3.4).

Perceptions of congestion in Brisbane

More than half (55 per cent) of motorists felt traffic had become worse in Brisbane over the last three years according to the 2011 IBM Commuter Pain Survey. The average commute observed by the survey in Brisbane took 29 minutes, covering 19 kilometres at an average speed of 39km/h. Frustration with aspects of the commute was acknowledged by 80 per cent of commuters, with stop-start traffic cited as the biggest problem. Thirty-one per cent of drivers surveyed had chosen not to make a journey in the last month due to traffic conditions.

35 Bureau of Infrastructure, Transport and Regional Economics (2007) Working Paper 71 – Estimating urban traffic and congestion cost trends for Australian cities

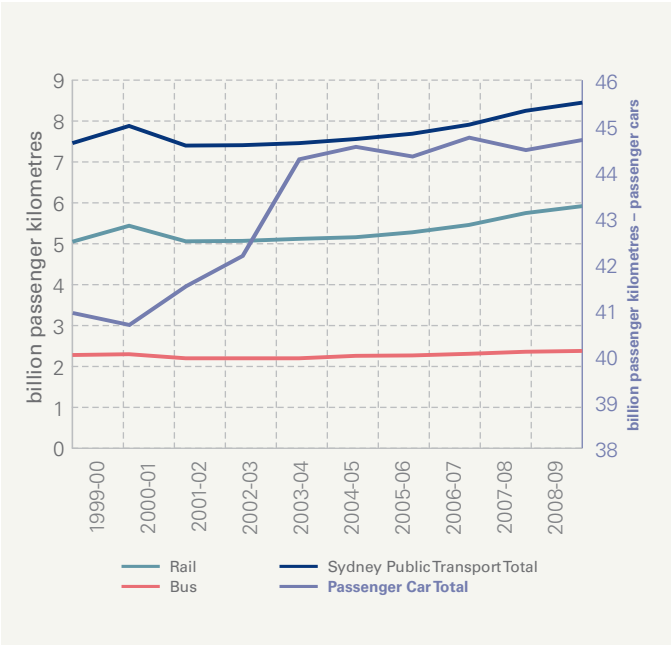
36 Saha International (2009) Urban Transport Challenge: Planning for South East Queensland, Report prepared for Infrastructure Partnerships Australia

3.7 IS AUSTRALIA READY FOR CHANGE?

Evidence suggests that while our cities are not experiencing 'London levels' of congestion, strong population growth appears to be catching up with our transport network. Road speeds have not shown uniform trends – some corridors have experienced declining average speed and other have experienced consistent or increasing average speeds. Traffic volumes measured in total passenger kilometres travelled by passenger vehicles in major cities have also shown consistent growth over the past three decades;[37] however, over the past few years, overall passenger kilometres by car have plateaued or declined marginally in Sydney, Melbourne and Brisbane as shown in Figures 3.5, 3.6 and 3.7. During the same period there has been a marginal increase in the mode share of urban public transport (UPT). Figure 3.8 shows that between 2004 and 2010 the mode share of UPT in Australia's capital cities experienced an upward trend, which levelled out in 2010. This change in growth trajectory and contingent modal shift could be attributable to a number of factors including rising fuel prices, effects of congestion, availability of other modal options and broader economic conditions including the impacts of the Global Financial Crisis.[38]

▼ **FIGURE 3.5**

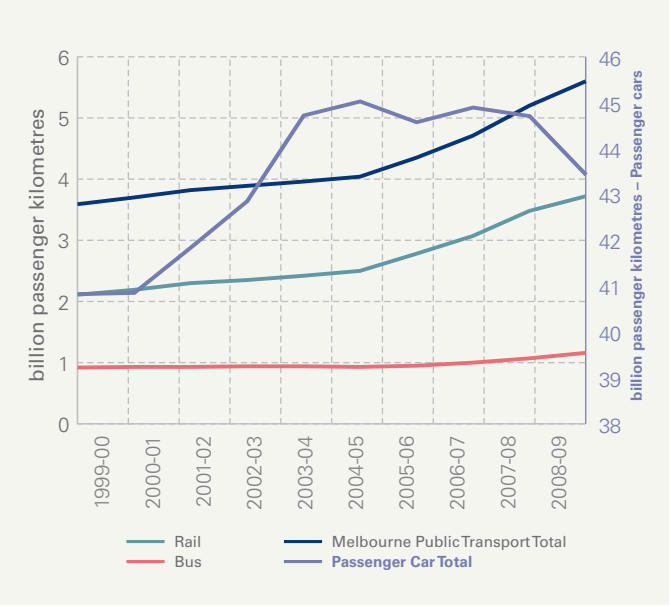
TOTAL PASSENGER KILOMETRES TRAVELLED BY CAPITAL CITY – SYDNEY, 1999 - 2009



Source: IPA analysis of BITRE, Infrastructure Yearbook 2011, Statistical Report, 2011

▼ **FIGURE 3.6**

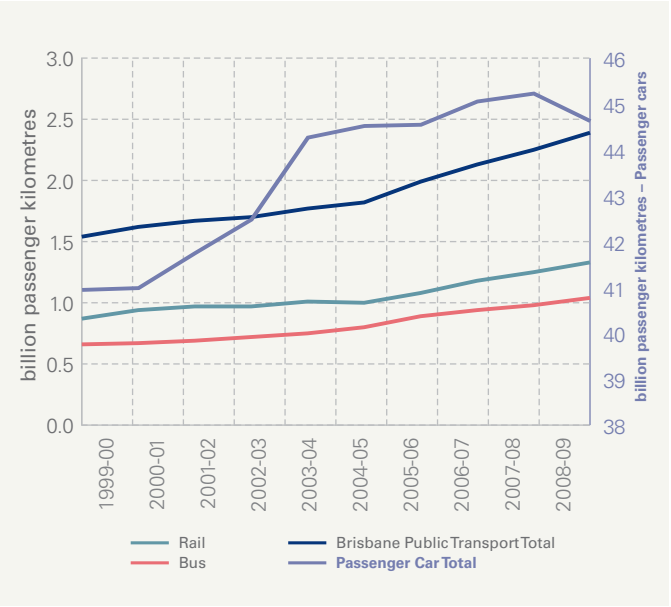
TOTAL PASSENGER KILOMETRES TRAVELLED BY CAPITAL CITY – MELBOURNE, 1999 – 2009



Source: IPA analysis of BITRE, Infrastructure Yearbook 2011, Statistical Report, 2011

▼ **FIGURE 3.7**

TOTAL PASSENGER KILOMETRES TRAVELLED BY CAPITAL CITY – BRISBANE, 1999 – 2009



Source: IPA analysis of BITRE, Infrastructure Yearbook 2011, Statistical Report, 2011

37 BITRE, *Infrastructure Yearbook 2011*, Statistical Report, 2011

38 BITRE, *Public transport use in Australia's capital cities: modelling and forecasting*, Research Report 129, p. v.

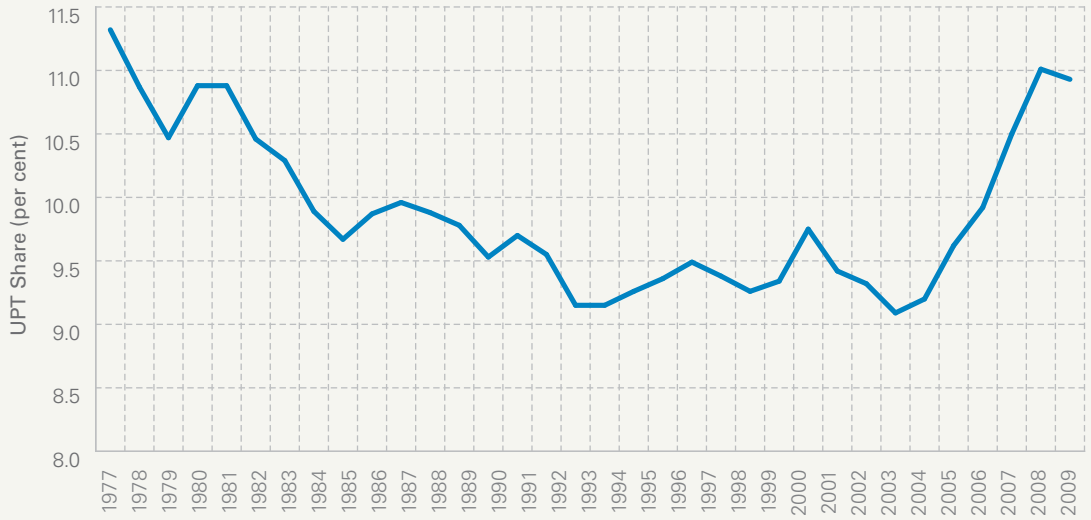
Whilst there has not necessarily been a uniform decline in travel speeds within major Australian cities, road users' perceptions of congestion have reflected a growing frustration with crowding and bottlenecks on particular sections of urban networks.[39]

A driver's perceived level of congestion and resulting level of frustration could be a major factor in their willingness (or otherwise) to accept a new approach to the way road use is priced. Where congestion is perceived as becoming 'unbearable' and delays unacceptable, users could be more likely to consider changes to the current road user charging regime.

Maintenance and improvement of current network performance will continue to require significant investments in capacity, but opportunities to expand road capacity are likely to become more limited and costly, particularly in cities with mature motorway networks such as Sydney. Reforms to address challenges in the current charging structure can help get more out of our existing transport network and ensure future investments in capacity enhancement deliver the best possible value for money. The best time for evaluating options and planning for the future is while the problems with the system are still manageable.

▼ FIGURE 3.8

URBAN PUBLIC TRANSPORT MODE SHARE, METROPOLITAN AUSTRALIA, 1977-2009



Source: IPA analysis of BITRE, Public transport use in Australia's capital cities, Research Report, 2013

Key points

- Important drivers for change include the need for more road network expansion funding, greater maintenance funding, a fairer allocation of costs and benefits of road use or the need to improve network performance.
- A well-structured road user charging scheme could help to secure a consistent funding stream for investment in land transport – meaning capital investment and maintenance spending can be allocated with a visibility of future funding streams.
- Evidence suggests that while our urban areas are not experiencing 'London levels' of congestion, robust population growth and other factors are exposing capacity constraints on urban transport networks.
- Opportunities to expand road network capacity to meet demand growth are likely to become increasingly limited and costly – reforms to the structure and application of road user charging have the potential to extract greater utility from the existing network and structurally embed those system benefits.
- In 2012, the avoidable social costs of congestion in Australia will be $14.2 billion. By 2020, congestion will strip more than $20 billion from the economy annually.

39 IBM (2011) Commuter Pain Study.

4 Principles and options to better price road use in Australia

Whereas the preceding chapters have focussed on the weaknesses of the current model and the broad opportunities that might be realised through reform, this chapter concerns itself with a basic description of how different pricing models might be used to achieve different outcomes. Beyond identifying the problems a road pricing regime may seek to solve, any future structure would need to establish a set of objectives and principles for reform.

4.1 AVOIDING COMPETING OBJECTIVES

In considering reform to the system of road user charging, policymakers will need to first clarify the objectives that are being sought. For example, is the scheme designed to maximise revenue; manage congestion; incentivise particular technology types (such as hybrids); or is it a mixture of all of these?

This section will seek to highlight that clarity about the outcome will largely dictate the design and impact of a reformed road pricing scheme.

For example, if the only outcome sought was to manage CBD congestion, then transport policymakers would likely pursue a more modest scheme, like the London Congestion Charge. However, if transport policymakers instead seek to address the range of challenges identified in the earlier sections of this paper, then it will necessarily demand a more careful consideration of scheme objectives, and the relative priorities of each.

This careful consideration is required to ensure that outcomes do not ultimately deliver a system with competing, or unmet, objectives.

At its most basic, direct road pricing is an opportunity to shape behaviour and change demand profiles, delivering more efficient signals for new investment and the allocation of capacity within and across transport networks.

Table 4.1, below, considers the broad policy objectives that have been sought in direct pricing schemes in other jurisdictions.

▼ TABLE 4.1

OBJECTIVES OF SELECTED ROAD USER CHARGING SCHEMES

SCHEME	MAIN POLICY OBJECTIVES
Germany – heavy vehicle road user charging	Raise revenue based on a user pays system
Singapore – area network charging	Demand management
Stockholm – cordon pricing scheme	Reduce congestion, increase accessibility and improve the environment
London – area-wide scheme	Reduce traffic and congestion in central London, and also to provide funding for transport investments
Trondheim – multi zonal charging	Raising private sector revenue to support needed urban transport infrastructure investment
Manchester – multi cordon pricing (rejected 2008)	Raise revenue for public transport investment and control congestion

Source: Deloitte

4.2 PRINCIPLES FOR REFORM

The following principles have been developed from Infrastructure Partnerships Australia's previous study on universal road user charging, *Urban Transport Challenge: a discussion paper on a role for road pricing in the Australian context,*[40] and has been further informed through consultation with Australia's peak motoring organisations, in response to the issues and problems identified in the preceding sections of this paper.

The reform principles outlined in Table 4.2 have been developed to inform the design of the indicative road user charging framework presented in this paper.

▼ TABLE 4.2

PRINCIPLES FOR AUSTRALIAN ROAD PRICING REFORMS

Objectives	A rationalised road user charging scheme should provide: • a mechanism to sustainably fund additions to the transport network; • a mechanism to sustainably fund maintenance of the network; • a fairer allocation of costs of benefits in the transport market; • funding stream security; and • an opportunity to improve network performance.
Scope and pricing	Prices should be set so that the total revenue generated by direct charging matches the current total revenue collected from road users. Any future scheme should be structured in a way that does not discourage private sector investment to address Australia's land transport infrastructure deficit.
Revenue allocation	Revenue generated through any scheme should be re-invested in the construction, maintenance and operation of infrastructure to facilitate mobility, including public transport.
Implementation	A new road user charging scheme should balance simplicity against the need to achieve complex reform objectives. If a scheme ultimately seeks to balance a range of objectives, then clear articulation and relative priority will have to be considered and priced. Potential impacts of new charging arrangements should be tested through pilot trials.
Privacy	Protecting the privacy of road users should be a central consideration in the design of the scheme.
Technology	Technology should be driven by scheme design, with final solutions to be developed through trials and competitive processes – including the flexibility to be delivered using a variety of technology solutions and allowing the market to determine the best approach.

4.3 WHICH ROAD USER CHARGING MODELS MIGHT BE CONSIDERED FOR AUSTRALIA?

In designing a new pricing scheme, transport policymakers must consider the effectiveness of particular models in resolving (or further complicating) the key challenges that exist under current arrangements, as well as the likelihood of unintended negative consequences from reform options.

This section examines the broad options that exist to price road networks, ranging from smaller, discrete pricing models, through to broader schemes that seek to change behaviours across the entire road network.

This section will explore the trade-off between scheme simplicity on the one hand, and the utility of the scheme to address a broader range of transport policy challenges on the other.

For example, road pricing schemes like the London Congestion Charge have the benefit of being relatively simple and thus, easily understood by the public. However, a model like the London Congestion Charge is unlikely to offer the opportunity to deal with the broader array of transport challenges that were discussed in the earlier sections of this paper – pointing to a need to consider a more sophisticated pricing system.

In designing a pricing scheme, transport policymakers have the opportunity to use price signals to change broader behaviour. For example, consideration of pricing models could include:

- The time of day the network is accessed;
- The distance travelled (e.g. the amount of road space consumed);
- The location of travel (e.g. CBD/urban, rural, specified area);
- Vehicle mass;
- The creation of externalities (e.g. noise, congestion, pollution); and/or
- The model of vehicle (e.g. hybrids, safer vehicle design etc.).

Adjusting the balance of these elements within a pricing framework can be used to achieve different outcomes. For example, a whole of network pricing model may include each of these elements to deliver a rational price on road usage, while specific components could be used to address discrete problems – such as a location based system to tackle a particularly congested urban area or corridor.

40 See Infrastructure Partnerships and SAHA International, *Role for Road Pricing in an Australian Context*, April 2010.

The following section outlines some examples of partial network charging models and whole-of-network rational pricing frameworks – including those covering specific vehicle classes and a model covering all vehicles.

The examples given below are not exhaustive, but seek to present a range of schemes that could be considered.

4.4 PARTIAL NETWORK PRICING

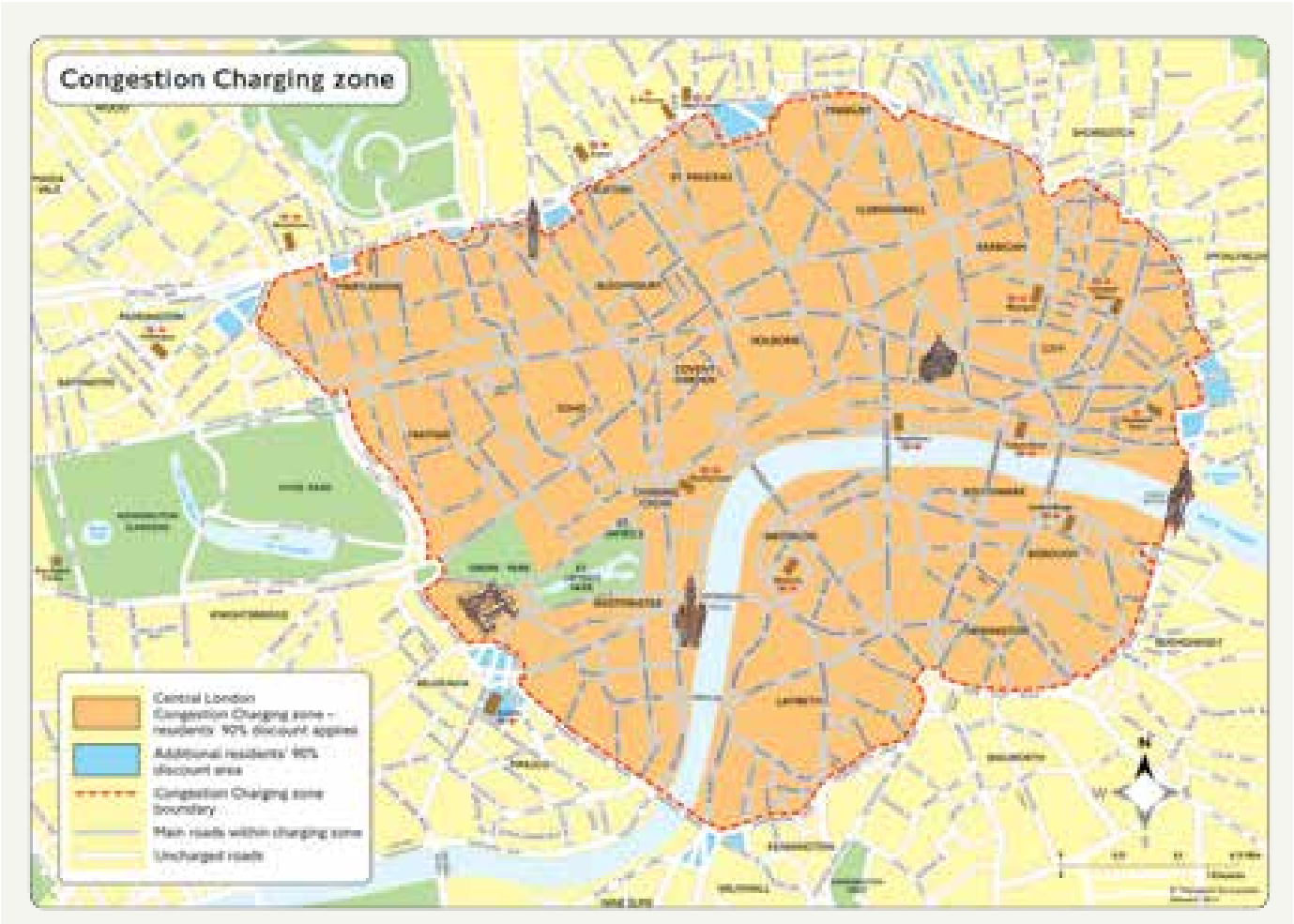
Location specific charging schemes – Cordon and area congestion charges

While they are slightly different, cordon and area charging systems can be considered together because they have a common approach of pricing access to a particular area at particular times of high demand (such as peak periods). A cordon or area scheme generally applies a fee or tax on all road users entering a defined area, usually within a city centre or central business district.

A cordon or area charge will usually have a simple, single objective of pricing congestion, providing an incentive for motorists to consider alternatives to private vehicle use within the cordon or area – but it will often be combined with a transport or public transport funding mechanism. The broader community is relatively familiar with this sort of approach, because they have been applied successfully in other jurisdictions (including London – see Figure 4.1, Stockholm, Milan and Singapore, among many others).

▼ **FIGURE 4.1**

THE LONDON CONGESTION CHARGING ZONE (A CORDON CHARGING SCHEME)



Source: Transport for London, 2013

This approach has proven successful in managing congestion. Because a price is applied for access to or use within the priced area or cordon at times of high demand, it creates a strong incentive for private vehicles or low-value journeys to avoid the area, seek access at times when the price is not in effect or change transport modes.

The simplicity of the scheme is also attractive for policymakers. It allows for the most damaging aspect of inefficient network congestion to be priced, creating a new revenue stream that can be used to invest in better road and mass transit options. Because of the discrete coverage of these kinds of schemes, it also means that the motorists affected by the scheme are the principal beneficiaries, through reduced congestion and complementary investment of the revenues in the broader transport network.

Efficacy in an Australian context

Global experience has shown that cordon or area pricing schemes work well to manage congestion and may offer solutions in Australia's major CBDs.

Because these schemes are trying to modify a simple behaviour (the time of access to a congested area) these schemes are relatively simple to design and implement. However, as shown in Table 4.3 below, the modest reach of an area scheme offers diminished opportunities to resolve the other objectives considered within a road pricing reform agenda.

▼ TABLE 4.3

DOES A CORDON/AREA PRICING MODEL MEET THE REFORM OBJECTIVES?

CAN CORDON/AREA PRICING	CORDON/AREA PRICING
Fund additions to the transport network	✔
Fund network maintenance	●
Provide a fair allocation of costs and benefits	✔ ●
Provide a secure funding stream	✔
Provide the opportunity to improve network performance	●

Corridor specific charging schemes – National Highway Improvement Charge model

Corridor specific pricing schemes, referred to in this paper as a National Highway Improvement Charge (NHIC) model, are another option that could be considered to better price strategic road corridors in Australia.

These models collect road user fees for access to a particular highway, or section of highway, working in a similar way to a capital city toll road, or turnpikes in other jurisdictions.[41]

Revenues are usually earmarked for investment in the priced road corridor. On this basis, the system is attractive to motorists and the community, because it transparently funds upgrades and improvements within the corridor for which a fee is charged.

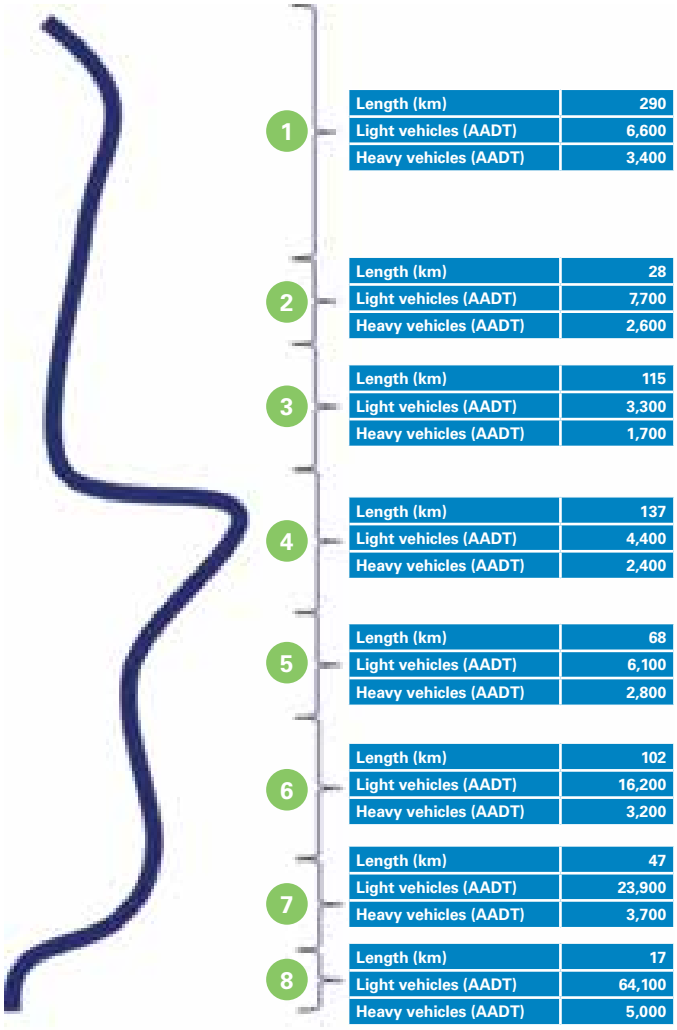
A NHIC may have merit within the Australian context, because it could shift the cost of completing, maintaining and operating the national highway network away from the Federal and state governments. Options might include a NHIC levied for use along the Hume, Pacific and Bruce Highways, thereby increasing the funding available to Australian governments to complete upgrades along these corridors to highway standard.

Figure 4.2, opposite, considers a theoretical highway which might be selected for a NHIC style pricing regime. In this example, the road is divided into eight sections, based on hypothetical boundaries (which might be guided by geographic boundaries, strategic road connections or other matters). In this example, the road corridor is segmented into eight areas, with estimates of the Annual Average Daily Traffic (AADT) based on vehicle type. This corridor could be charged on a per kilometre basis, or for the number of sections accessed in a journey.

41 This concept was explored in a feasibility study undertaken by the Department of Transport and Regional Services in 2005.

▼ FIGURE 4.2

INDICATIVE HIGHWAY IMPROVEMENT CHARGING MODEL



Efficacy in an Australian context

Obviously, equity considerations such as the price paid by local residents along the corridor (for whom it is necessarily a local road), would need to be resolved.

A corridor specific charging model has previously been applied to some sections of intra-urban highways, such as the F6 and F3 corridors in Sydney. These charges were discontinued in the 1990s. More recently, the efficacy of this approach on the Pacific Highway was subject to consideration by the Federal Government, but it is understood that it was found to be unviable.

While this model may offer utility in terms of completing, maintaining and upgrading discrete sections of Australia's national highway network and modestly increasing the public sector's revenue take, this model again fails to meet broader aims because it does not address urban congestion, or address the broader challenge of diminishing, transport related revenues.

Table 4.4 gives a broad evaluation of the NHIC model against the reform objectives developed earlier in this paper.

▼ TABLE 4.4

DOES A NATIONAL HIGHWAY IMPROVEMENT CHARGE MODEL MEET THE REFORM OBJECTIVES?

CAN A NATIONAL HIGHWAY IMPROVEMENT CHARGE	NATIONAL HIGHWAY IMPROVEMENT CHARGE
Fund additions to the transport network	●
Fund network maintenance	✔
Provide a fair allocation of costs and benefits	✔ ●
Provide a secure funding stream	✔ ●
Provide the opportunity to improve network performance	✘

Selected vehicle class, partial network schemes

A scheme covering selected vehicles on a partial network basis would see a particular part of the vehicle fleet (for instance, heavy vehicles or light commercial vehicles) charged a road user charge for use of particular parts of the network. The system would differ from a congestion charge on the basis that it would price usage for a particular type of vehicle on a particular type of road – such as commercial vehicles on the National Highway network, charged on a mass and distance basis – rather than targeting a particular area of acute congestion through a cordon or area charge on all vehicles.

The German Heavy Goods Vehicle scheme uses a selected vehicles, partial network approach to road user charging with distance based tolling of vehicles over 12 tonnes on 12,000 km of major highways and arterials using Global Positioning System (GPS) tracking. Charges are aligned to the route, the emission class of the vehicle, maximum gross vehicle mass, and the number of axles.[42]

Efficacy in an Australian context

A selected vehicle class, partial network scheme may have some benefits for the Australian context – including as an opportunity to concept test road pricing reforms and as a mechanism to price assets that largely benefit a particular class of users. Revenue could be used to provide infrastructure or upgrades where the particular vehicle class is the principal beneficiary on the portions of the network from which the revenue is collected – such as infrastructure that largely benefits freight vehicles on a National Highway network.

It may also provide some opportunities to manage particular areas of demand and provide funding to make discrete supply side additions. In addition, by applying to a particular vehicle class, a scheme of this nature could provide detailed data about the needs of certain types of user.

However, a scheme that only covers selected vehicles over particular portions of the network does not provide options to address broader network issues – such as systemic network congestion and funding required additions and maintenance for the full network.

Table 4.5 shows how a model applied to selected vehicle classes for selected portions of the network meets the reform objectives.

▼ TABLE 4.5

DOES A SELECTED VEHICLE CLASS, PARTIAL NETWORK MODEL MEET THE REFORM OBJECTIVES?

CAN THE SELECTED VEHICLE CLASS(ES), PARTIAL NETWORK REGIME	SELECTED VEHICLE CLASS(ES), PARTIAL NETWORK
Fund additions to the transport network	●
Fund network maintenance	●
Provide a fair allocation of costs and benefits	✔ ●
Provide a secure funding stream	✔ ●
Provide the opportunity to improve network performance	● ✘

42 Association of European Vehicle and Driver Registration Authorities, Road Pricing in Europe 2012: Second version, pp. 93 – 4. Available at: https://www.ereg-association.eu/downloads/public/general/Publications/Road%20Pricing%20in%20Europe/Roadpricing%20in%20Europe%20(Second%20Version,%202012).pdf

4.5 WHOLE OF NETWORK PRICING

Selected vehicle class, whole-of-network pricing schemes

Another option would be to apply a pricing scheme to all vehicles of a particular type (e.g. heavy vehicles or light commercial vehicles) across the entire road network. It is likely that this kind of approach would require the proceeds collected from users to be directed to investments that support the vehicle class that is subject to the charging scheme.

A selected vehicle class, whole-of-network approach is used for the Switzerland performance-related Heavy Vehicle Fee (HVF) system[43] and forms the basis of the approach for the COAG HVCI process which would see alternative models of heavy vehicle road pricing and funding either on a whole-of-network or partial network basis. The Swiss HVF scheme applies to vehicles over 3.5 tonnes and uses a tonne per kilometre fee based on Euro Emission classes with usage data collected via an on-board unit or periodic declarations.[44]

Efficacy in an Australian context

A partial market, whole-of-network system would provide a detailed trial and concept test for a broader road pricing reform and could conceivably be progressively rolled out to cover additional vehicles classes. However, the full benefits of the pricing signals offered by a whole of network model would not be realised when only particular vehicles are covered. As such, in a similar result to the selected vehicle, partial network model, the scheme only partially meets most of the objectives laid out for road pricing reform. Table 4.5 shows the rating against each evaluation criteria.

▼ TABLE 4.6

DOES A SELECTED VEHICLE CLASS, WHOLE-OF-NETWORK MODEL MEET THE REFORM OBJECTIVES?

CAN THE SELECTED VEHICLE CLASS(ES), WHOLE-OF-NETWORK REGIME:	SELECTED VEHICLE CLASS(ES), WHOLE-OF-NETWORK
Fund additions to the transport network	●
Fund network maintenance	●
Provide a fair allocation of costs and benefits	●
Provide a secure funding stream	✔ ●
Provide the opportunity to improve network performance	● ✘

All vehicles, whole of network pricing schemes – Universal Road User Charging model

A URUC model would cover all vehicles and the entire road network. In place of existing Fuel Excise taxation and fixed access and registration charges, vehicles would likely attract direct user charges that include elements to price vehicle mass, distance travelled and location of travel and time of journey. A URUC approach offers strong opportunities to rationally price access to and usage of the road network – providing a mechanism to fund network additions, fund maintenance and improve network performance by aligning supply and demand.

A URUC style framework was considered, and legislated for introduction, in the Netherlands between 2007 and 2010.

In 2009 the Dutch Government passed a bill approving the gradual implementation of a road pricing framework, based on a per kilometre tax and including variable charges for the place and time of use and the environmental characteristics of different vehicles.[45] The charging framework, which was to be first applied to foreign heavy goods vehicles in 2012 followed by light vehicles by 2016, covered all Dutch roads, with total revenue collected under the scheme to be earmarked for infrastructure investment.[46] All vehicles were to be fitted out with a recording device which utilised GPS to establish distance, time and location of use.

Although legislated, the proposed road pricing framework was never introduced. Support for the policy stalled following the collapse of the ruling coalition in early 2010 and following general elections the new ruling coalition halted implementation of the new system.

Efficacy in an Australian context

A URUC approach has potential to deliver the broadest range of benefits in the Australian context. However, it would represent the deepest and widest reform of any of the options presented in this paper. Executed well, reform along the lines of a URUC could meet each of the objectives set out in this paper - including being the only model assessed which provides an opportunity to improve whole-of-network performance by offering appropriate pricing signals for road users and road providers. Table 4.4 outlines the extent to which a well-considered URUC could meet the objectives for reform developed in this paper.

▼ TABLE 4.7

DOES A URUC MODEL MEET THE REFORM OBJECTIVES?

CAN UNIVERSAL ROAD USER CHARGING	UNIVERSAL ROAD USER CHARGING (ALL VEHICLES, WHOLE NETWORK)
Fund additions to the transport network	✔
Fund network maintenance	✔
Provide a fair allocation of costs and benefits	✔
Provide a secure funding stream	✔
Provide the opportunity to improve network performance	✔

43 Swiss Federal Customs Administration - http://www.ezv.admin.ch/zollinfo_firmen/steuern_abgaben/00379/index.html?lang=en

44 Australian Transport Council, COAG Road Reform Plan Phase I Report, May 2009 and Swiss Federal Customs Administration - http://www.ezv.admin.ch/zollinfo_firmen/steuern_abgaben/00379/index.html?lang=en

45 Association of European Vehicle and Driver Registration Authorities, *Road Pricing in Europe 2012: Second version*, pp. 93 – 4. Available at: https://www.ereg-association.eu/downloads/public/general/Publications/Road%20Pricing%20in%20Europe/Roadpricing%20in%20Europe%20(Second%20Version,%202012).pdf

46 Bert van Wee 2010, *The New Dutch Per-Kilometre Driving Tax*, p. 65. Available at: http://webcache.googleusercontent.com/search?q=cache:ov_VroII8UoJ:www.cesifo-group.de/portal/pls/portal/ifo_applications.switches.DocLinkIfoDL%3FgetDoc%3Ddicereport210-rm1.pdf+&cd=1&hl=en&ct=clnk&gl=au

4.6 SELECTING THE 'RIGHT' MODEL?

Selecting the 'right' model to reform road pricing in Australia will require a much deeper analysis of scheme design, implementation, incentives and equity considerations than can be advanced in this paper.

However, for the purposes of this paper, this section considers the utility of each potential reform model to address the challenges that exist under the current approach. Table 4.8 shows the simplified options analysis; with the existing framework of road user charging used as the base case for assessment, shown in the first options analysis column.

▼ TABLE 4.8

OPTIONS ANALYSIS

CHARGING REGIME 'Problem to solve'	EXISTING FRAMEWORK	CORDON/AREA PRICING	NATIONAL HIGHWAY IMPROVEMENT CHARGE	SELECTED VEHICLE CLASS(ES), PARTIAL NETWORK	SELECTED VEHICLE CLASS(ES), WHOLE-OF-NETWORK	UNIVERSAL ROAD USER CHARGE (ALL VEHICLES, WHOLE NETWORK)
Funding additions to the transport network – can the charging regime provide a sustainable funding mechanism to provide capacity enhancements to the transport network?	🔴	🟢	🟡	🟡	🟡	🟢
Funding network maintenance – can the charging regime provide a secure and reactive funding source for network maintenance?	🔴	🟡	🟢	🟡🔴	🟡	🟢
A fair allocation of costs and benefits – can the charging regime ensure a fair distribution of costs between users, where those who use more, pay more and those who use less, pay less?	🟡🔴	🟡	🟢🟡	🟡	🟡	🟢
Funding stream security – can the charging regime offer a secure funding stream that reflects changing demand for road usage and promotes longer term investment planning?	🔴	🟢🟡	🟢🟡	🟢🟡	🟢🟡	🟢
Improving network performance – can the charging regime provide appropriate pricing signals for road users and road providers to improve the performance of the network?	🔴	🟡	🔴	🟡	🟡🔴	🟢

🟢 Meets the parameter

🟡 Partially meets the parameter

🔴 Fails to meet the parameter

Models not considered further

A cordon or area charging option similar to those that have been introduced in Europe is not considered further in our work. A cordon based charge was considered to only partially meet the objectives, principles and parameters developed at the start of Section 5. Australian cities present a number of unique features which may render a cordon based charging system sub-optimal when compared to the other options under evaluation. Evidence suggests that cordon pricing is most effective when travel is currently heavily city-centric and there is a large portion of users currently entering the CBD area using private motor vehicles. The low density and increasingly decentralised nature of employment centres in some of our cities may work against the effectiveness of a cordon charge (e.g. Sydney is often described as a "city of cities").

A NHIC is also not considered further in the paper. However, the model remains a candidate for additional investigation as a mechanism to fund improvements of the national highway network, along with providing financing partnership opportunities with the private sector – where innovative funding and financing arrangements could be utilised to speed up delivery of critical road infrastructure. Separate consideration of the viability and implementation of a national highway improvement charging model may be warranted in the future – particularly if pursued in combination with any whole of network road user charging framework.

Neither the selected vehicle class, partial network, nor the selected vehicle class, whole of network schemes are evaluated further in this paper. Both models have merit, and in particular could be considered as incremental steps toward whole of market, whole of network reform. However, neither partial scheme was considered to meet the objectives in regard to providing a mechanism for demand management. The partial schemes were also considered to provide sub-optimal mechanisms in regard to provision of road user price signals and a fairer allocation of costs and benefits.

The selected model

Based on this analysis, the model selected for further evaluation in this paper is the URUC, which is assumed to include mass, distance, time and location based charging components.

The URUC is discussed in further detail below, before considering the pricing impacts in the ensuing chapter.

Development of the Universal Road User Charging model

While conceptual frameworks for a broad Australian road user charging system have been put forward from time to time, little detailed work has been done to refine the case for change. In particular, there is scant analysis in the public domain that considers the user cost impact of different options to reform road user pricing.

This paper makes a series of assumptions to refine the structure and operation of an Australian URUC.

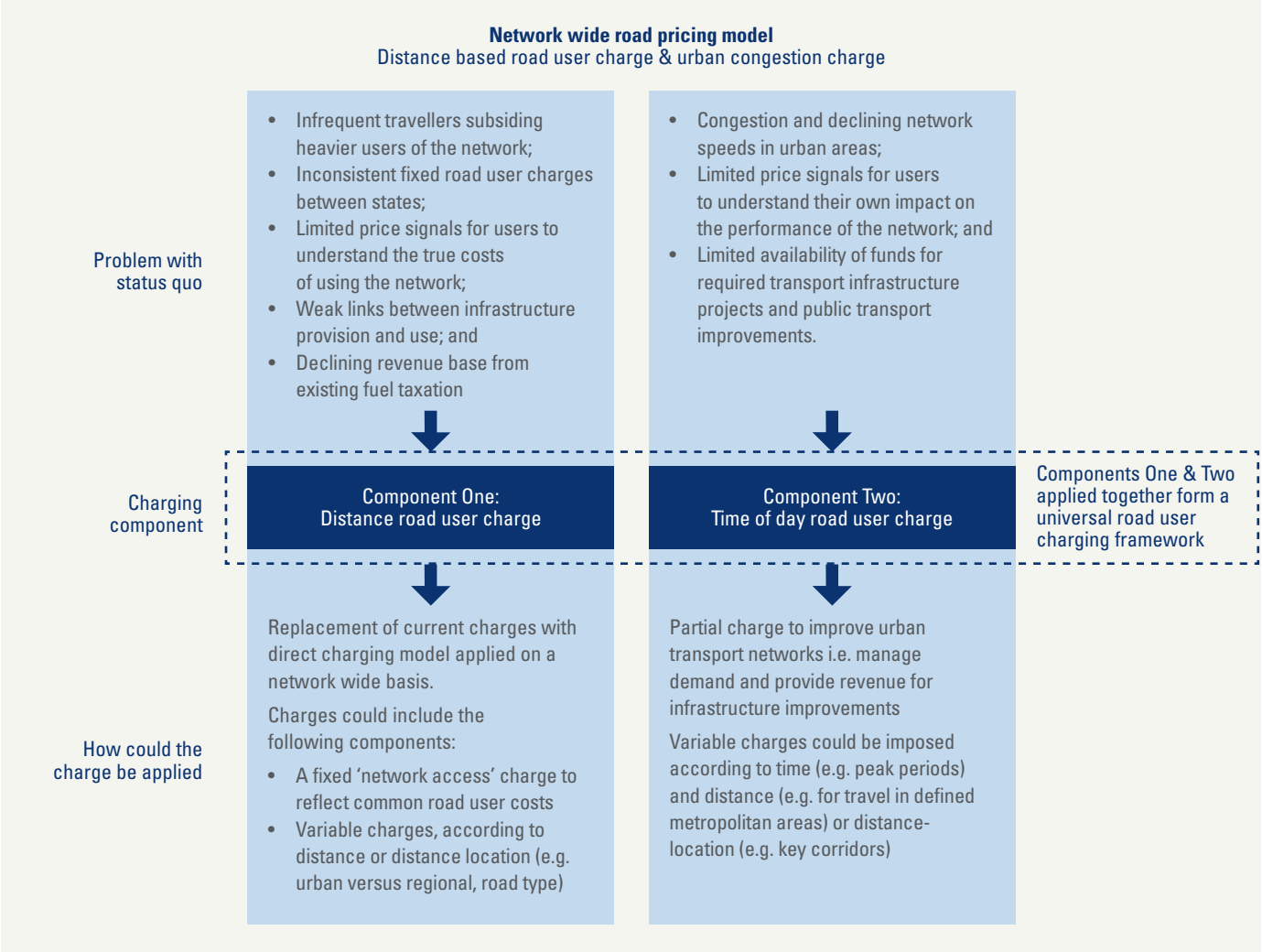
These assumptions include:

- The URUC would replace all existing road user taxes and charges, which would be abolished;
- The URUC would calculate the price paid by a road user, based on the time, distance, location and mass of the vehicle accessing the road network;
- All revenues raised by the scheme would be hypothecated (earmarked) for transport investments; and
- The URUC would be designed to be revenue neutral, meaning that the revenue of the new scheme would be equal to the current road-related revenues collected by Federal and state governments.

Figure 4.3 provides an overview of the URUC's two fundamental components, namely a distance road user charge and a time of day road user charge.

▼ FIGURE 4.3

POTENTIAL MODEL FOR AN AUSTRALIAN UNIVERSAL ROAD USER CHARGING MODEL



Source: Deloitte

The conceptual application of each component is considered below.

Component One: Distance road user charge

The distance road user charge would consist of multiple layers. The first would be a base road access charge, which would recover administrative costs, such as registration and licensing and would be a common flat charge, applying to all light vehicles.

The distance road user charge component would also put a variable price on consumption, based on the distance travelled by a vehicle, varying according to a vehicle's mass.

Component one would see:

- Smaller vehicles pay relatively less than larger vehicles (who have a greater impact on the network);
- Motorists who travel longer distances would pay more; and
- Motorists who travel shorter distances would pay less.

Component Two: Time of day road user charge

The second component of the scheme would apply additional charges to road users in specific areas affected by congestion. In this paper, we assume that Australia's three major capital cities, Sydney, Melbourne and Brisbane, would be subject to this component.

Under this option, the charges paid by road users would vary according to the point in time and place that they use the road network. Motorists travelling during peak periods in capital cities would pay a greater charge per kilometre than motorists that use these roads during less busy periods. Depending on the technologies or system used, this component could be applied to any particular area experiencing acute congestion, or across wider sections of urban transport networks.

Because driving in peak periods would be more expensive, this second charging component would provide an incentive for motorists to consider alternative options, such as mass transit. Motorists who pay higher charges for using the road network in peak periods could also expect to receive benefits, through reduced congestion and more reliable journey times.

Component two would see:

- Motorists in capital cities pay more to use the road network in peak periods;
- Motorists in regional or rural areas would experience lower charges than urban users;
- Peak hour motorists could expect more consistent, faster journey times; and
- Motorists travelling in capital cities outside of the peak would pay less than peak period users.

Key points

- A suite of approaches to road user charging are available to achieve different objectives and could be applied individually or in combination.
- Defining the principles and objectives of a reform to road user charging should drive decisions on which model (or combination of models) are pursued.
- The objectives put forward recognise that the initial pricing structure should not make road users worse off (in aggregate financial terms) under any new road charging scheme, i.e. total revenue raised by one or several new charging systems should not exceed the amount of revenue currently collected from road users.
- Potential models should be transparently evaluated against agreed principals and objectives for reform.
- The URUC model was selected for further consideration in this paper. The model consists of two components: a distance based road use charge applied to all motorists, and a variable time of day charge applied to road users in urban areas.


VIA
PARRAMATTA RD 440
PLEASE
SIGNAL DRIVER
Sydney Buses

5 Road pricing scheme design

This section details how a URUC could be structured and prices set across the light vehicle market.

5.1 SCHEME DESIGN: UNIVERSAL ROAD USER CHARGING

Revenue Assumption

Present arrangements see Commonwealth and state governments collectively recover $20.4 billion from road users (2009-10), but for the purposes of this paper (which excludes heavy vehicles) we assume that a revenue neutral approach to reform will collect $18.1 billion from light vehicles.

This assumption deducts the $2.3 billion in costs attributable to heavy vehicle users in that year, which are recovered separately under the PAYGO model.[47] This revenue also includes a portion of revenue returned under the Fuel Tax Credit Scheme.

Together, components one and two of the URUC have been structured to achieve this revenue target. Under the scenario modelled:

- 60 per cent of revenue will be collected under Component One (distance charge); and
- 40 per cent will be collected under Component Two (time of day charge).

This balance has been selected to broadly reflect the impact of road users on the network but could be adjusted to a different balance of revenue share derived under each component. The model assumes that all existing road related fees and charges as outlined in the section above will be abolished and replaced by the URUC.

47 National Transport Commission (2010) Annual Adjustment Consultation Paper 2010

Methodology for Component One: Distance based road user charge

The model discussed in this paper would make substantial changes to the way charges are calculated and accrued by motorists. In effect, Component One would serve to operate as a more sophisticated two part tariff, based on a reduced fixed charge reflecting administration costs, and a differential distance based charge, varying by vehicle size.

Whereas the current model relies on comparatively high fixed charges based on vehicle ownership (e.g. registration fees), the reformed model would reduce the annual fixed charges to reflect only the basic costs of administration, assumed here at $50 per vehicle per annum across all light vehicle types.

The second layer of charges within Component One would be a differential distance based charge. This charge would remain fixed for all journey types, irrespective of time or location on the road network (which are priced in Component Two, discussed below). The rate charged per kilometre would reflect vehicle size, ensuring that larger vehicles (which have greater impacts on the road network) would pay a high rate than smaller, more efficient and less damaging vehicles.

The methodology used to model Component One is shown in Figure 5.1, below.

▼ FIGURE 5.1

CHARGING APPROACH – COMPONENT ONE: UNIVERSAL ROAD USER CHARGING

Light vehicles (those under 4.5 tonnes) were categorised into nine categories based on those considered in the Australian Bureau of Statistic (ABS) for the Survey of Motor Vehicle Use (SMVU). The categories are:

- Motor cycles;
- Passenger cars (small and medium);
- Passenger vans & Light buses;
- 4WDs: passenger;
- 4WDs: light commercial;
- Light commercials & Other light vehicles;
- Light rigid trucks; and
- Buses: 2 axles: GVM 3.5 to 4.5 tonne.

The passenger car category was broken into small and medium categories. The Vkt (vehicle kilometres travelled) recorded in the 2007 ABS SMVU was used to determine the proportion of Vkt travelled by each category of vehicle. This was then applied to the total Vkt travelled by light vehicles (208 billion km) in 2010 (ABS data).

A vehicle 'impact weighting' was given to each category to reflect the different levels of impact that vehicles have on infrastructure and the environment (e.g. road damage, pollution and other environmental factors). A small passenger car is considered to have a vehicle impact weighting of 1.00 with all other vehicles rated relative to that vehicle class – for example, motorcycles attract a 0.50 impact weighting and light commercial 4WDs a 1.70 weighting. These values are indicative only, and further work would be needed to understand the relative impact imposed by different classes of vehicles. A weighted Vkt was then derived by multiplying 2010 Vkt by the vehicle weighting.

An overall cost per km was derived from the revenue target and total weighted Vkt. This was assigned to each vehicle category, depending on the impact weighting. Weightings and estimated per kilometre charges for Component One of the model are shown in Table 5.1 below. Based on existing road usage profiles this charging structure would deliver 60 per cent of the revenue target.

▼ **TABLE 5.1**

WEIGHTINGS AND CHARGES – DISTANCE BASED ROAD USER CHARGE

VKT BY VEHICLE	ESTIMATED PROPORTION VKT 2007 (%)	VEHICLE IMPACT WEIGHTING	ESTIMATED CHARGE (C/KM)
Motor cycles	0.95%	0.50	2.29 c/km
Passenger cars			
Small	39.21%	1.00	4.57 c/km
Medium	26.14%	1.20	5.49 c/km
Passenger vans & Light buses	1.30%	1.30	5.95 c/km
4WDs: passenger	12.45%	1.50	6.86 c/km
4WDs: light commercial	6.37%	1.70	7.78 c/km
Light commercials & Other light vehicles	12.58%	2.00	9.15 c/km
Light rigid trucks	0.95%	2.30	10.52 c/km
Buses: 2 axle: GVM 3.5 to 4.5 tonne	0.04%	2.50	11.43 c/km

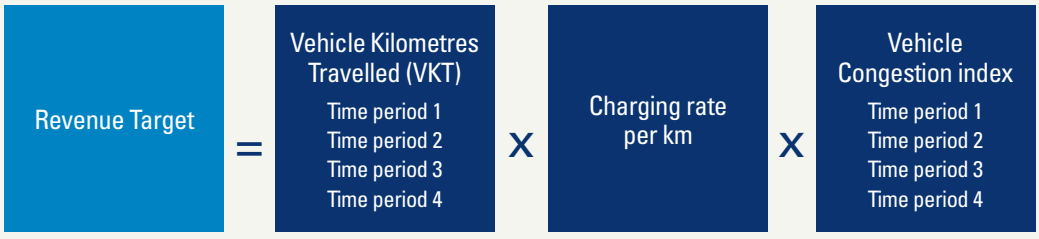
Methodology for Component Two: Time of day road user charge

This second component represents the most fundamental change to the established system of road user charging, because it introduces an additional price component for major capital cities (or other areas of high demand) based on the time and location at which the road network is accessed. While this represents a substantial departure from the established, supply only approach to road network operation, it also offers the most substantial opportunity to manage demand and increase allocative efficiency within the transport market.

In effect, this charge would mean that road users travelling during weekday and weekend peak periods would pay a greater charge per kilometre, than motorists that use roads during less busy periods.

▼ **FIGURE 5.2**

CHARGING APPROACH – COMPONENT TWO: UNIVERSAL ROAD USER CHARGING



While this charging aspect could be applied either to particular areas of the network, or on a wider basis across all urban areas – for the purpose of the modelling in this paper, Component Two is assumed to apply only to the east coast capitals, Sydney, Melbourne and Brisbane.

An overview of the methodology used to estimate the distance based road user charge is shown in Figure 5.2.

The first step in the charges estimation process was to divide the travelling week into time periods reflecting similar levels of travel activity. These were based on the following time periods which are commonly adopted in strategic transport models:

Weekday – AM Peak (7am - 9am);

- Weekday – (9am - 3pm);
- Weekday – PM Peak (3pm - 6pm);
- Weekday – Night time (6pm - 7am);
- Weekend – 7am - 9am;
- Weekend – 9am - 3pm;
- Weekend – 3pm - 6pm; and
- Weekend – 6pm - 7am.

Data on the Vkt in the Sydney region (urban only) for these periods was obtained and the proportion of travel conducted within each period calculated. These proportions were applied to the total Vkt in Sydney, Melbourne and Brisbane areas for 2010 to determine total Vkt in each time period.

Adopting a similar approach to the weighting process for Component One (the distance based road user charge), each time period was then given an index, depending on its relative contribution to congestion. These indicative values are shown in Figure 5.2, opposite.

The weekday AM peak was considered to be the most congested period, with other periods referenced against this. Congestion during the PM peak was considered to be 90 per cent of levels experienced during the AM peak, with day periods on weekends considered to be 30 per cent of levels during the same period. Night time and other weekend periods were given a zero index (meaning a $0/km time of day charge in those periods).[48]

A weighted Vkt was then derived by multiplying 2010 Vkt by the congestion index. An overall cost per km was derived from the revenue target and total weighted Vkt. This was assigned to each time period, depending on the congestion weighting. Weightings and estimated charges for Component Two of the model are shown in Table 5.2.

▼ TABLE 5.2

WEIGHTINGS AND CHARGES – TIME BASED ROAD USER CHARGE

TIME PERIOD	PROPORTION VKT	TIME OF DAY WEIGHTING	ESTIMATED CHARGE (C/KM)
Weekday - AM Peak (7am - 9am)	12.18%	1.00	14.42 c/km
Weekday - InterPeak (9am - 3pm)	24.54%	0.40	5.77 c/km
Weekday - PM Peak (3pm - 6pm)	18.31%	0.90	12.98 c/km
Weekday - Night time (6pm - 7am)	19.20%	-	
Weekend - 7am - 9am	1.95%	-	
Weekend - 9am - 3pm	11.70%	0.30	4.33 c/km
Weekend - 3pm - 6pm	5.56%	-	
Weekend - 6pm - 7am	6.57%	-	

Key points

- Charges for the URUC model under consideration were derived by considering the amount of revenue (Commonwealth and state taxes) that is recovered under the current system.
- The scheme design provides flexibility to adjust user payment contributions to allow for different policy settings.
- Based on existing road use patterns, Components One and Two combined would deliver revenue equivalent to that currently raised from Fuel Excise and state based charges. Adjustments to the target revenue could be achieved within the framework.
- Distance based charges (Component One) were assumed to vary according to the type of vehicle used, to reflect the impact of different vehicles on the transport network and environment. Under the scenario modelled, Component One would deliver 60 per cent of existing revenue.
- Road users travelling in areas experiencing acute congestion would be required to pay a time of day charge (Component Two). This could be applied to particular areas of the network or on a wider basis across all urban areas. Under the scenario modelled, Component Two would deliver 40 per cent of existing revenue.

48 The derivation of these indexes was supported by Austroads National Performance Indicators (Austroads 2008).

6 Impacts on users

6.1 DEFINITION OF TEST USERS

To allow a thorough assessment of the typical user price impacts that might be expected under the proposed URUC, a number of 'test users' have been defined. The rationale for generating test users is to provide a sample of different types of light vehicle, to compare and contrast the different components, and provide 'real-world' user comparisons against the existing charging regime.

These test users are shown in Table 6.1 below.

Importantly, this analysis has not considered demand elasticity. Future work on the URUC framework outlined in this paper should evaluate the implications of demand elasticity for both user behaviour and scheme design. Furthermore, commercial and fleet heavy vehicles have not been tested, given that pricing reform to these users is being pursued under a complementary reform process, through HVCI.

▼ TABLE 6.1

CHARACTERISTICS OF TEST USERS

USER	AGE	LOCATION	TRAVELLING CHARACTERISTICS
1. Peter 	62	Victoria, Regional City	• Owns one car – 2009 Holden Cruze (Vehicle 1) • Owns one light commercial vehicle – 2005 Toyota HiAce (Vehicle 2) • Operates own furniture restoration business, is required to use van for pick up and deliveries • At least once a week, travels on national highway network to make deliveries • Uses car three to four times per week for personal use, travelling only short distances
2. Graham 	45	NSW, Sydney, outer suburbs	• Family owns 2 cars – 2009 Audi A4 (Vehicle 1) and Jeep Grand Cherokee (Vehicle 2) • Graham drives to work every day and parks at office (Audi), drives on motorways (one way journey length 26 km) • His wife uses 2010 Jeep Grand Cherokee to short distances in local area (e.g. school drop off and pick up, other personal business) • Frequent weekend usage (both vehicles)
3. Leanne 	32	South East Queensland, outer urban area	• Owns one car – 2007 Toyota Corolla (Vehicle 1) • Night shift worker, travels to work (cross city, non-CBD) in the early evening and returns home before the AM peak period • Occasional weekend usage, generally travelling short distances in local area

6.2 WHAT DO USERS PAY UNDER THE CURRENT SYSTEM?

Table 6.2 below shows current weekly road use charges paid by the test users selected. This includes registration charges, Fuel Excise, stamp duty and other costs (e.g. plate fees, transfers). To provide a consistent base case, estimates were based on an average of road use charges across New South Wales, Queensland and Victoria. It was assumed that stamp duty payments and transfer fees were incurred once every five years (based on the assumed period of ownership). Weekly travel distances are also shown for reference. Costs exclude tolls, insurance and other non-government charges.

Under the existing system, total weekly road use charges are in the range of approximately $15 to $50 for the respective users. Fuel Excise represents a significant portion of costs for users travelling longer distances (e.g. Peter, Vehicle Two and Leanne). Stamp duty is noticeably higher for Graham due to his vehicles being more expensive relative to other users.

The estimates highlight some of the key short comings of the current charging system. In particular, infrequent/low distance travellers pay substantially higher road use charges on a per kilometre basis compared to those using the network more frequently. For example for Vehicle One, Graham travels approximately seven and a half times the distance of Peter, but pays only two and a half times the cost on weekly basis. Graham enjoys a substantially lower per kilometre charge as a result of using his vehicle to drive greater distances than Peter.

▼ TABLE 6.2

ESTIMATE OF CURRENT ROAD USE CHARGES (2012 DOLLARS)

BASE CASE	PETER		GRAHAM		LEANNE	
Vehicle One	**$**	**%**	**$**	**%**	**$**	**%**
Distance travelled	46 km		346 km		260 km	
Registration Charge	$6.02	54.9%	$6.02	23.1%	$5.12	32.8%
Fuel Excise Charge	$1.32	12.0%	$9.90	37.9%	$7.44	47.6%
Stamp Duty	$3.46	31.5%	$10.00	38.3%	$2.88	18.5%
Other Costs	$0.18	1.6%	$0.18	0.7%	$0.18	1.1%
Vehicle 1 Charges - Base Case ($ per week)	**$10.97**	**-**	**$26.09**	**-**	**$15.61**	**-**
Vehicle 1 Charges - Base Case ($/km)	*$0.24*	-	*$0.08*	-	*$0.06*	-
Vehicle Two (if applicable)	**$**	**%**	**$**	**%**	**$**	**%**
Distance travelled	418 km		98 km			
Registration Charge	$12.77	33.5%	$8.60	42.6%	-	-
Fuel Excise Charge	$20.73	54.4%	$5.23	26.0%	-	-
Stamp Duty	$4.40	11.6%	$6.15	30.5%	-	-
Other Costs	$0.18	0.5%	$0.18	0.9%	-	-
Vehicle 2 Charges - Base Case	**$38.07**	**-**	**$20.16**	**-**	**-**	**-**
Vehicle 2 Charges - Base Case ($/km)	*$0.09*	-	*$0.21*	-	-	-
Total Weekly Charges - Base Case	**$49.04**		**$46.25**		**$15.61**	

6.3 THE IMPACT OF A UNIVERSAL ROAD USER CHARGING MODEL

Table 6.3 presents the new charges estimated under the URUC model in comparison with charges under the current system. As anticipated, those users travelling relatively short distances would experience cost savings under this model.

▼ TABLE 6.3

ESTIMATE OF NEW ROAD USE CHARGES (2012 DOLLARS)

USER	BASE CASE	UNIVERSAL ROAD USER CHARGING			TOTAL NEW CHARGES	% CHANGE
		BASE CHARGE	DISTANCE ROAD USE CHARGE	TIME ROAD USE CHARGE		
Peter						
Vehicle One	$10.97	$0.96	$2.40	$0.00	$3.36	-69.4%
Vehicle Two	$38.07	$0.96	$33.53	$0.00	$34.49	-9.4%
Total	**$49.04**	**$1.92**	**$35.93**	**$0.00**	**$37.85**	**-22.8%**
Graham						
Vehicle One	$26.09	$0.96	$18.04	$18.94	$37.95	45.4%
Vehicle Two	$20.16	$0.96	$5.90	$6.07	$12.93	-35.9%
Total	**$46.25**	**$1.92**	**$23.94**	**$25.01**	**$50.87**	**10.0%**
Leanne						
Vehicle One	$15.61	$0.96	$10.43	$0.57	$11.96	-23.4%
Vehicle Two	$0.00	$0.00	$0.00	$0.00	$0.00	
Total	**$15.61**	**$0.96**	**$10.43**	**$0.57**	**$11.96**	**-23.4%**

As a low mileage network user driving a medium sized car in a regional area, Peter (Vehicle One) would experience the greatest cost savings of 69 per cent under the new model. While Peter travels the greatest distance each week (across both vehicles) and would incur a decrease in road charges of 22.8 per cent, however all of his trips are regional and away from dense urban areas where congestion generally occurs – and consequently away from where Component Two of the model would apply.

Graham would experience a modest cost increase for Vehicle One due to travelling relatively long distances on the urban road network during peak periods. While charges would decrease for Vehicle Two, this does not outweigh cost increases for Vehicle One, leading to an overall increase in road use charges of 10 per cent. Graham could reduce this impact if he were able to change the time of day he travels or his vehicle profile, or he may benefit from reduced journey times and improved reliability in continuing to travel at peak periods, if other network users change their time and/or mode of travel away from peak period road use.

Leanne would experience a cost saving of 23.4 per cent under the URUC model as she mainly uses the road network during non-peak periods, consequently largely avoiding charges under Component Two.

6.4 IMPLICATIONS FOR DEMAND

This analysis has not modelled the specific implications for demand as a result of a re-aligned framework for road user charging. A modified demand profile would be an intentional outcome of the structure discussed in this paper, particularly with regard to Component Two which seeks to shape demand away from peak periods.

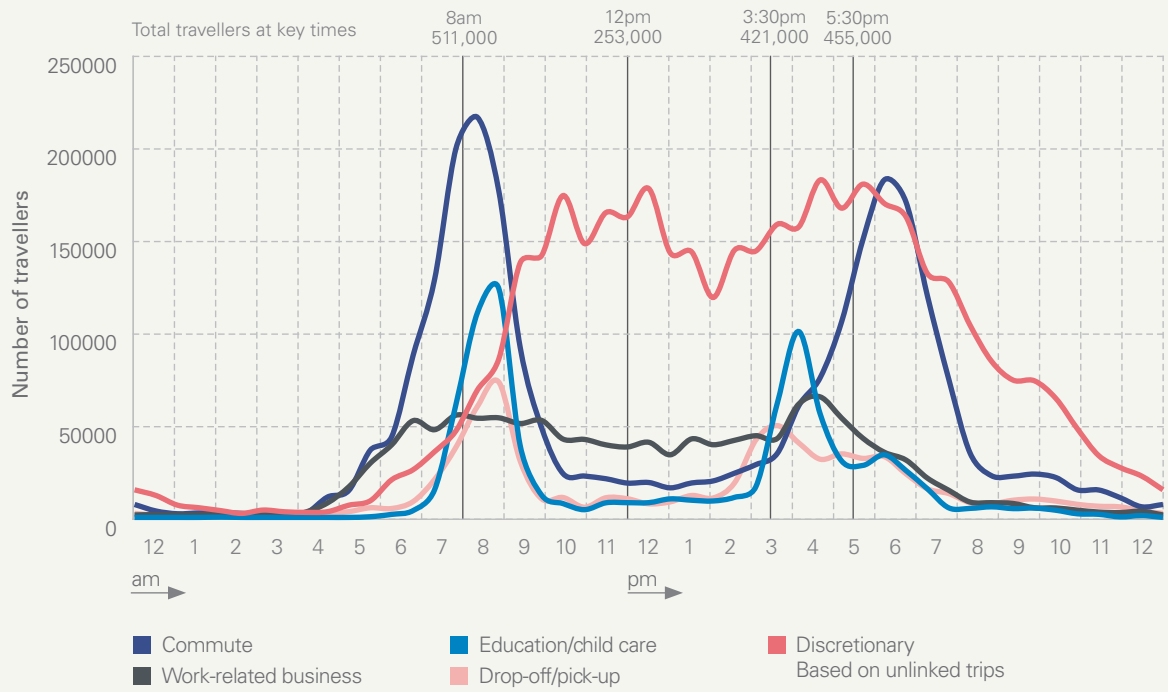
The structure put forward would see no greater cost burden on users as a whole; rather it would re-distribute charges to better reflect true costs (including externalities) and benefits. Before implementation of a similar scheme (or any reform to road user charging) detailed analysis of the price elasticity of demand will be required. However, if structured correctly and priced efficiently, a rational road user charging model would see appropriate and intended shifts in the demand profile.

Whilst detailed analysis would be required some broad assumption can be made about the impacts for demand flowing from a URUC. The current 'rego and excise' model for road pricing does not provide for pricing to disincentivise peak time usage (or incentivise off-peak use) – other than in a relatively blunt sense through the additional cost of time and additional fuel consumed by vehicles in congested conditions compared to free-flow usage.

One consequence of this pricing inadequacy is that users who have the flexibility to move their journey outside of peaks are not incentivised to do so. Some studies have suggested that as much as 40 per cent of travel during some peak periods is considered discretionary.[49] Figure 6.1 shows the 24hr travel demand profile in Sydney by trip purpose.

▼ FIGURE 6.1

DISTRIBUTION OF TRAVEL IN SYDNEY THROUGH AN AVERAGE WEEKDAY ACCORDING TO PURPOSE



Source: Transport for NSW, Draft NSW Long Term Transport Master Plan

Under a URUC structure with pricing appropriately aligned to demand elasticity users at peak period with the flexibility to transfer modes may choose to do so – freeing up available network capacity for those prepared to pay more and themselves avoiding the additional costs of peak road use. Consequently, those paying the additional cost of travel at peak times could expect less congested roads and more consistent travel times. Road users shifting their travel outside of traditional peak periods would face lower charges and would save money compared to continuing to travel in the peak, and may also benefit the community overall by deferring the need for some infrastructure investments by making better use of existing capacity.

49 *Transport for NSW, Draft NSW Long Term Transport Master Plan*, Page 94, September 2012.

Key points

- To assess the impacts of a new URUC charging regime a number of 'test users' were defined. A base case road use cost was established for each user and vehicle under the existing road use revenue framework.
- Prices considered in the analysis of user impacts were derived on the basis that the charging system would recover the full amount of revenue currently collected from light vehicle users.
- Road use costs were then generated for each user under the selected URUC model and compared to the base case scenario.
- Findings from the modelling highlight some of the key short comings of the current charging system. In particular, infrequent/low distance travellers pay substantially higher road use charges on a per kilometre basis compared to those using the network more heavily.
- Under the analysed model, those users travelling relatively short distances would experience cost savings compared to the current charging system.
- Example road user Leanne, who drives a small car and generally travels at off-peak times, would save 23 per cent under the modelled URUC when compared to her road use costs under the current framework.
- The vehicle Graham drives to work in a congested CBD area at peak hour would attract 45 per cent higher charges, exposing the cost of Graham's choice of vehicle and his contribution to urban congestion. Graham's higher costs for one vehicle would be partially offset by lower charges on his family's second vehicle, which has a much lower network usage and would consequently attract 36 per cent lower usage charges.
- Whilst some users could pay more under a reformed charging system, it is important to recognise that new charges could – if structured correctly – provide broader benefits, such as reduced journey times, a consistent funding stream, and improved road safety.

7 Pathways for reform

7.1 AGREEING ON OBJECTIVES FOR REFORMS

In considering the reform of road user pricing, it is easy for the debate to accelerate too quickly to focus on options for implementation, with too little regard or analysis of the ultimate outcomes that are being sought.

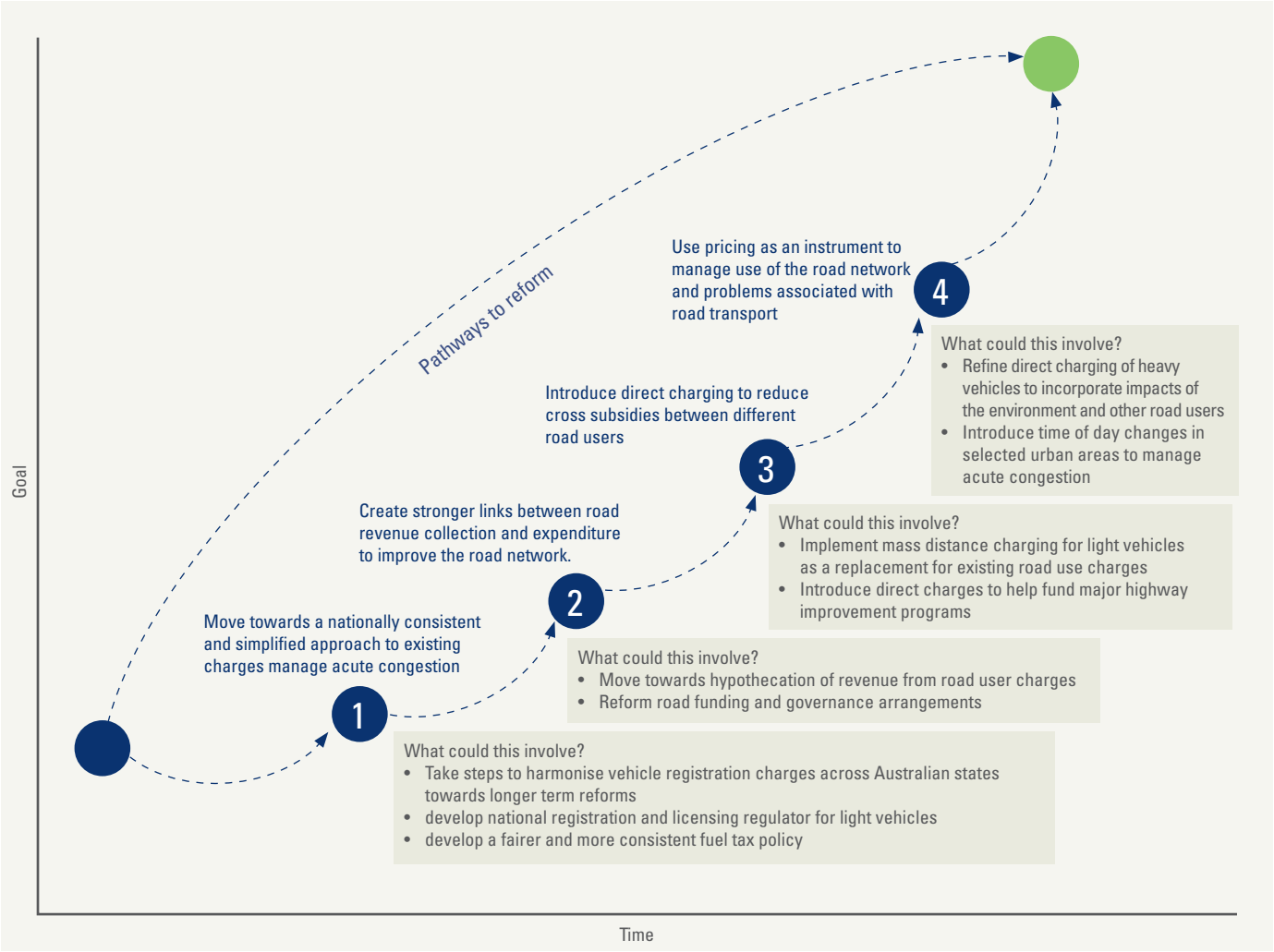
There are a large array of potential models to manage, fund and allocate capacity within the transport network, with a trade-off between the relative efficiency, utility and simplicity in achieving those outcomes.

It is likely that reform in Australia will be approached in a number of incremental steps, meaning that an upfront consensus about the principles and objectives will naturally help to articulate the need, identify the best solution and resolve the pathway to achieve reform.

This paper does not seek to endorse any particular objective or charging model to achieve reform. Rather, the paper uses an indicative model to provide a detailed scenario that might be achieved through well-considered and well-implemented reform. Drawing on global experience and the modelling of the URUC, this paper has developed an indicative process to reform road pricing. This is described below in Figure 7.1.

▼ **FIGURE 7.1**

PATHWAYS FOR REFORM



To provide a foundation for longer term reforms, immediate efforts could focus on addressing obvious distortions within the current charging system. These include inconsistencies in state road use taxes and fuel charges.[50] Options involving use of discreet pricing mechanisms as instruments to manage demand (e.g. time of day charges) could be introduced as a longer term reform to complement more fundamental forms of direct charging. The indicative pathway outlined in Figure 7.1 is not fixed, and the sequence and timing of reform steps could be adjusted.

7.2 MAKING THE PUBLIC CASE FOR ROAD PRICING REFORM

It is self-evident that successful reform of road pricing will substantially rely on the acceptance and appetite of the broader community. The debate will need to be well-led by transport policymakers, and must start with a forensic analysis of the problems under the current approach, a clear explanation of the best solution; and a detailed articulation of the benefits offered through change.

Defining the problem

Achieving a public consensus about the need for change demands consensus that a problem exists, and will also require a high degree of policy leadership and consensus across Australia's governments.

The introduction of the London Congestion Charge provides a useful case study for Australia, because of the lengthy process that was used to garner public consensus about the problem to be solved.

Before London's scheme was introduced, congestion was widely acknowledged as the major transport policy challenge facing that city. In 2002, around 15 per cent of commuter journeys to the centre of London were undertaken by private vehicle, with around half an hour per journey spent either stationary, or in very slow moving traffic.[51]

Moreover, average network speeds had consistently declined in central London as a result of congestion. Indeed, between 1986 and 2002 average kilometres travelled per hour during the evening peak had declined from 18.5 to 13.2 kilometres (see Table 7.1).[52]

▼ TABLE 7.1

AVERAGE NETWORK SPEEDS (KM/H) WITHIN THE CHARGING ZONE, 1986 TO 2002

YEAR	AM PEAK	INTER-PEAK	PM PEAK
1986 June/July	18.0	16.3	18.5
1990 June/July	15.1	15.6	16.1
1994 June/July	17.3	15.9	16.2
1997 June/July	15.4	14.5	15.1
2000 June/July	15.2	13.2	15.1
2002 Nov/Dec	14.7	12.7	13.2

Source: Transport for London

The perception that congestion was a problem was commonly agreed upon by London residents; 90 per cent of London residents surveyed before the charge was introduced believed that there was too much traffic in the capital.[53]

The public perception regarding the need to address London's congestion problem was translated into a political consensus by Ken Livingstone, the first Mayor of London, elected in 2000. Livingstone campaigned and was elected on a platform to address congestion in London, through the introduction of a cordon congestion charge.

Ken Livingstone, backed with electoral support and the powers attached to the newly-created position of London's Mayor, successfully implemented the London Congestion Charge in 2003.[54]

London provides a contemporary case study, in the process to build community support to facilitate substantial reform. The London case study also presents a number of important considerations for Australian policymakers, including the availability of viable alternative options for road users – such as access to public transport, the option to re-mode, adjusting travel time or choosing not to make a journey.

50 For example, See Australian Automobile Association (2001) 'Towards a fairer fuel tax policy' Submission to the Fuel Tax Inquiry Committee, October 2001
51 Banister, D 2003, 'Critical pragmatism and congestion charging in London', International Social Science Journal, Vol. 55, No. 176, pp. 249-264.
52 Transport for London 2003, Impacts Monitoring – First Annual Report, Central London Congestion Charging Scheme. Available at: http://www.tfl.gov.uk/assets/downloads/Impacts-monitoring-report1.pdf.
53 Turton, E 2000, Road Charging for London: A Technical Assessment, HMSO, London.
54 Ison, S & Rye, T 2005, 'Implementing road user charging: the lessons learnt from Hong Kong, Cambridge and Central London', Transport Reviews, Vol. 25, No.4, pp. 451 – 465.

Articulating road pricing as the solution

Broad experience from other jurisdictions points to the requirement for a detailed discussion with road users, to outline the principles, objectives and challenges to be addressed through road pricing. Political sustainability for reform models appears to have a close relationship to the level of public debate, consultation and community education that occur, in advance of implementation.

Switzerland provides another useful case study. In that country, the concept of distance based charging for vehicles above 3.5 tonnes gross vehicle mass (GVM) was discussed for a decade and half, before the level of required public support was attained.

In 1984, an annual flat fee for heavy vehicles was applied - from the outset this fee was considered to be a transitional measure, leading to a distance-based charging mechanism. However, a referendum two years later to replace the annual tax with a distance-based equivalent was rejected by 66 per cent of voters[55] (for a major reform to be introduced in Switzerland it must be supported by the majority of the population through voting in a referendum).[56]

The policy was not put to another public referendum till the mid-1990s, and once approved did not commence until 2001. During this time the policy of distance based road user charging for heavy vehicles remained on the public agenda in Switzerland; numerous research reports were written and a consistent campaign of advocacy and public debate occurred, outlining the requirement for reform; and importantly the likely impact on the road and transport network in Switzerland.

The successful second referendum shows the utility and importance of a live process of consideration, research and debate, in advance of implementation.[57]

The Swiss case study shows that in that jurisdiction, political support for reform took some 17 years to mature. Lessons should also be taken from the deep process of sustained interrogation and public socialisation of difficult reform.

Demonstrating the benefits

Experience from jurisdictions that have reformed road user charging shows that public support lifts, post implementation. This suggests that users are more likely to accept change, once the benefits become tangible and are realised by individual road users.[58]

Our analysis of road pricing schemes across other jurisdictions shows a range of approaches to sustaining public support through establishing and clearly demonstrating the benefits of reform.

Demonstration Period

One approach has seen the use of a demonstration period, allowing the public to experience the impact of the reformed pricing model in advance of a binding decision on implementation.

The introduction of the Stockholm congestion charge in 2007 is one example. Preceding the decision to implement a permanent cordon charge in Stockholm, a full scale trial was conducted for the first seven months of 2006. The trial was matched by a dedicated public education campaign by the Stockholm City Council.[59]

In the Stockholm case study, the demonstration period was particularly important in shifting the opinion of residents and road users within central Stockholm. Surveys conducted by the Stockholm Office of Research and Statistics regarding public attitudes towards the cordon charge indicate that a significant portion of Stockholm's population positively changed their mind about the new charge, following the trial period. About a third of those surveyed became more positive, 14 to 17 per cent became more negative, and the remaining half maintained their original view, in surveys conducted after the trial was introduced.[60]

Investing in Public Transport

A common (and legitimate) argument exists that viable public transit options need to be available, if the aim of pricing reform is to affect congestion and therefore, shift non-discretionary (but lower value) journeys onto alternative modes. Moreover, there is substantial evidence to suggest that developing better quality mass transit that is more accessible and journey focussed will also help to attract users, because the relative value of mass transit is increased.

The London and Stockholm case studies provide evidence in this regard. In both cases, large investments were made to improve the quality of the transport networks in the two cities.

In London significant attention was paid to improving the capacity of the bus network – capacity of the central London bus network was increased by 24 per cent at a cost of £30 – 40 million.[61] During the demonstration of congestion charging in Stockholm, almost $170 million was spent on increased public transport services – including 16 new bus lines and 14 new express buses to the city, and 1500 new parking spaces were created near train stations.[62]

The uniting lesson from each case is the large, visible investment in supporting mass transit capacity prior to the implementation of permanent reform. The timing is important as it enables the public to comprehend a tangible positive of the new policy – improved public transport.[63]

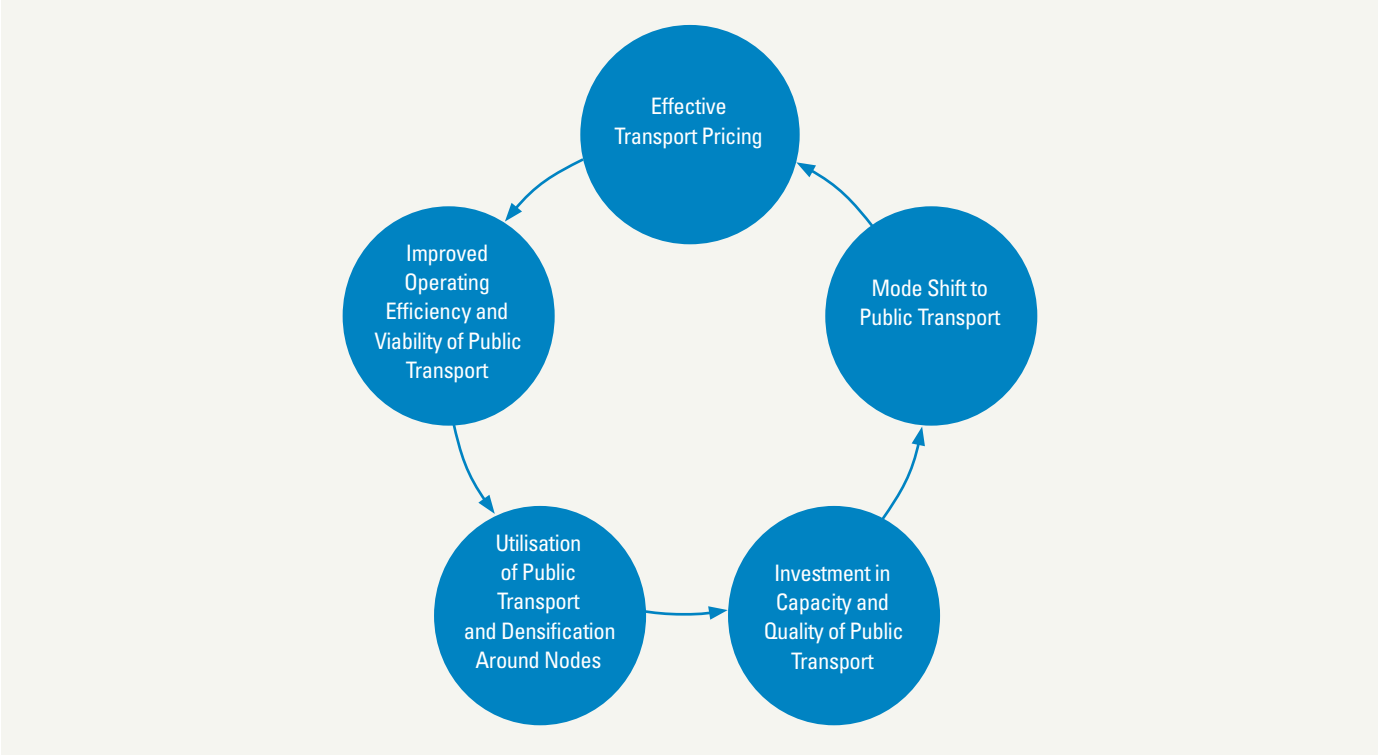
55 Ibid.
56 Balmer, U 2003, 'Practice and Experience with Implementing Transport Pricing Reform in Heavy Goods Transport in Switzerland', available at: http://www.imprint-eu.org/public/Papers/IMPRINT4_balmer.pdf
57 Suter, S & Walter, F 2001, 'Environmental Pricing – Theory and Practice: The Swiss Policy of Heavy Vehicle Taxation', Journal of Transport Economics and Policy, Vol. 35, No. 3, pp. 381-397.
58 Winslott-Hiselius L, Brundell-Freig K, Vaglandm A & Bystrom, C 2009, 'The development of public attitudes towards the Stockholm congestion trial', Transportation Research Part A, Vol. 43, pp. 269-282.
59 Schuitema, G, Steg, L & Forward, S 2010, 'Explaining difference in acceptability before and acceptance after the implementation of a congestion charge in Stockholm', Transport Research Part A, Vol. 44, pp. 99-109.
60 Winslott-Hiselius L, Brundell-Freig K, Vaglandm A & Bystrom, C 2009, 'The development of public attitudes towards the Stockholm congestion trial', Transportation Research Part A, Vol. 43, pp. 269-282.
61 Swanson, J 2009, 'Gaining Public Support for Congestion Charging: Lessons from Europe for U.S. Metropolitan Areas', Policy Brief: Comparative Domestic Policy Program, The German Marshall Fund of the United States. Available at: http://www.scribd.com/doc/38426948/Gaining-Public-Support-for-Congestion-Charging-Lessons-from-Europe-for-U-S-Metropolitan-Areas
62 Schuitema, G, Steg, L & Forward, S 2010, 'Explaining difference in acceptability before and acceptance after the implementation of a congestion charge in Stockholm', Transport Research Part A, Vol. 44, pp. 99-109.
63 Swanson, J 2009, 'Gaining Public Support for Congestion Charging: Lessons from Europe for U.S. Metropolitan Areas', Policy Brief: Comparative Domestic Policy Program, The German Marshall Fund of the United States. Available at: http://www.scribd.com/doc/38426948/Gaining-Public-Support-for-Congestion-Charging-Lessons-from-Europe-for-U-S-Metropolitan-Areas

The benefits of road pricing reform for public transport (funders, providers and users) should also be considered. Where road pricing reform seeks to price congestion, the outcome sought is a more efficient allocation of capacity on both road and public transport networks. Pricing congestion is a mechanism designed to change the relative economics of road use, compared to other modes.

An effective charging system would offer the opportunity to develop a virtuous cycle of demand led public transport investment. Effective transport pricing, which accounts for undesirable externalities such as congestion, would increase demand for alternative modes generating a modal shift to public transport. In turn this would drive increased investment in the capacity and quality of public transport and improve road and road-based public transport journey times. Investments in high quality public transport are likely to lead to greater utilisations and densification around transport nodes and a related improvement in operating efficiency and the viability of public transport. Finally, this would continue to allow more effective transport pricing across all modes, completing a virtuous cycle in the medium to longer-term – see Figure 7.2.

▼ FIGURE 7.2

VIRTUOUS CYCLE OF EFFECTIVE TRANSPORT PRICING



Source: Infrastructure Partnerships Australia, 2013

Hypothecation of revenue

Our analysis of international case studies also finds a fundamental correlation between the treatment of revenues and the political sustainability of pricing reform. Experience shows a much higher level of public support is achieved and sustained, if the revenues from reform are hypothecated to transport network investment. In the case of a road user charge, it would refer to the commitment of funds raised from that charge to investments in dedicated transport infrastructure projects, including public transport, that complements the network that is priced.

However, experience also shows that policymakers must be cautious in how widely those benefits are invested, and to what degree revenues support modes that are distant and of marginal benefit to the source of the charges. A sound example of this tension exists in the implementation of the German Heavy Vehicle Charging scheme.

The German scheme was introduced in 2005, with all freight vehicles with a GVM exceeding 12 tonne paying a distance based charge for access to the German road network. Of the revenue collected, 50 per cent is allocated to roads, 38 per cent to rail and 12 per cent to waterways.

An internet based survey, conducted in 2005 with German road freight operators, indicated that acceptability of the scheme was diminished as a result of revenue being used to cross subsidise other modes of transport. The freight companies supported revenue being spent on a combination of road maintenance and motorway upgrades, but predominately rejected the use of revenue for rail and water transport. 50 per cent of the trucking companies surveyed rejected the revenue from the charge being used to fund other transport; 25 per cent agreed and the remaining 25 per cent were undecided.[64]

In the London case study, net revenues over the first decade of congestion charge must be invested in committed transport priorities in the London Mayor's Transport Strategy. For example in 2009/10, the scheme generated £148 million in net revenue; which was allocated to funding enhancements to the bus network, road safety measures and new cycling and pedestrian facilities.[65]

In the London case, those who pay the congestion charge – motorists travelling inside the cordon during charging periods – can expect to directly or indirectly benefit from these investments; for example, investments in the bus network through service quality, increased capacity or new routes may provide an alternative option for the motorist, or free up road capacity by encouraging other motorists to use a public transport alternative. Support for the London scheme has remained high, indicating that where there is a tangible benefit from hypothecation to those who bear the burden of the cost road pricing schemes can maintain popular backing.

Substantial evidence exists to support the thesis that the investment of revenues is a fundamental consideration in achieving sustained public support. To alleviate this tension, decisions regarding the use of revenue by governments must be effectively communicated to both road users and the general public.

7.3 KEY CONSIDERATIONS FOR AN AUSTRALIAN REFORM PROCESS

Use of revenue

As discussed earlier in this paper, there is a considerable gap between what is charged to road users, and the amount that is invested in the nation's road network, under current arrangements. As discussed above, there is a well-accepted and fundamental linkage between public support for reform, and the investment of revenues.

That means that the reform of road pricing in Australia will necessarily require consideration in the context of a broader national taxation strategy. Further complexity is created, because of an array of inconsistent parallel taxation and distributions structures between states and local governments. The practical complexity of achieving reform across all road users and all tiers of government across the country point to the requirement for a clear, staged and detailed engagement to achieve full hypothecation.

In the near term, the hypothecation of road related charges at a state level may present an achievable first step.[66] Proposed funding and revenue distribution arrangements which may be introduced under the HVCI reforms could be relevant to light vehicle road use reforms in the future which is discussed in the next section.

National reform will also require a decision about the target revenues to be raised by the scheme. Setting the revenue target will naturally have a direct impact on the community's acceptance of reform. At a minimum, a reform model should set a revenue target equal to all existing road related investment. However, under this option, additional revenue beyond the road charging system would need to be sought to fund the major expansions of the network, thus representing a sub optimal outcome.

For road pricing reforms to contribute to the development of additional road and transport infrastructure, it would be preferable that new charges be structured to initially generate revenue equivalent to that of all road-related revenue currently collected by all Australian governments,[67] supported by a staged approach to hypothecation. In addition to generating revenue, hypothecation could also serve to increase transparency in transport related expenditure – better allowing the public to understand the spending requirements for maintenance and augmentation of the transport network and how revenue is directed to pay for those demands. Exposing the true cost could serve to increase the integrity of investments through transparency and visibility of both revenue and expenditure.

64 Link, H 2008, 'Acceptability of the German Charging Scheme for Heavy Goods Vehicles: Empirical Evidence from a Freight Company Survey', Transport Reviews, Vol. 28, No. 2, pp. 141-158.
65 Transport for London 2011, What do you need to know about Congestion Charging. Available at: http://www.tfl.gov.uk/assets/downloads/congestion-charging.pdf
66 This is currently the practice for some jurisdictions (e.g. New South Wales) but for most, registration charges form part of consolidated revenue.
67 Excluding the Goods and Services Tax, Fringe Benefits Tax and privately collected motorway tolls

Revenue in excess of current road expenditure could be directed to other modes of transport e.g. rail freight, public transport, active transport and other transport facilities. Public transport will play a particularly important role in supporting road pricing reforms in urban areas, and provision of better travel alternatives may be seen as a prerequisite by the community. Under an urban time of day based charging system, the higher volumes of passengers wishing to switch mode from private to public transport is likely to provide substantial public support for the necessary investment in improved public transport capacity and capability.

Under a whole-of-network user charging mechanism, when and where revenue is invested in the transport network is a complex issue that will require detailed analysis and consultation. Options are varied and include:

- Centralised distribution of revenue on a best for network basis;
- Revenue remaining in the state jurisdiction from which it was collected, with state governments responsible for allocating capital within that jurisdiction;
- Revenue distributed on the basis of an agreed formula akin to horizontal fiscal equalisation used to allocate GST revenue;
- A single, or series of, infrastructure investment fund(s) with spending decisions taken at arms-length from governments;
- Revenue distributed based on observed traffic volumes on particular corridors or road classes (i.e. National Highway Network, Arterial and Suburban Roads); or
- A combination of above or other mechanism.

Under a universal charging framework a wealth of currently unavailable data on actual road use and demand would be available to policymakers. Access to reliable and detailed data about actual usage patterns could be invaluable to inform the allocation of capital to maintain and augment the network – ensuring that investment decisions are responsive to the needs of users.

Lessons from heavy vehicle reforms

Reforms in heavy vehicle charging arrangements over the past decade, including work recently undertaken as part of the HVCI, can provide important lessons for the future introduction of direct charging for light vehicles. Focusing initial reforms on commercial network users has been appropriate, as this group of users is likely to have a much greater appreciation of the benefits of a more direct, rational user pays system.

Significant improvements to the heavy vehicle charging regime have been incrementally achieved over the last decade. Key steps in the reform process may have some relevance to the pathway that could be followed for light vehicles e.g.:

- Recognition of distortions caused by inconsistent heavy vehicle registration charges and development of a nationally consistent charges;
- Establishment of a national registration scheme with an agreed mechanism for redistributing revenue to states;[68]
- Establishment of road use charges linked to infrastructure use;[69]
- Ongoing refinements to road use charges to minimise cross subsidies between vehicle classes and ensure that charges continue to recover infrastructure costs; and
- A multi-jurisdictional approach to investigation of more advanced direct charging mechanisms.

Work being undertaken by HVCI to investigate the feasibility of mass distance charging for trucks is likely to be particularly relevant to the future reform process for light vehicles. Although this reform process is only dealing with a 'partial market', a number of general lessons are likely to emerge from the process, for example:

- Alternative approaches to setting charges;
- Technology capabilities and limitations; and
- Approaches to revenue distribution and reforms which can ensure that road supply decision making is more responsive to the needs of network users.

The National Transport Commission and other stakeholders involved in HVCI should play a key role in reforms to light vehicle charging arrangements to maximise the value of knowledge gained during that process.

The role of technology

Technology is no barrier to the implementation of the kind of scheme outlined in this paper. Indeed, consideration of the ultimate reform model should lead the selection of technology, rather than selecting a scheme to fit a particular technology. Policymakers should avoid being prescriptive about a particular system (e.g. GPS, telematics, odometer readings), recognising that scheme outcomes may be achievable through a variety or combination of technologies.

The selection of the most appropriate technology solutions will need to balance a range of considerations, including cost for motorists and government, effectiveness, and relative simplicity of use. On-going costs associated with a new system will need to be investigated as lessons from other road pricing schemes show that this can have a considerable impact on revenue. An understanding of the costs of administering the current system of road use charges will be needed to properly evaluate options – at present, this is not well understood.

The procurement of technology should provide an opportunity for service providers to develop innovative, leading edge solutions which satisfactorily deliver the scheme's objectives at the best value for money and reliability.

An example of such an approach is provided by the following case study on New Zealand's 'eRUC' system. Whilst electronic payments for registration are a reality in most Australian states, the development of the eRUC solution provides an example of a non-prescriptive approach to developing a technology solution for road pricing reforms, combining regulatory and commercial services within a common platform. This style of approach can reduce costs and risks

68 The Australian Government established the Federal Interstate Registration Scheme (FIRS) in 1987 to promote uniform charges and operating conditions for heavy vehicles operating interstate. It is an alternative to state or territory registration for heavy vehicles. Approximately 20,000 vehicles are registered under the scheme (representing approximately 3% of all heavy vehicles). Revenue from FIRS is collected by the states and territories and submitted to the Australian Government. The Department redistributes the revenue back to states and territories according to an agreed formula that reflects road damage as a result of FIRS registered heavy vehicles. This distribution process reflects the relative amount of heavy vehicle travel within each Australian state.

69 The PAYGO charging cost base is based on the recovery of road expenditures (construction and maintenance) by all levels of government (Commonwealth, State and Territory) that is attributable to heavy vehicles.

for government, whilst at the same time encouraging innovative solutions from the private sector and providing network users with a commercial incentive to use a system that can also provide regulatory benefits.

A market based approach to the supporting technology for a road user charging scheme is best placed to deliver efficient and innovative solutions that meet customer demands. Subject to the objectives a road user charging framework seeks to achieve, it is likely that the scheme's outcomes could be supported by a variety of technology solutions – allowing the market to determine the most viable technology solution(s), and recognising that different users are likely to be better serviced by different technology solutions.

The US state of Oregon provides another contemporary example of a technology-agnostic approach, through its 2012 Oregon Road User Charge Pilot Program.[70]

Earlier evolutions of the pilot programme required a government mandated GPS tracking solution to support the charging mechanism. Under the 2012 Oregon pilot programme motorists will be able to choose between a number of service provider technology options; ranging from their own GPS device to odometer based readings, or even pre-pay mileage block options for motorists concerned about privacy or 'bill-shock'.[71]

The philosophy underpinning this approach is sound, in that the market will be able to determine the validity of technologies, with customer choice leading decisions. Obviously, the ultimate model and scheme adopted in an Australian context would dictate the broader suite of options that would be practical. This kind of approach has benefits, because it would limit the degree of direct exposure to technology risks.

Encouraging technology innovation in road pricing reforms – the New Zealand experience

New Zealand has had variable mass-distance based charging regime in place since 1978. The Road User Charges (RUC) scheme applies to all vehicles over 3.5 tonnes GVM and all light vehicles powered by diesel or other fuels which are not taxed when sold. Under the system, road users purchase a licence to use the network in 1000 km increments.

All vehicles under the scheme must be fitted with distance recorders to provide reliable records of distance travelled. Paper based licences are required to be displayed on the inside of the vehicle windscreens.

A review of the RUC was undertaken by the New Zealand Government in 2008 and made a number of recommendations including the need for improvements to the approach to collecting revenue. Compliance costs under the scheme were found to have a high impact on users because of the need to purchase paper licences. Evasion and tampering with odometers and hubodometers (used on trailers) were also issues.

Coinciding with the review, a private company, EROAD, approached the New Zealand Government with a proposal to develop an electronic road user charging (eRUC) system. The system, approved for implementation in 2009, is a cellular-based vehicle tracking and fleet management system which also enables users to purchase RUC licenses via a web application.

Users pay a fee of $80 per month, plus an additional $5 transaction fee for licence payments. Whilst the vehicle tracking and fleet management system provides the main source of revenue for the vendor, the electronic payment mechanism has provided an internet-based payment channel for government, which has reduced the number of paper based transactions for licences.

New Zealand Transport Agency officials estimate that during fiscal year 2011 up to 15 per cent of the heavy vehicle fleet used the eRUC system, an increase from less than 1 per cent in September 2009.[72] Under the certification model adopted for the reform, other technology vendors are not precluded from acting as agents for eRUC payments. It is understood that other vendors are now developing competing systems.

Such GPS or cellular based systems could potentially serve as a platform for further reforms in charging and funding arrangements (e.g. allocation of payments to road owners, differential rates for particular road types or targeting a particular corridor or area congestion issue).

70 Oregon Road User Charge Pilot Program, http://cms.oregon.egov.com/ODOT/HWY/RUFPP/pages/rucpp.aspx
71 Ibid.
72 United States Government Accountability Office, Report to the Subcommittee on Transportation, Housing, and Urban Development, and Related Agencies, Committee on Appropriations, House of Representatives GAO-13-77, December 2012 and EROAD (2009), EROAD (2011) NZ Electronic Truck Tolling, presentation to CRRP Board, 5 July 2011

Other practical considerations

A series of other practical considerations need to be recognised and addressed during the defining stages of any future reforms to the road user changing framework. Issues for consideration may include:

- that charges are logical, transparent and can be easily understood by road users;[73]
- if applicable, the issue of how to include occasional and 'out-of-region' users is carefully addressed;
- Concessions and special users are considered and adequately addressed;
- a clear understanding of community service obligations (CSO) associated with the road network (for example, the maintenance of road connectivity to remote communities);
- strategies to manage revenue, operating costs and risks are in place; and
- it has sufficient lead-time, including for real-world testing and transitional arrangements, to work through all the issues so the scheme can commence and operate effectively.

Each of the issues raised would require careful consideration and may require individual analysis and modelling to better understand its effect on the overall effectiveness of the scheme.

7.4 RESEARCH PRIORITIES

There remain a large number of 'unknowns' within the road charging reform debate. In the short-term, further research is needed to address a number of key issues.

Strengthening the 'evidence base' on transport network performance

There is a need for consistent, time series information on network travel speeds, congestion and its impacts on productivity. The Bureau of Transport and Regional Economics' *Estimating Urban Traffic Congestion Cost Trends for Australian Cities* is a useful and widely referenced information source, but is based on an aggregated modelling approach.[74]

More detailed studies of traffic congestion within specific urban areas will be important for future decision making, as will detailed information on how the broader road network is actually used. Information on congestion and road network performance should be published on a regular basis and data should be made freely available to the travelling public.

Reform to road pricing will also require a more detailed understanding of public transport availability and demand in anticipation of a contingent modal shift away from private vehicle use. Further consideration of whether public transport capacity will be sufficient to accommodate changing demand will be required.

Analysis of revenue that may be raised under different schemes

Future analysis should focus on potential revenue that may be generated by different charging models. For universal distance based charging schemes, this will require consideration of revenue shortfalls in particular regions (e.g. rural areas) and the potential need for community service obligation CSO payments to ensure that non-commercial parts of the network can be maintained.

Investigation of urban schemes should consider the amount of revenue that can be raised and the level of investment needed in other transport alternatives to manage the impacts of higher road use charges during selected periods. Analysis should also include scenario analysis and sensitivity testing on the risk to revenue flows from any proposed charging regime reforms.

Further analysis of likely winners and losers under different road charging reform options

Using findings from this work, further analysis should consider the impacts of direct road user charges on different types of motorists, households and geographic regions. Work should also consider the potential for new charges to have a negative impact on some socio-economic groups. This may require further information on travel patterns of particular network users. For instance whilst comprehensive travel models have been developed for many urban areas, there is a comparative lack of data available on travel in regional areas.

Assessing the costs and benefits of reforms

Reforms to light vehicle charges should be subject to thorough economic evaluation of costs and benefits. Further work to assess the likely national productivity benefits associated with road charging reforms (e.g. especially models applied in urban areas) will be important.

Analysis should also consider the city shaping implications of a rational approach to road pricing, recognising that schemes may have impacts on areas such as consumer demand for density close to urban centres or in close proximity to transport hubs – this is particularly pertinent in regard to schemes which include a congestion management component.

There is also a need to test road user responsiveness to different pricing levels and explore the magnitude of changes needed to change behaviour. A number of innovative research projects have been undertaken looking at how road users respond to different price signals which could be used to test the effects of different road charging models.[75]

73 This issue was recognised in a recent review of road user charges in New Zealand, which concluded that "while a degree of precision is desirable when determining the allocation of costs and setting of charges, absolute precision is not possible or practicable" (Road User Charges Groups (2009) An Independent Review of the New Zealand Road User Charging System).

74 The Bureau of Transport and Regional Economics 2007, Estimating Urban Traffic Congestion Cost Trends for Australian Cities, Working Paper 71.

75 For example see Greaves and Fifer (2011), *Analysis of a financial incentive to encourage safer driving practices*, Institute of Transport Studies Working Paper 11-18

Key points

- To provide a foundation for longer term reforms, immediate efforts could focus on addressing distortions within the current charging system including inconsistencies and inefficiencies in road access taxes and fuel consumption charges. Options involving the use of pricing as an instrument to manage demand could be introduced as a medium to longer term reform.
- For road pricing reforms to contribute to the development of additional road and transport infrastructure, new charges could initially be structured to generate revenue equivalent to all road-related revenue currently collected by all governments. This should be supported by a staged approach to hypothecation.
- Work being undertaken by the HVCI to investigate the feasibility of mass distance charging for trucks is likely to be relevant to the future reform process for light vehicles.
- Experience from international jurisdictions has shown public support for road pricing reforms relies on policy makers and political leaders being able to demonstrate the problem to solve, articulate road pricing as the solution to that problem and demonstrate the benefits of reform.
- The technology used to underpin a new charging system will need to balance a range of considerations, including cost for motorists and government, effectiveness, and relative simplicity of use. A market based approach to the procurement of technology should provide opportunities for service providers to develop innovative solutions.
- In the short-term, further research is needed to address a number of key issues including:
  - Strengthening the 'evidence base' on transport network performance;
  - Analysis of revenue that may be raised under different schemes;
  - Further analysis of likely winners and losers under different road charging reform options;
  - Assessing the costs and benefits of reforms; and
  - Understanding the implications of more direct charging as an urban planning or city shaping tool.

8 Conclusion

This paper seeks to progress the discussion about the positive options that are available to materially restore the efficiency of the nation's transport network.

As the major stakeholders across the national road network, including the owners, providers, regulators and most particularly, road users, we are seeking to begin a genuine, honest and collaborative policy reform process for road user charging and funding.

It is increasingly apparent that the current approach is diminishing in its funding capacity, and of limited use in balancing the signals for efficient expansion, maintenance and usage of the broader transport network.

This is not a niche area of government policy, or an abstract application of economic theory; rather it is a fundamental challenge that is entrenched into the price of the goods and services that we consume and produce.

Failure to reform will risk increasing urban and freight congestion, and a sustained erosion of the abilities of Australia's cities and regions to compete in global markets.

By presenting a range of identifiable and relatable, but hypothetical, real-world users, we have sought to demystify the discussion about reform – showing road users, taxpayers and policymakers alike that reform offers substantial opportunities to make life better.

We accept that the scale of reform considered in this paper offers substantial political complexity. We further accept that broad taxation reform in Australia has historically required a sustained period of public debate and consideration, to achieve the level of consensus that makes reform politically achievable and electorally sustainable.

The potential to reform road user charging has been considered several times in Australia, but to date, theoretical concepts have not matured into any meaningful process.

What is missing in this debate is a formal process to interrogate the options, consider the pathways and provide a forum for ongoing consideration, ventilation and socialisation of the concept of reformed road user pricing.

That process could begin immediately, through a formal referral to the Productivity Commission, as outlined as the principal recommendation of this paper; and a concurrent process to drive consistent approaches and common regulation across Australia's federation.

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INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

31 July 2018

Senator Tim Storer
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600

Dear Senator Storer,

RE: Submission to Select Committee on Electric Vehicles - inquiry into the use and manufacture of electric vehicles in Australia

Infrastructure Partnerships Australia is pleased to provide this submission to the Select Committee on Electric Vehicles and its inquiry into the use and manufacture of electric vehicles (EVs) in Australia.

Infrastructure Partnerships Australia is an independent think tank dedicated to shaping public debate about infrastructure and driving policy reform for the benefit of the national interest. EVs offer a once in a generation opportunity to deliver a fairer, more efficient transport market. By aligning reform to the rise of EVs, Australia has the opportunity to lead the world in EV uptake and to deliver a modern, fairer way to pay for transport infrastructure.

EVs are coming, and that's a good thing

EVs are set to become the dominant drivetrain in the new light vehicle market over the coming decade. While liquid fuel vehicles will continue to make up a substantial proportion of the existing fleet, the declining cost, increasing efficiency, ease of maintenance and reliability of EVs will make them the preferred consumer option (particularly for urban markets) in the near term. Put simply, EVs will become a better solution for personal mobility, relative to combustion engine vehicles, for the overwhelming majority of Australians.

The 2018-19 financial year will likely see between 8,000 and 12,000 full plug-in EVs sold in Australia. The growth pathway is exponential and compounding. Within the next few months, the electric Hyundai Kona is set to enter the Australian market, placing pressure on other major car manufacturers to accelerate the deployment of electric cars and the broader electrification of the private vehicle transport market.

However, the current approach to charging for roads is increasingly unsustainable – and this trend will be accelerated by EVs

While the uptake of EVs and more fuel-efficient vehicles is undoubtedly a good thing, this trend is driving a rapid and terminal decline in Fuel Excise revenue, making the case to act swiftly on road reform an urgent concern for all Australians.

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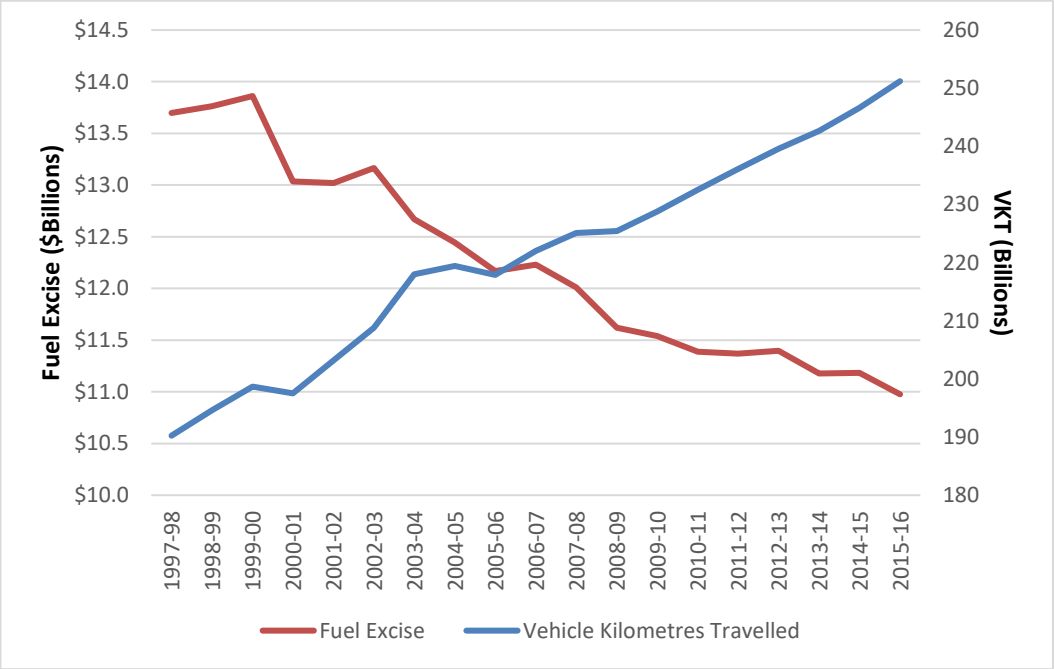
Indeed, the Parliamentary Budget Office's latest report *'Trends affecting the sustainability of Commonwealth taxes'* cites declining Fuel Excise as the most significant threat to the Commonwealth's revenue base. According to the PBO, Fuel Excise as a proportion of the overall economy has declined by 30 per cent since 2001-02 from around 2.8 per cent, to 1.9 per cent in 2016-17.

As demonstrated in Figure 1 below, this represents a $1.1 billion real decline in Fuel Excise receipts over the last decade (from 2005-06 to 2015-16). Over the same period, the number of total vehicle kilometres travelled on Australian roads has surged, from 217 million to more than 250 million. This means demand for roads has been increasing as the population and economy grows, while the revenue needed to support investment has declined.

Figure 1: Fuel Excise ($Billions, 2015-16 prices) verses Vehicle Kilometres Travelled (Billions)



Source: Infrastructure Partnerships Australia analysis of BITRE data, 2018

As the upfront and whole-of-life costs of EVs reach parity with and fall below that of combustion engine vehicles, this downward trend in revenue will accelerate. Equally, as the marginal cost of EV travel declines due to lower fuel and maintenance costs, there is likely to be additional upward pressure on demand for roads (as represented by total vehicle kilometres travelled in Figure 1). This will become a self-reinforcing cycle.

The incumbent road funding system is unfair for road users and this inherent unfairness will intensify as more EVs enter the fleet

Under the current regime, a motorist driving an electric car will only pay state-based road access charges

through registration and licence fees while making no direct contribution for their use of roads. Meanwhile, motorists driving combustion vehicles are left with the burden of paying Fuel Excise charges to fund our roads. In effect, motorist with combustion vehicles will increasingly cross-subsidise EV users.

This is set against a further perverse incentive where purchasers of EVs pay substantial upfront taxes (through Luxury Car Tax and import duties) which stifle the uptake of EVs as a mass market option and delay the broader benefits that electrification of the private mobility market will offer.

EVs are an opportunity, not a threat

To date, most policy discussion about the rise of EVs has focussed on the negative impact mass market adoption will have on Fuel Excise revenue and the related decline in governments relative capacity to fund transport infrastructure. While this concern is legitimate, it is the wrong lens through which to consider what is in fact a positive market transition.

EVs present an opportunity to attach reform to the rise of an emerging but disruptive technology. As noted, while combustion engine vehicles attract Fuel Excise, there is no existing consumption-based charge applied to EVs which reflect their use of the road network.

While EV drivers pay substantial upfront acquisition costs, the lack of a user charging regime means that EV drivers do not make a fair contribution toward delivery and upkeep of the roads they consume – nor the provision of new infrastructure to support these new forms of mobility.

Therefore, we recommend that all EVs and other zero emission vehicles sold in Australia should fall under a new distance-based road user charging mechanism, ensuring EV users continue to make a fair contribution towards the provision and maintenance of transport infrastructure.

This new charging system should be supported by broader, whole-of-market, road reform over the medium term. However, this may prove unnecessary in a scenario where EV uptake accelerates rapidly. Further, all revenue raised from any EV charging regime should be re-invested in transport infrastructure to maintain our existing networks and develop additional capacity.

We should encourage EV uptake and remove upfront disincentives

EVs offer a generational opportunity to reduce transport emissions, deliver a more sustainable transport future and deliver broader reform in the infrastructure sector.

In recognition of the substantial benefits EV's offer, we recommend the Australian Government investigate and implement policies to accelerate the transition to EVs in Australia.

Specifically, Infrastructure Partnerships Australia is advocating for all upfront disincentives to purchasing an EV (including Luxury Car Tax and vehicle import duties) to be reduced to zero. Furthermore, in consultation with industry and consumers, government should develop a national strategy to co-ordinate the transition to EVs.

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We have a once in a generation opportunity to introduce reform alongside a structural technology change, but the window of opportunity is rapidly closing

Successive inquiries, reviews and reports have all pointed to the need to reform our road funding and user charging system. Each of these have drawn the same conclusion that the current system for funding and investing in our roads is inefficient, unfair and unsustainable. These include:

- Infrastructure Partnerships Australia's *Road Pricing and Transport Infrastructure Funding* (2014);
- The Productivity Commission's *Inquiry Report into Public Infrastructure* (2014);
- Harper's *Competition Policy Review* (2015); and
- Infrastructure Australia's *Australian Infrastructure Plan* (2016).

The Australian Government, in response to a recommendation from the *Australian Infrastructure Plan*, has committed to an inquiry into road market reform. The new road user charging regime for EVs represents an opportunity to progress a no regrets policy which should be pursued irrespective of the timeframe of the planned inquiry into broader market reform.

The Australian Government should also consider recasting its planned inquiry into road market reform to take a broader perspective on new technologies in mobility (including EVs), and how these structural changes can be leveraged to deliver a fairer and more sustainable transport market.

However, the window of opportunity to leverage the rise of EVs for a positive reform outcome is closing. We must act in the very near term, while EV sales are low, and before mass market uptake makes this sensible reform electorally unachievable.

For this reason, the Australian Government must enact a dual policy of reducing the upfront disincentives of EVs, while also implementing a fairer, consumption-based charging mechanism for new EVs.

A classic no regrets policy

Implementing a direct user charge on EV is a no regrets policy. Under any EV projection scenario this policy remains robust. Indeed, even if EV uptake is lower than currently projected implementing such as charge will mean that our road charging system will be in no worse position than it is currently. However, if Australia misses this once in a generation opportunity, then the ability to reform our road transport system will be lost.

Moreover, the continued decline of Fuel Excise receipts will further erode the Australian Government's fiscal capacity, and in turn it's available funding envelope for transport and other policy priorities. For this reason, we recommend the Australian Government act swiftly to enact this simple, yet fairer and sustainable user charge mechanism.

Thank you for your consideration of this submission. Should you require further information please contact Mr Nick Hudson, Director of Economics and Policy, on (02) 9152 6018 or nick.hudson@infrastructure.org.au.

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Yours sincerely,

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