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Productivity Commission

SHIFTING THE DIAL



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SUPPORTING PAPER NO. 9

FUNDING AND INVESTMENT
FOR BETTER ROADS

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Funding and investment for better roads

Key points

- Governments have acknowledged the need for reform of funding and management of roads but action has been slow. This partly reflects that the community has not been sufficiently engaged in the discussion, or in decision-making on road services more broadly.
- Reform of funding arrangements is becoming more urgent. Improvements to vehicle technology such as greater fuel efficiency (and electric power), as well as changes in driver behaviour and preferences, have eroded revenue from the primary road-related taxes. The anticipated introduction of autonomous vehicles will exacerbate this effect.
- The funding dilemma presents an opportunity to more fundamentally improve road service provision — so that it is more responsive to motorists' actual preferences, networks are used efficiently, and there is greater assurance of value for money on spending.
- Arrangements for road reform were canvassed in the Commission's Public Infrastructure (2014) inquiry. The inquiry recommended implementing Road Funds as the basis of reform efforts to move toward broader road user charging. This review specifies steps that can be taken now to improve road planning and investment decisions, and elaborates on key policy considerations in pursuing more fundamental reform.

1 Introduction

Roads are integral to the day-to-day functioning of cities and the economy. Like electricity, gas and water services, they are an essential service for most people. Roads help connect people to jobs, goods to markets, all suburbs within cities, and regional and remote areas to cities and beyond. The location and type of roads also shape developments around them.

Roads are the most widely and commonly used form of transport, and the single largest infrastructure spending item for governments in Australia. Australia's population has grown by 85 per cent since 1971, while total vehicle kilometres travelled have increased by 220 per cent, most of this in cities.¹ Taxpayers nationally funded \$24.2 billion of road investment and maintenance expenditure in 2014-15, a figure that rose on average by 4.6 per cent per year over the decade to 2014-15.

¹ The first toll road in Australia was built in 1811, running from Sydney to Parramatta. Despite this long history in Australia (the earliest toll roads date back to Darius the Great and the Achaemenid Empire of the 5th century BC), there are only 16 toll roads operating in Australia with a total length of 241 km (BITRE 2016). Australia has around 873 400 km of roads (2015, excluding busways), 356 000 km of which were sealed (at 2011).

There are several challenges facing road service providers. Among them: the need to secure a sustainable source of funding for roads given that receipts from a major source of road-related funding, the fuel excise, are declining due to shifts in technology; and improving how roads are used and delivered. There continue to be prominent instances of poor decision making on road projects, a reflection of weak mechanisms for considering road users' preferences in investment decisions, and the susceptibility of funding to political imperatives.

Governments at all levels in Australia have been considering aspects of road reform for over a decade. The Australian Government has recently committed to investigate more fundamental road regulatory reform. This paper outlines key elements of the current system of road funding and service provision, reform efforts to date, and essential aspects of a more effective and sustainable system of road funding and regulation that should be part of the reform program.

Road funding and regulatory arrangements involve all levels of government. Effective reform will thus require sustained commitment by all governments.

The rest of this paper is structured as follows:

- Section 2 outlines the current road-related revenue, expenditure and funding arrangements at different levels of government.
- Section 3 discusses the problems arising from the current arrangements, and the need for road funding and investment reform.
- Section 4 details the road reform landscape, and outlines steps that would improve outcomes in the short term and that would also advance longer-term reform goals of ensuring road networks are more efficient and funding is more sustainable.
- Section 5 specifies in more detail the impact of autonomous vehicle technologies, and how regulatory structures may respond.
- Section 6 discusses road user-charging pilots based on lessons learned from international and domestic trials and processes as a way of advancing reform.

2 How decisions on roads are made and funded

Revenue

Funding for investment and maintenance in roads comes largely from the consolidated (taxation) revenue of Federal, State, Territory and Local Governments. While there are road-related fees and charges paid by motorists (table 1 and box 1), the vast majority of funds raised through these means are not hypothecated to road expenditure and instead directed to consolidated funds, from which governments allocate expenditure (across a range of areas). There are some exceptions to this in the case of the Federal Interstate Registration Scheme, which is owned by the Australian Government (and administered by the State and Territory Governments), some vehicle registration fees in jurisdictions, and

some tolled public-private roads. However, these revenue sources make up a small fraction of overall funding.

Table 1 Annual road fees and charges levied by governments^{a,b,c}
Per vehicle, average annual estimates

<i>Charge type</i>	<i>Indicative cost (\$2015-16)</i>
Fuel excise (Australian Government)	607
Registration fees (State and Territory government)	270
License fees (State and Territory government)	22
Stamp duty (State and Territory government)	139
Other taxes (State and Territory and Australian Government) ^c	296
Total fees and charges	1,334

^a Excludes all personal costs of vehicle ownership, including fuel costs, depreciation and maintenance costs, non-compulsory insurance policies and other costs. ^b Updated to \$2015-16 using the consumer price index. ^c Includes Luxury Car Tax, Fringe Benefits Tax, and smaller discretionary items.

Sources: Originally from Infrastructure Australia's *Australian Infrastructure Plan* (2016), sourced from BITRE 2014 *Yearbook 2014: Australian Infrastructure Statistical Report*.

Total road-related revenues in Australia were \$26.4 billion in 2014-15. \$11.0 billion was collected through fuel excise, \$5.6 billion through State-level vehicle registration fees, \$0.5 billion through driver licence fees and \$9.2 billion through a range of other taxes.

The absence of a dedicated funding source for roads has been of relatively low concern until recently, with road-related fees and charges raising sufficient revenue to meet notional road expenditure needs (and, indeed, over and above these needs). Revenues raised from road-related fees and charges have, however, fallen as a percentage of gross domestic product for over a decade and are now broadly equivalent to the amount of funding allocated by governments to road expenditure through budget processes (figure 1).

It is projected that road-related revenues will continue to fall in real terms relative to demand for road services (even under conservative assumptions about population growth). This implies, in the absence of policy change, a diversion of funds from other policy areas of the budget, higher debt or increased taxes to maintain service standards, or a reduction in those standards.

The main contributor to the weakness in projected road-related revenues is fuel tax receipts, the largest single road-related charge (accounting for about 45 per cent of total road-related charges in 2015-16). Fuel tax receipts have declined and are projected to continue to fall in real terms due to the improved fuel efficiency of cars, changes in travel preferences of commuters, the emergence of e-commerce, and the anticipated shift toward electric vehicles, which all reduce average fuel consumption.²

² While the debate on the sustainability of fuel excise revenue often focuses on light vehicles, electric and hybrid electric trucks do exist and are likely to become more popular as their range and towing capacity

Box 1 Road-related fees and charges

Road-related fees and charges are levied by the Australian and State and Territory governments. Local governments do not raise any direct revenues from road users apart from parking fees.

The **Australian Government** collects fuel excise from vehicle fuel companies, which is passed onto light and heavy vehicle road users through fuel prices (both diesel and petrol)³. Charges on light and heavy vehicle users are determined differently. For heavy vehicles, a credit is paid equal to the difference between the fuel excise rate and a road user charge, meaning that in practice heavy vehicles only pay the road user charge, and only if the net balance of all fuel tax credits is above zero for that period. Up to 2001, the fuel excise for light vehicles was indexed to the consumer price index in order to maintain the real value of excise collections. In 2001, the excise was frozen at 38.14 cents per litre in nominal terms. It was subsequently unfrozen in November 2014, when the excise was increased to 38.60 cents per litre and the government introduced biannual indexation linked to the consumer price index. The fuel excise was increased to 40.10 cents per litre in February 2017.

The heavy vehicle road user charge and heavy vehicle registration fees are recommended by the National Transport Commission, using what is known as the Pay-As-You-GO (PAYGO) model. The road user charge is set in law following a decision taken annually by the Transport and Infrastructure Council of the Council of Australian Governments (which is not obliged to follow the National Transport Commission recommended rate). It is a backward-looking (*post hoc*) charge to approximate road expenditure attributable to heavy vehicles. The methodology for calculating the heavy vehicle road user charge was recently reviewed. The Australian Government collects other smaller road related revenues, including road-related GST, road-related Fringe Benefits Tax, the Luxury Car Tax, and customs duties on passenger motor vehicles.

Each **State and Territory Government** applies registration charges to light vehicles and have their own systems for determining the charges (for example, they may be based on weight, engine capacity, or accident risk based on where the vehicle is garaged), and may combine these charges with other state levies such as fire and emergency services levies.

Other vehicle and road-related charges include stamp duties on sales of new vehicles and transfers of used vehicles, drivers licence charges and number plate fees.

State and Territory Governments also administer the Federal Interstate Registration Scheme (FIRS) on behalf of the Australian Government. The FIRS is a voluntary registration scheme for vehicles over 4.5 tonnes undertaking interstate trade, and is a budget-neutral scheme for the Commonwealth. FIRS-registered vehicles (at 30 June 2016) represented only 1.65 per cent of the Australian heavy vehicle fleet, and numbers of participants are expected to decline over time, as has been observed since 2007.

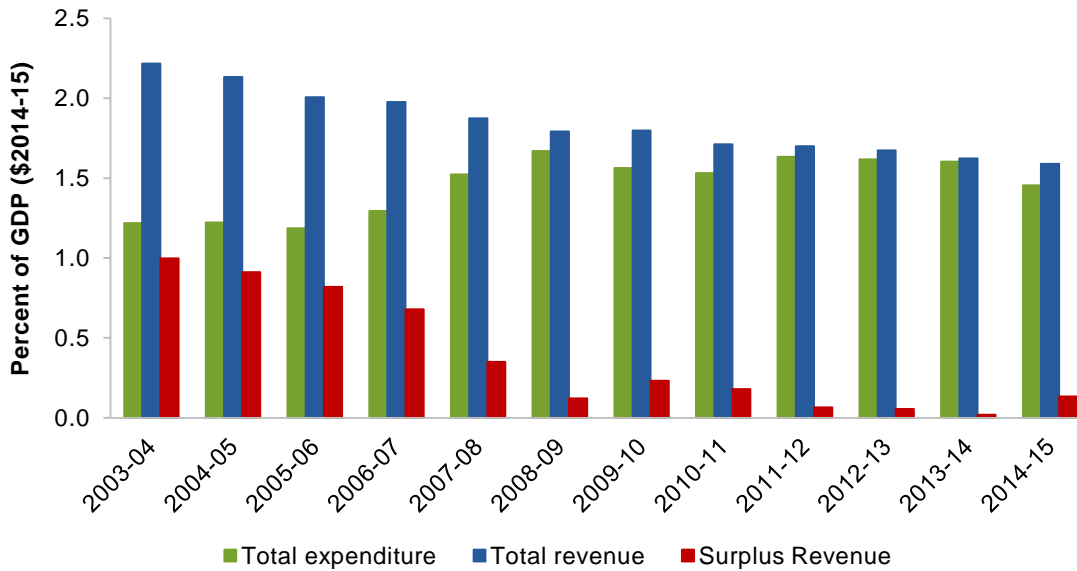
Sources: ATO (2017), Austroads (2016), DIRD (2017).

improve. International examples exist in applications of lower weight grades and shorter distance hauls. Electric garbage trucks operate in Beijing, Chicago and France. Industrial applications are present in Holland and Switzerland. Tesla is scheduled to release a battery powered electric truck in late 2017.

³ Cars using Liquefied Petroleum Gas also attract a fuel excise, although it is lower, currently at 13.10 cents per litre.

Figure 1 **Road-related revenues are in structural decline**^{a,b}

Real revenues and expenditures to GDP



^a Aggregated over all levels of government. ^b Includes work done for and by the public sector.

Source: BITRE 2016, *Australian Infrastructure Statistics Yearbook 2016*.

There have also been falls in Australian Government customs duties and the fringe benefits tax since the early 2000s. Tariff reductions account for the decline in motor vehicle customs duties, offsetting increases in the import share of vehicles in Australia (ACIL Allen 2016). The overall result has been that road related revenues at the Australian Government level have been in long run decline as a proportion of gross domestic product. Annual State and Territory Government revenues have been relatively stable.

The system of road funding is complicated by State and Territory and Local Governments' reliance on the Commonwealth for funding, with their expenditures roughly double their road-related revenues. Given the absence of hypothecation of most road revenues, there are minimal links between funding for road services and the actual use of roads.

CONCLUSION 9.1

There is a need to reform arrangements for road funding.

If left unaddressed, the existing funding approach for road infrastructure will put increasing pressure on governments to choose between roads and other services, shift further into debt or increase taxes further.

Expenditure and funding

Expenditure on roads is usually categorised into *capital expenditure* (replacing, improving or expanding the network), *operational expenditure* (departmental and regulatory expenditure such as administering transport shopfronts and licensing/registration services), and *maintenance expenditure* (repairs to the road network).

Austrroads (2016) categorises road expenditure into two broad categories: that on arterial roads (which predominantly carry traffic from one region to another), and on local roads (which are primarily used for local traffic and access to properties). In general, State and Territory road agencies and local governments are responsible for the capital, operational, and maintenance expenditure on arterial and local roads, respectively. The Commonwealth does not have a direct constitutional responsibility for roads. Rather, its foundational involvement draws on its taxation powers and powers relating to interstate trade.⁴

The Australian Government allocates funds to other levels of government through a number of different mechanisms. It has historically contributed funding to new State and Territory road upgrades (through direct grants and loans), upgrading and maintaining local roads (through untied grants to Local Government), and maintenance of the National Land Transport Network (NLTN) (grants are discussed in the following sections). The NLTN comprises road and rail corridors deemed nationally significant by the responsible minister.

Generally, responsibility for the project management of capital and maintenance expenditure for road assets lies with the State and Territory, and local, governments (for arterial and local access roads, respectively).

The Australian Government provides part or whole contributions to projects based on its investment priorities and largely under the framework set out under the *National Land Transport Act 2014* (Cth), and the supporting National Partnership Agreement on Land Transport Infrastructure Projects (under the Federal Financial Relations Framework). The National Land Transport Act stipulates the conditions under which the responsible minister(s) may approve funding for individual projects. The National Partnership Agreements set out Commonwealth investment priorities and outline the objectives of investment, roles and responsibilities and further conditions and requirements on the particulars of projects.

The schedules to the National Partnership Agreements constitute a considerable portion of the Commonwealth's infrastructure investment program, but do not reflect the full extent of its infrastructure investment. Further details on Commonwealth funding arrangements are outlined below.

⁴ This section was usefully informed by advice from the Department of Infrastructure and Regional Development received as part of this inquiry (DIRD 2017).

States and Territories fund or finance expenditure with own-source revenues and grants from the Commonwealth, and also provide funding to Local Governments. Local Governments fund expenditure through own-source revenue (such as rates) and grants.

After accounting for grant funding, final road expenditure by the Australian, State and Territory (excluding public non-financial corporations) and local governments in 2014-15 was \$4.8, \$12.5, and \$6.2 billion, respectively.

Each level of government has its own prioritisation, assessment and selection framework for roads. At each level of government, the strategic priorities for roads may differ.

Australian Government grants to State and Territory governments

Australian Government grants for road projects are largely provided to State and Territory road agencies under the Infrastructure Investment Program of the National Partnership Agreement on Land Transport Infrastructure Projects.

Grants (or financing support) are provided for major projects — largely on the basis of network deficiency and to deliver national economic objectives, to undertake maintenance and minor works (in this case, grants are usually untied); and to support specific policy aims, such as freight productivity or road safety. For example, under the Infrastructure Investment Program the Australian Government provides funding for the Black Spot Program, which is aimed at reducing accident risk. Funding for this program is allocated based on nominations by local and state authorities for sites that meet eligibility criteria, including accident history information.

Beyond this, the model for Australian Government funding of State and Territory road expenditure is coordinated by the Australian Government infrastructure portfolio, in negotiation with the State and Territory Governments. Historically, State and Territory Governments have brought forward proposals for assessment by the Commonwealth, including through Infrastructure Australia (which reviews projects for which \$100 million or more in Commonwealth funding is being sought, prioritises available funding, and determines models of financial support).

Other funding provided by the Australian Government tends to reflect its policy priorities and the investment needs of the jurisdictions at certain points in time. Examples include the Infrastructure Growth Package of 2014-15, and the current government's City Deals, which, although not specific to roads, contain road-related components.

Australian Government grants to local governments

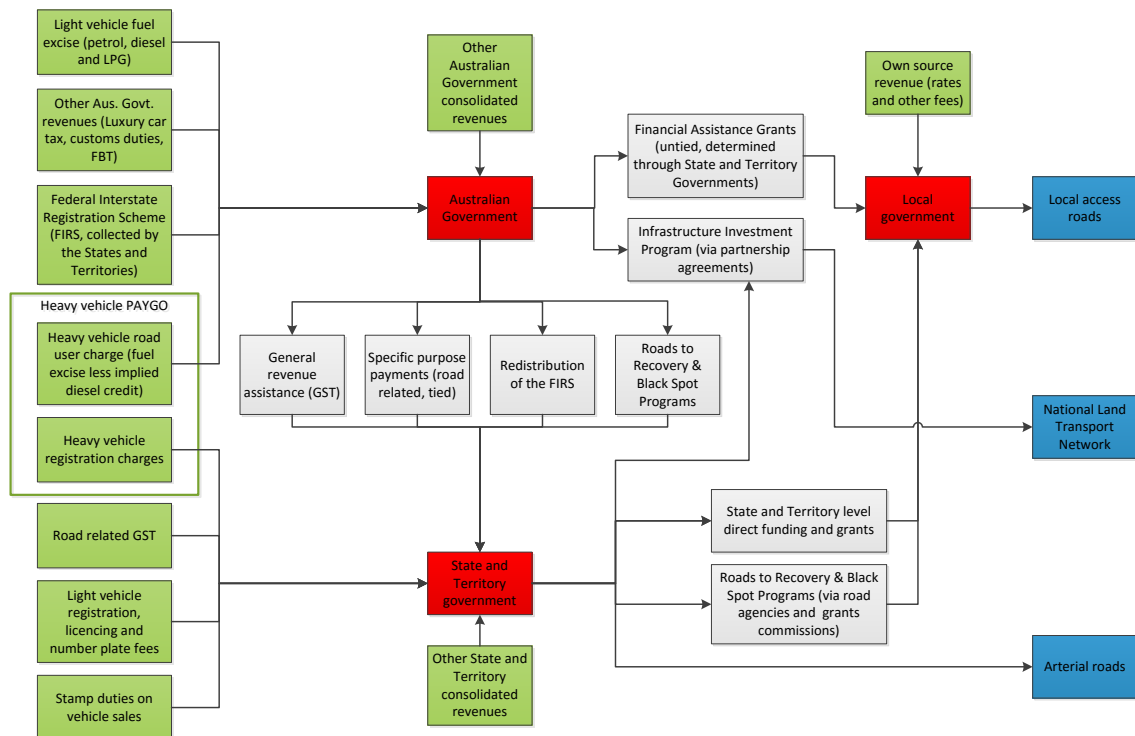
Grants to Local Governments (via State and Territory governments) include the roads component of Financial Assistance Grants and the Roads to Recovery Program. Both the general and local road components of Financial Assistance Grants are 'untied', meaning local governments have autonomy in how they are spent.

The Roads to Recovery Program is aimed at maintaining or replacing road infrastructure assets. In practice, funding is distributed to specific local governments based on their allocation of local roads grants. The Australian Government Minister for Local Government approves allocations.

State and Territory road agency funding to local governments differs by jurisdiction, but generally includes financial assistance to councils for work on council-managed arterials and payments to councils for contract work on state-managed roads. In addition, State and Territory governments also spend directly on local roads in some instances.

A stylised depiction of the current road funding system is depicted in figure 2.

Figure 2 Australia’s current road funding and investment architecture



3 The need for road funding and investment reform

Many Australians have become less confident over time about prospects for improvement in transport services. Their highest priorities for improvements were public transport, followed by roads. But whereas Australians are optimistic that public transport improvements will lead to better local transport services, roads are anticipated to be the main reason for their worsening (ITLS 2017). This is perhaps unsurprising.

Significant taxpayer funds have, in recent times, been allocated to transport network projects, particularly roads (box 2). In the recent past, major network augmentation and investment projects in major cities (for example the Clyde Road duplication in Berwick, Melbourne (VicRoads 2015)), are likely to have provided some relief on congestion and average commute times in specific areas. However, survey evidence on people's perception of transport and congestion issues suggests a strong *prima facie* argument that over time, and in many congested areas, new capacity has tended only to create induced demand, eroding any observed improvement in congestion.

Box 2 New road funding commitments by governments

The Commonwealth has flagged significant expenditure over the medium term. As one indicator, Infrastructure Australia's Infrastructure Priority List (at February 2017) has over \$21.7 billion in total capital costs listed in association with 10 road-related projects in New South Wales, Victoria and Queensland.⁵ These are either 'high priority' or 'priority' projects for which a full business case has been completed by the proponent (State government) and positively assessed by the Infrastructure Australia Board. There are a further 29 road-related infrastructure 'initiatives' listed in the plan (that is, those for which a business case has not yet been completed).⁶

As a sample of the States:

- the New South Wales Government's 2017-18 Budget includes \$1.5 billion to continue the Pacific Highway upgrade program, \$648 million for road upgrades to support the Western Sydney Airport at Badgerys Creek, and \$609 million for other major road upgrades
- the Victorian Government's 2017-18 Budget lists 12 new road expenditure projects estimated at \$823 million, in addition to an extra \$846 million for the continuation of its level crossing removal program
- the Queensland Government's 2017-18 Budget highlights \$489 million in additional funding for two road projects.

Overall, new road investment is the single largest area of both transport infrastructure spending, and public physical infrastructure investment more broadly. Average annual real expenditure on roads (measured as new engineering work done by the public sector, and the private sector for the public sector) in the five years to 2015 was \$12.5 billion. This compares to investment in railways, and ports and harbours, of \$2.9 billion and \$450 million respectively, while investment in energy, telecommunications and water infrastructure was \$5.9, \$1.7 and \$4.1 billion, respectively. Governments also contribute to private infrastructure in mining and other heavy industries.

Sources: BITRE (2016), IA (2017), NSW Government (2017), Queensland Government (2017), and Victorian Government (2017a).

⁵ These estimates are based on capital costs provided in States and Territories' proposals; that is, based on nominal, undiscounted P50 costs (unless funding was being sought on the basis of P90 costs, in which case the P90 estimate was used).

⁶ Other projects listed in the plan (including for the other States and Territories) are non road related projects.

This is consistent with several theories from traffic engineering, which suggest that additional supply tends to alleviate congestion only in the short term. At the same time, there has been continuing population growth in inner city areas, which has worsened congestion. The avoidable social costs of congestion for Australia's capital cities have risen significantly over time, estimated at \$5.7 billion in 1990, \$9.3 billion in 2000 and rising to \$18.7 billion in 2015, and are projected to increase significantly in the absence of major policy change (BITRE 2015) (updated to 2016 dollars).

It is not clear that funding is being applied to the most urgent areas, given available options for network augmentation and maintenance, which is partly a reflection of incomplete data, particularly at the local government level. Grant allocations to State, Territory and Local governments are not based on any consistent framework to identify priorities according to demand, or performance against consistently developed standards. More fundamentally, the views of road users do not directly inform spending choices, whether on the quality or availability of services, willingness to pay or the relative merits of competing priorities.

Further, there is no explicit price for road services to make the costs of using and providing services transparent, which is critical to inform choices. Recent road and transport funding decisions by governments also highlight missed opportunities to use pricing as a way of funding infrastructure clearly desired by the community (an example in box 3).

Box 3 Victoria's level crossing removals

In June 2014, VicRoads provided the then Victorian Government with a strategic framework for prioritising metropolitan level crossing projects on the Melbourne train network. In November 2014, the incoming Victorian Government sought an electoral mandate to begin removing 50 level crossings identified as posing a safety risk and/or contributing to congestion.

The election mandate sought in 2014 is one indicator that the community may have been willing to pay for the new infrastructure (through, for example, simple cordon charging) given likely improvements to commute times, community safety, train station upgrades, and potentially land values along the main removal sites. The decision making process, however, did not allow for user willingness to pay to be assessed as an option for funding the project.⁷

The removal process began in early 2016. A Level Crossing Removal Authority has since been established to implement the project, and to engage the community on plans. The Victorian 2017-18 Budget papers indicate that funding for the project has been sourced from the proceeds from the leasing of the Port of Melbourne, and additional debt issuance. In 2017, the project was estimated to cost taxpayers \$6.9 billion, upwardly revised from an initial estimate in the 2015-16 Budget of \$5-6 billion (in nominal terms).

Sources: VicRoads (2014), Victorian Government (2015, 2017b).

⁷ The framework noted, however, the potential for land development options and value capture arrangements to be used on a case-by-case basis.

The accountability mechanisms to ensure that the projects with the highest net benefits are chosen are relatively weak. With no consistent framework for allocating grants, projects made possible through such funding can be particularly subject to the political imperatives of the day. Prominent, and not infrequent, instances of poor decision making on major projects (for example, those discussed in chapter 4 in the main report and the Commission's 2014 Public Infrastructure inquiry) have raised serious questions about project selection and delivery.

CONCLUSION 9.2

Current arrangements for road service provision are highly vulnerable to poor decisions and outcomes. The long-lived nature of road assets mean that any sub-optimal decisions can materially, and permanently, reduce community welfare relative to what it would otherwise be.

Local council asset management frameworks

Several studies, including by local government associations, have pointed to deficiencies in the road asset management practices of local councils, particularly in regional and remote areas (box 4).

State and Territory Governments generally require local governments to keep registers of physical infrastructure assets including roads, and provide them with guidance on the management of assets. Local governments are therefore obliged to have an understanding of their road asset base, the condition of assets, and any requirements for investment or maintenance. There can, however, be significant variations in asset management practices, whether across local councils within a State, or across different levels of government. Overall, studies suggest that practices cannot give confidence that assets are being efficiently managed (whether augmented, renewed, replaced, maintained or phased out) or that funds are being allocated to the highest priorities.

The majority of Australian, State and Territory Government grants to local governments for roads are untied, which allows the funds to be spent on what is considered at the local level to be the highest priority. The prudent allocation and use of funds relies significantly on sound asset management frameworks.

Additionally, the capacity of various local governments to efficiently allocate these resources varies, and recent information suggests State Governments can do more to help improve the governance of, and skills within, local councils in their jurisdictions (Pugalis and Tan 2016).

CONCLUSION 9.3

There is scope to improve asset management at the local government level.

Box 4 Local government road asset management

Infrastructure Australia's National Road Asset Reporting Pilot (2013) noted that:

The nation's ... stock of roads is not subjected to even cursory national condition assessment. This represents a difference between roads and all other economic infrastructure (energy, telecommunications, rail, water, etc.) where to varying degrees and in different ways there is asset condition examination and standards of performance to guide funding choices. In practical terms, and notwithstanding complex road grant funding formulae and different jurisdictional road plans, the lack of any asset reports, or a sense of standards that roads are funded to achieve, means that Australia's entire system of road funding more or less comes down to governments throwing several billion dollars of taxpayer money at the road network each year and hoping that the results will be good. This is not an efficient use of scarce taxpayer money.

The Victorian Auditor General's 2014 audit on Asset Management and Maintenance by Councils identified:

... significant deficiencies in asset renewal planning and practice, the quality of asset management plans, the linking of service levels to these plans, the development of asset management information systems, and in councils' monitoring, evaluation and reporting on asset management. The continuing growth in councils' asset renewal gaps remains of considerable concern.

The Australian Local Government Association's 2015 State of the Assets Report⁸ notes:

... confidence levels for [infrastructure] function and capacity is low reflecting the potential for improvement in asset management capacity and planning across [the] three levels of Government in Australia. Without an integrated plan at the national, state and local level, opportunities for smart infrastructure investment will be lost and funding will be reactive, responding to areas of highest perceived local benefit or risk limited by current resources.

The Western Australian Local Government Association's Report on Local Government Road Assets & Expenditure 2014-15 notes:

Federal and State Government initiated studies point to opportunities to reform road investment and funding arrangements ... current arrangements are not sustainable in the long term in regional Western Australia. In order to evaluate models for reform of investment decision making and funding, reliable information about the road asset, its deterioration and use is required. This Report provides an important part of that overall picture. Local Governments have allocated resources to measure and record more information about their assets and the condition of those assets which helps ensure that the right decisions are made, based on sound evidence.

Sources: IA (2013), Victorian Auditor-General (2014), ALGA (2015), WALGA (2015).

Distortions arising from the lack of pricing signals

Motorists pay a significant amount for road services (table 1). Crucially, however, the fees paid neither signal to users an incentive to use the network in a cost-effective manner nor are reflective of the costs of road service provision. The absence of a cost-reflective price for road services means users have limited information on which to base their decisions on road use, while providers have poorer information on which to base investment and asset management decisions.

⁸ Only 230 of the 562 local governments surveyed as part of the ALGA's 2015 *State of the Assets Report* participated in a simple data collection exercise. The authors note such data should be readily accessible and available.

The lack of cost recovery from users of roads further creates uncertainty on funding, and provides a weaker onus on the part of governments to justify to users what, and how, services are delivered. Together with the determination of expenditure priorities predominantly through budget processes — that is, in accordance with the priorities of the governments of the day — it is unsurprising that questions about the prudence or efficiency of expenditure are not infrequent.

The situation with roads stands in contrast to the provision of other government services, such as electricity, urban water and even other public transport services (buses and passenger rail), where, although arrangements are imperfect:

- the more transparent linking of services and costs that accompanies pricing places more pressure on regulators and road managers to seek efficient methods of regulation and service delivery, and to better tailor services to customer preferences
- prices help users to choose between different transport and or utility service options, where available, and/or to manage their demand and associated costs (for example, through peak and off-peak pricing or other differentiated tariff structures)
- demand management through pricing helps or provides scope to improve the efficiency of asset/network utilisation
- recovery of costs directly from users reduces the taxation burden on those who do not directly or primarily benefit from relevant regulation and services.

For Australia, charging for road use has been narrowly limited to toll roads and notional heavy vehicle charges, neither of which meet the primary purpose of a price, which is to create a known cost of use that allows alternatives for meeting service goals to develop and more informed choices to be made.

Furthermore, poor design of toll road contracts, including misallocations of risk and rewards, have failed to deliver value for money for motorists in several cases. A recent example is Brisbane's CLEM 7 tunnel, which involved an initial fivefold underestimation of traffic volumes, leading to its operator's eventual insolvency (Terrill 2016). Another is Sydney's NorthConnex tunnel, which is partly aimed at reducing truck usage of arterial surface roads and due for completion in 2019. The contract provides that the operator of the tunnel will receive compensation from taxpayers if too few trucks use the tunnel (Saulwick 2017).

CONCLUSION 9.4

Road users pay a significant amount for road services, but this is indirectly through a range of fees and charges rather than a price for usage, such as exists for most other public transport services (and, indeed, essential services generally).

Pricing linked to usage will put road funding arrangements on a more sustainable footing. The transparent linking of services and costs that accompanies pricing will place more pressure on governments to seek efficient methods of service delivery, and to better tailor services to customer preferences.

The big picture: the objectives for road reform

The objective of road reform is to put road service provision on a more stable footing and a shift in policy focus towards consumer-oriented and directed services. In practise this would bring the governance arrangements over roads into better alignment with other transport sectors. Key features of a better system for road funding and delivery include:

- investment and maintenance decisions on roads being directly informed by users' preferences, and pricing that makes transparent the costs of providing services and allows sensible alternatives for meeting service goals to develop
- users' choices between modes, and on the use of roads, being guided by prices that help to allocate finite capacity, resulting in more efficient utilisation of the transport network
- public confidence in the price-setting process through independent vetting of the prudence and efficiency of proposed expenditure, and the quality of services actually provided (such that, for cost recovery purposes, prices only reflect the efficiently incurred costs of providing services that are valued by users)
- stable and adequate funding for road services, which also implies a shift to user charges and away from a predominantly tax-driven model
- clear accountability for decisions and outcomes, facilitated through improved institutional frameworks that embody community consultation and transparency on service costs and quality.

Road reform should allow, over time, differences in service levels depending on user demands and preferences. Creating known costs of use will also make trade-offs on spending decisions more transparent — for example, if a government on behalf of road users, decided to maintain universal access on some part of the network by keeping user charges low, the subsidy to allow this to occur (and the foregoing of investment elsewhere) would be known.

Most, if not all, of the current array of Australian Government and State and Territory road fees and charges should be replaced with a single charge type that is based on how much

and when drivers use roads. Today's technology makes it plausible to price road use by time of day or which roads are being used.

Apart from better alignment of payment for road services with those that most value these services, there are no policy reasons why the average costs paid by road users will increase. Some of the costs paid by road users under the current system, including the costs of waste arising from poor decisions and the cost of poor outcomes, such as lost time spent in traffic (which often comes at the expense of leisure time, or lost earnings) will almost certainly reduce. Many road users will experience lower overall costs, particularly if they are willing and able to alter their usage patterns (such as driving outside of peak hours).

Road user charging can improve broader transport network planning and management

As noted in chapter 4, the funding and charging arrangements for roads are distinct from, and generally lag behind, other forms of transport. Changes to this sector may prompt improvements on parts of integrated road/transport networks where user charging is not fully aligned. This is because user charging creates clearer demand signals, which can help to improve the responsiveness of expenditure to user preferences, providing users with better value for money and potentially additional options for transport.

In some countries, user charging has been introduced to explicitly address congestion. Where this has occurred, the introduction of pricing has generally been accompanied by investment in public transport services.

The Commission does not envisage road user charging being a device primarily to raise excess revenue to improve other transport modes, although it may contribute to this aim. The key emphasis of policy should be a link between those who pay for roads and project selection, via *Road Funds* (discussed below) to create a market-like reallocation mechanism. All road charges would be pooled into Road Funds, ensuring that those who pay get a direct say in the future allocation of monies. Such an arrangement will ensure users have confidence that even if they are not today's beneficiary, they remain represented in the selection of tomorrow's projects and thus a beneficiary in future.

Projects may be road-related, or for other public transport projects. Road users would, however, help determine this via their representative on projects. Governments (at all levels) would have a say also, but via a seat at the same table as user representatives.

Road investment and maintenance decisions are presently made with regard for the impacts on alternative modes of transport, in addition to the efficiency of the existing road network. Under the proposed changes, such considerations would improve with better knowledge of road users' needs and costs.

CONCLUSION 9.5

Core elements of revised governance arrangements over road investments include:

- investment and maintenance decisions on roads being directly informed by user preferences, and pricing that makes transparent the costs of providing services and allows sensible alternatives for meeting service goals to develop
- users' choices between transport modes, and on the use of roads, being guided by prices that help to allocate finite capacity, resulting in more efficient utilisation of the transport network
- public confidence in decision making processes through independent vetting of the prudence and efficiency of proposed expenditure, and the quality of services actually provided (such that, for cost recovery purposes, prices only reflect the efficiently incurred costs of providing services that are valued by users)
- replacement over time of the currently disparate and indirect fees and charges for roads with a singular cost-reflective direct road user charge based on usage.

Steps and policy considerations in the reform process are discussed in section 4 following a summary of relevant reform initiatives.

The impacts of road reform

Changes to governance arrangements to more directly involve users in the determination of road service standards and investment priorities, based on better information on the condition of roads, will help to improve allocative efficiency. Present user dissatisfaction with road services discussed above is one indication that the gain is likely to be significant.

Independent vetting of the prudence and efficiency of proposed expenditure will help to ensure funds are well spent and reduce waste associated with poor project selection.

Lastly, the pricing of roads will enable better management of demand for road services and more efficient utilisation of the road network, which will have positive implications for congestion. Congestion affects labour supply, leisure time, and business operating costs (BITRE 2015; Metrolinx 2008).

Commission estimates of the economic impact of *better asset utilisation*, while necessarily indicative, equate to a permanent increase in output of around 0.7 per cent of gross domestic product in the long run, aggregated over all capital cities (with more of this accruing to cities facing the largest congestion costs).

4 Linking road reform to current transport policy reforms

There is broad acknowledgment of the need to change road funding and investment arrangements in Australia, with many reviews in recent years highlighting the need for reform (appendix A contains additional information on these reviews). However, progress has been slow, with governments focusing largely on heavy vehicle reform.

Status of heavy vehicle road reform

The focus of road reform efforts to date has been on the establishment of user charges for heavy vehicles (the heavy vehicle road reform program, HVRR). The Council of Australian Governments (COAG) Transport and Infrastructure Council (TIC) is pursuing HVRR as an ongoing work stream, following cessation of the Heavy Vehicle Charging and Investment (HVCI) reform project in mid-2014.

COAG agreed to accelerate the HVRR in December 2015. To date, this has involved the development and publication of freight route asset registers and expenditure plans. The TIC has stated it will work to implement independent price regulation for heavy vehicle charges, design and consider a forward-looking cost base for roads, and seek agreement on a range of heavy vehicle user charging trials (COAG 2017).⁹

The timing for this work remains unspecified. Including the duration of the HVCI project (and its predecessor, the COAG Road Reform Program), heavy vehicle reforms have now been continuing for over 10 years.¹⁰ In part, this delay reflects differences of opinion between industry and government on the basis for charging.

Productivity Commission's Public Infrastructure inquiry (2014)

The Commission has previously recommended that State and Territory Governments establish 'Road Funds' to integrate the tasks of road funding and selection (Recommendations 8.1 and 8.2); and undertake pilot studies of distance- and location-based charging for light vehicles (Recommendation 4.1).

⁹ Alongside this, the NTC is also designing a new framework to define, measure and track Australia's land transport productivity. Its aim is to help governments and industry monitor multi-modal productivity performance, help governments improve policy and infrastructure investment decisions, and facilitate operational improvements to the use of transport network. It is due to report to the Transport and Infrastructure Senior Officials Committee in late 2017.

¹⁰ The HVCI project stems back to the Commission's inquiry into *Road and Rail Freight Infrastructure Pricing*, which, in April 2007, gave rise to the COAG Road Reform Program to conduct a review of current heavy vehicle user charges and to investigate the viability of alternative charging models for heavy vehicles.

Road Funds were envisaged as specific-purpose, ring-fenced financial funds that would ensure spending decisions reflected road user preferences (box 5). They would be governed by a body that operated at arm's length from government. This body would determine allocations of funding, be responsible for involving road users in project selection, funding, and road charging decisions, and facilitate post-project evaluation and review of decisions.

Box 5 Road Funds as envisaged in the Commission's *Public Infrastructure (2014)* inquiry

The purpose of Road Funds as envisaged in the Commission's Public Infrastructure (2014) inquiry was to enhance the sustainability of road service provision in Australia by instituting new institutional and governance arrangements over road related revenue collections, and funding choice. Road Funds would comprise both a specific purpose financial fund into which road-related funds are collected ring fenced, and a decision making body (a board) to determine road funding priorities (with input from road users) and make funding allocation choices given various competing priorities. The key features of Road Funds (Recommendation 8.1) included:

- having the objective of clearly linking road-user preferences with investment and maintenance decisions
- integrating the tasks of road funding and provision
- having a significant degree of autonomy
- having access to adequate revenue to meet the costs of the road network they administer, as required by the relevant road users
- entailing transparent processes for determining the level and allocation of funds
- including an open and transparent procedure for direct involvement of road users and consultation with the broader community on project selection, funding, and road charging decisions
- involving systematic post-project evaluation and periodic review of the arrangements.

It also recommended that the implementation of Road Funds take into account the research and analysis developed for heavy vehicles by the Heavy Vehicle Charging and Investment reform project (which, by the time the inquiry was publicly released, had ceased operations). The HVCI project had, during its operations, focused on user charging and institutional reforms for heavy vehicles. The institutional model proposed by the HVCI combined elements of a Road Fund and corporatised road agency models.

Source: PC (2014).

The Commission's key recommendations were linked in that the pilot studies would be designed to inform a shift in time to direct road user charging for light vehicles, where revenue from user charges would be hypothecated to roads through the Road Funds. Pilots would test the notion of replacing fuel excise and other indirect taxes with road user charges.

The Australian Government endorsed the Commission's recommendations in principle as long-term priorities. The government response noted shifts to user charges as 'the most

significant longer-term reform initiative identified’, and was open to the use of the Road Funds model. However, it noted that the immediate priority through COAG was progressing user charging models for heavy vehicles.

In response to Infrastructure Australia’s inaugural Australian Infrastructure Plan (IA 2016), the Australian Government has more recently committed to further investigate this issue, in particular to undertake a study into road reform through Infrastructure Australia beginning later in 2017 (Australian Government 2016).

Instituting new funding and investment mechanisms

This section considers initial (and ‘no regrets’) steps that would facilitate reform, and considerations in developing a detailed road governance reform program. It also outlines how Road Funds could operate in the short and longer terms, in particular how it could align heavy vehicle reform efforts with the broader program of reforms to network governance, and evolve with a longer-term shift in revenue sources from taxes to user charges.

Initial steps along the reform pathway

There are things governments can do in the short term that will help improve governance and provide discernible benefits to road users. Many of these steps are needed as technical preconditions to user pays road pricing, but are beneficial in their own right.

These include better understanding and measuring the asset base, especially at the local level, to clarify service standards and inform investment plans, more transparent setting of service levels, and improved governance arrangements over expenditure decisions.

- The task of measuring the asset base should include identification of roads that should, in fact, be priced, roads that might be subject to community service obligations, as well as clarifying the standards that apply to roads.
 - Governments are already taking steps in this direction with the development of standards to help harmonise the datasets and measurement frameworks used to determine service levels (Austroads 2017). As noted, local governments may benefit from guidance from State and Territory governments on asset measurement and management.
- There is little reason why responsibility for independent vetting of major road expenditure proposals could not be given, in the short term, to existing economic regulators or advisers. They would test the prudence and efficiency of proposed expenditure given stated policy objectives.
- Authorities should restructure governance arrangements to ensure that representatives of those who pay for roads — that is, users — contribute to project selection and funding decisions.

-
- Processes to appoint such representatives should be at arm’s length to government, while appointees should have the right mix of technical skills and community interests to effectively gauge and promote users’ preferences.
 - Governments should also hypothecate current road-related fees and charges (that would be replaced by a user charge) to road-related spending. This would help to institute the equity and efficiency benefits of the ‘user pays’ principle, ensure that funding for roads is spent for that purpose, and help prepare the path to user-charging.

CONCLUSION 9.6

There are several changes to the regulatory and funding arrangements for roads that can be undertaken by State and Territory governments in the short term to improve the quality and value for money from road services. These will also facilitate a subsequent move to road pricing and broader reforms.

SHORT-TERM IMPROVEMENTS INCLUDE:

- restructuring governance arrangements to: i) ensure that representatives of those who pay for roads — that is, users — contribute to project selection and funding decisions, and ii) provide for independent appraisal of all major road expenditure proposals
- better measurement of the asset base and identifying roads that should, in fact, be priced
- more transparent setting of service levels, including establishing mechanisms for consulting users
- hypothecating existing road-related fees and charges to a pool from which expenditure would be allocated under the new governance arrangements.

Key considerations under new governance mechanisms

Transitioning from the current system of road funding arrangements to a new system of road funding will require governments to develop and commit to a long-term reform plan. Some key reform considerations include:

- the need to incorporate the heavy vehicle reform program into a broader reform strategy that focuses on the road network as a whole
- how governance arrangements should be designed so that expenditure decisions are made prudently and road network assets are efficiently managed
- the transition to, and design of, road prices
- how a Road Fund model could work in a phased reform process.

Achieving regulatory coherence across all road users

The focus of road reform efforts in Australia on heavy vehicles reflects, in part, that their size and weight impose proportionately larger costs.¹¹ This has given rise to regulatory arrangements that distinguish between vehicle types, but a continuation of this distinction will almost certainly lead to inefficient management of vehicle use and networks as a whole.

The current focus on reforming heavy vehicle charges represents a partial market solution for what is ultimately a network-wide issue. The problem of congestion in cities and large urban centres is predominantly a byproduct of light vehicle use.¹²

Light and heavy vehicles make up roughly 96 and 4 per cent of the stock of registered vehicles, and 92 and 8 per cent of total vehicle kilometres travelled, respectively (BITRE 2016). The road service standards that should apply in cities need to take into account the needs of both heavy and light vehicle users. And regardless of their number, light vehicles, despite lower average costs per vehicle, of course do cause wear and tear on roads. The task of road network management cannot sensibly be distinguished by vehicle types in cities, although prices may be charged differently to different vehicle classes. From a policy perspective, cost-reflective user pricing should apply across all types of road users.

Instituting Road Funds at the State and Territory level represents a desirable way to integrate the current HVRR process into broader road reform. Specifically, Road Funds could initially be established for heavy vehicles then be expanded over time to cover the road network as a whole. This is further discussed below.

Institutional governance arrangements — Road Funds

Road Funds differ internationally, reflecting differing taxation settings, and roles and responsibilities of different levels of government. They appear, however, to be effective vehicles for more closely linking expenditure with user preferences. The model used in New Zealand is one such example (box 6).

Consistent with the overall objectives of changing road governance arrangements, it is envisaged that Road Funds in Australia would provide for:

- the formal involvement of road users in expenditure and financing decisions

¹¹ Heavy vehicles are defined as those with a gross vehicle mass of at least 4.5 tonnes. The effect of vehicular mass on road damage (and thereby expenditure) has been found to vary in a power law with axle mass. The most widely known version of this is the ‘fourth power rule’. However, the exact relationship will vary with pavement types, geological conditions and road environments.

¹² Prices and/or restrictions have also been placed on where and when heavy vehicles can use certain parts of the road network, largely restricting their access to inner city areas.

-
- proposals on new investments to be based on economic appraisal of all reasonable options for achieving the policy goal. If the policy priority was to improve traffic flow, for example, economic appraisal would be undertaken to help justify whether this should be done by increasing capacity and/or constructing ramps, reconfiguring clearways and traffic light patterns, and/or charging based on elasticity of demand
 - independent vetting of all proposed capital and maintenance expenditure
 - any ministerial decisions overriding these ground rules being transparently disclosed in order to ensure accountability for decisions.

Box 6 **New Zealand's road funding model**

The New Zealand Road Fund approach initially involved an entity responsible for the management and allocation of road funding, and separate road providers responsible for operating and planning the road network. A single entity responsible for road funding and management of the state highway system — the New Zealand Transport Agency (NZTA) — was created in 2008 in response to issues relating to governance and funding, including lack of clarity on the role of some agencies and inconsistent planning and funding policies.

The NZTA invests in land transport, manages the state highway system (including undertaking the functions of planning, funding, design, supervision, construction and maintenance), and manages funding for the land transport system (including auditing the performance of organisations receiving land transport funding). The NZTA Board is responsible for decisions relating to investment of funds for transport from the National Land Transport Fund, with funds sourced from road users through fuel excise, charges on diesel and heavy vehicles (road user charges), and vehicle registration and licensing fees. The *Land Transport Management Act 2003* ring-fences this revenue for investment in land transport, including building and maintaining State highways and local roads.

State highways are managed by the NZTA. The costs of building and maintaining local roads are shared between the NZTA and local councils. Councils contribute to the cost of their land transport activities from both rates and borrowing.

The New Zealand government's priorities for land transport funding are set out in a Government Policy Statement on Land Transport, which allocates ranges within which road improvements and maintenance can be funded. The NZTA must give effect to this statement. Each local council then prepares a Regional Land Transport Plan, which the NZTA considers when allocating funding to individual road projects. This separation of the Minister from individual funding decisions is aimed at helping avoid perceptions of conflict of interest.

In instances where the New Zealand government wishes to fund projects unable or unsuitable to be funded by existing charges for road users, or to exercise more control over investment than is permitted through the NZTA, it can direct additional funds through the usual Budget processes.

Sources: New Zealand Ministry of Transport (2017), PC (2014).

The Commission envisages that Road Funds would operate at the state or regional level (as aggregations of local governments) given the accountability of those levels of government to the primary beneficiaries of services (PC 2014). The service delivery entity would, in principle, be separate from Road Funds, so that there are clear distinctions between 'policy' and operational tasks, and accountability for respective decisions.

The corporate form of Road Funds was left open in the Commission’s 2014 review. This matter would need to be considered by each government as it raises policy questions related to objectives for road services. These include how the goals of efficiency and equity can both be met, and the extent to which subsidies are likely to apply in any broader network pricing scheme (and hence how much expenditure, in practice, would be subject to budget deliberations). These and other matters would have a bearing on how commercial disciplines could be best obtained.

Under this model, responsibility for road funding and investment decisions would lie clearly with State and Territory Governments. The Australian Government would continue to be engaged, however, on decisions relating to areas of the network that are important from a national perspective (for example, to facilitate trade), and linked to Australian Government policy responsibilities (such as airports).

The PC (2014) model assumed that the role of determining projects was the domain of the Road Fund. Under the Road Fund operating assumptions above, the independent regulator would be empowered to not reflect in prices any poorly implemented projects, unapproved projects, or expenditure arising from inefficient management. It could also include incentives for efficiency improvement by road network managers in the design of pricing structures.

Bringing the heavy vehicle reform program into the fold

The HVRR program should be oriented so that it can be incorporated into the broader reform program. Components of HVRR reform efforts to which this applies include:

- the role and functions of any new independent regulator for heavy vehicle charges
- the development and maintenance of asset registers and assessments of service levels (including any requirements for geographic information systems)
- the development of road expenditure and investment plans
- decisions regarding the interaction of funding and investment between different levels of government.

Road pricing – some considerations in transition and design

As noted, current road related fees and charges should, with the introduction of a user charge, be phased out.

Available technologies make it possible to determine when a vehicle moves between different parts of the network, and thus when road user charges should apply, and when they should not. This is an important consideration for three reasons.

First, on privately owned and operated toll roads, users will still need to pay the prevailing toll, but should not be required to pay any additional road user charge above that. Second,

technologies will enable charges to be levied only for those components of the network that governments determine should attract a charge; that is, excluding those components of the network subject to community service obligations. Third, they enable revenues to be attributed to the jurisdiction in which the travel took place.

Pilots have been effectively used in other countries to introduce the idea of pricing to the community, and inform how it could be rolled out. This matter is further discussed in section 6. Notwithstanding the form of consultation and the timing of decisions, technological and other advances mean that scheme rollout may be more efficiently conducted in conjunction with private sector providers. Private sector-designed schemes to trial road user charging technology (for example that proposed by Harrison and King (2017) (box 7) and undertaken by Transurban (2016), box 10) indicate that systems can be developed to provide a coherent system of charging for roads over the network, and that these systems need not be implemented by governments.

Box 7 Clearways' proposal for customer-led demand management

New technologies and developments in key markets like open data and the payments system have made new models of charging for road use possible. In a submission to the 2017 Wolfson Economics Prize, Harrison and King (2017), for example, developed a proposal for a customer-led solution to road user charging, based on an opt-in approach in which drivers initially pay a charge (capped so they are made no worse off than a baseline), and are provided a rebate at the pump for the amount of the fuel tax that would otherwise have been charged. The authors note the potential for such a scheme to engender support for user charging given the ability of participants to save money through behavioural changes (incentivised through dynamic pricing systems).

Though untested, the model suggests that the task of administering a road user charge need not be undertaken by governments themselves. Private providers may be better placed to respond to customer preferences and offer packages and pricing options tailored to individual drivers, and could thereby unlock greater benefits in the administration of road user charging programs. For example, for those who seldom drive or do not drive great distances, or have a history of safe driving practises, the system could be used to lower insurance premiums.

The Clearways proposal has been discussed with the Australian Government and is understood to be subject to consideration as part of broader road reform efforts.

Sources: Harrison and King (2017) and sub. 44.

Tariff structures could take a variety of forms. Ideally, prices would take into account distance travelled, the time of day and vehicle mass, alongside geographical data on the degree of network use, and road surface type/quality. Accompanying policy considerations include technology solutions and large data requirements, accounting for privacy considerations, and determining pricing algorithms.

To date, distance-based charges have been predominantly used in domestic and overseas trials, and represent a potential starting point. Either way, the design of pricing structures should be technologically neutral and able to accommodate advances in technology and data over time.

Additionally, pricing structures will need to account for the fundamentally different driving patterns of some, which may be unavoidable on account of where they live and/or work. This is particularly relevant for non-urban areas, where road use patterns differ substantially compared to urban areas.

Most obviously, lower urban density in these areas means that drivers are less affected by congestion relative to those in cities. Smaller coastal country and inland remote areas also generally have higher average commuting distances, although the same is not necessarily true for those in large regional centres, with for example, Townsville, Bendigo, Albury-Wadonga, Launceston and Canberra-Queanbeyan having lower average distances than Melbourne, Brisbane, Perth and Sydney, reflecting their smaller urban footprint (IV 2016a).

The characteristics of the road network itself are also often different in these areas, reflecting the proportionately greater length of arterial (as opposed to local) roads in these areas. Such roads are generally more costly to maintain. As such, local governments in regional and remote areas (and their state government road agency counterparts) face both lower per capita revenues and higher per capita expenditures relative to local governments in more densely populated urban areas (Austroads 2016).

Governments will need to determine how mechanisms are designed to account for distributional issues, such as the impacts of pricing on regional and remote roads. As for other areas of government services, subsidies may be the practical tool; and for road users in such districts, the signs of change between today's system and the future under direct pricing may be very few indeed. In an economic sense, however, the benefit would accrue from making funding requirements and competing alternatives clearer.

CONCLUSION 9.7

A move to direct road user charging should be accompanied by the phasing out of current road-related fees and charges. Road user charging should not be just an additional tax on users.

How a Road Fund model could work in a phased reform process

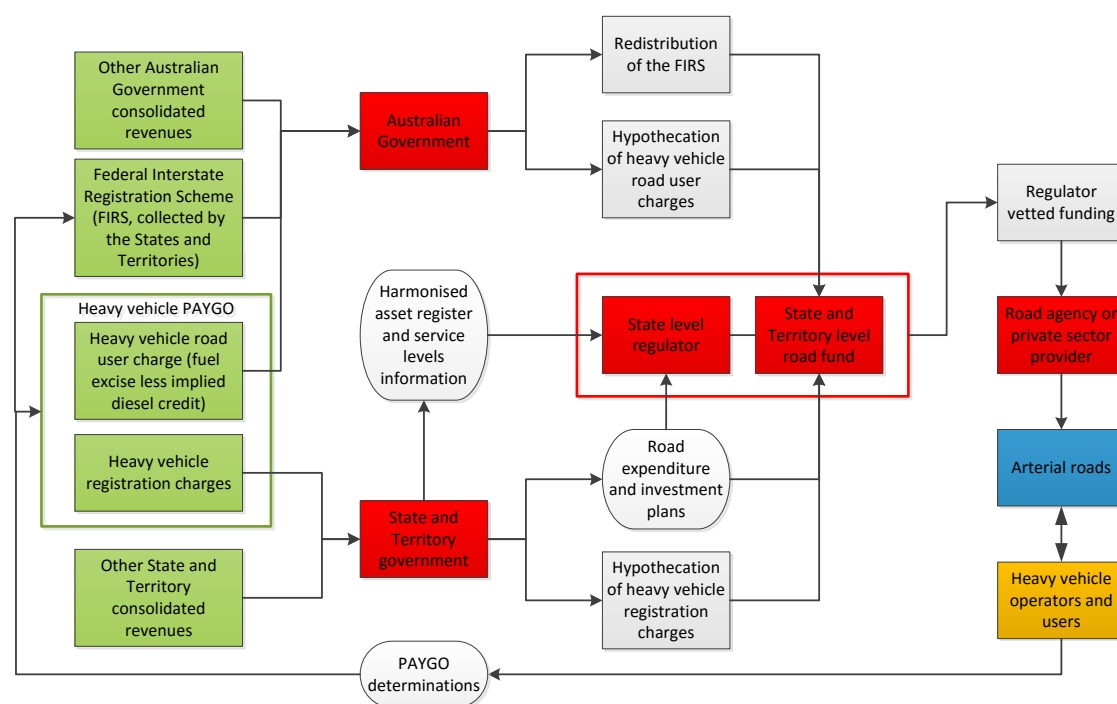
Instituting an initial Road Fund model for heavy vehicles

Initially establishing the Road Fund model on the basis of heavy vehicle revenues and expenditures has the benefit of instituting hypothecation for expenditures that are met (at least approximately) by cost-reflective charges. A stylised depiction of an initial State and Territory government-level Road Fund system based on heavy vehicle revenues and related expenditures is at figure 3. This model focuses on heavy vehicle revenues and arterial roads funding and expenditure.

Pre-existing elements of HVRR are also conducive to structuring a coherent road funding and investment framework for all road users, including the development of State-level asset registers and service level information for key routes, and road expenditure and investment plans of governments. These elements, in addition to powers of expenditure proposal vetting, are important for the efficient operation of the Road Fund model.

Once established, several aspects of this framework can be adapted over time to cover the entire road network, and all road users. For example, the development and maintenance of asset registers and assessments of service levels for heavy vehicles can be adapted to develop a broader regulatory asset base.

Figure 3 An initial heavy vehicle Road Fund model



The transition period to this model could be used to agree the precise role of ministers, road management agencies (the expenditure proponents) and economic regulators, and the particulars of the regulatory framework applying to roads. While the broad institutional parameters were set out above, choices can be made on, for example, the extent to which regulators are involved in designing concessional pricing arrangements to achieve social policy objectives, and mechanisms to ensure the transparency of any government directions.

This model could accommodate additional changes to the tax mix to simplify the hypothecation structure of revenues at different levels of government. For example,

real-time monitoring for use and tracking of heavy vehicles could enable State and Territory governments themselves to administer the road user charge component of Pay-As-You-Go (PAYGO), based on a location and distance based charge rather than this continuing to be levied through fuel excise accruing to the Australian Government.

Moving the Road Fund model to cover all road users

A stylised depiction of a Road Fund system based around all current vehicle revenues and related expenditures is at figure 4.

The Australian Government's role will necessarily evolve as such a system takes form. In the longer term, establishing State-level funds and pricing mechanisms will ultimately avoid the need for the Australian Government to design and administer grants.

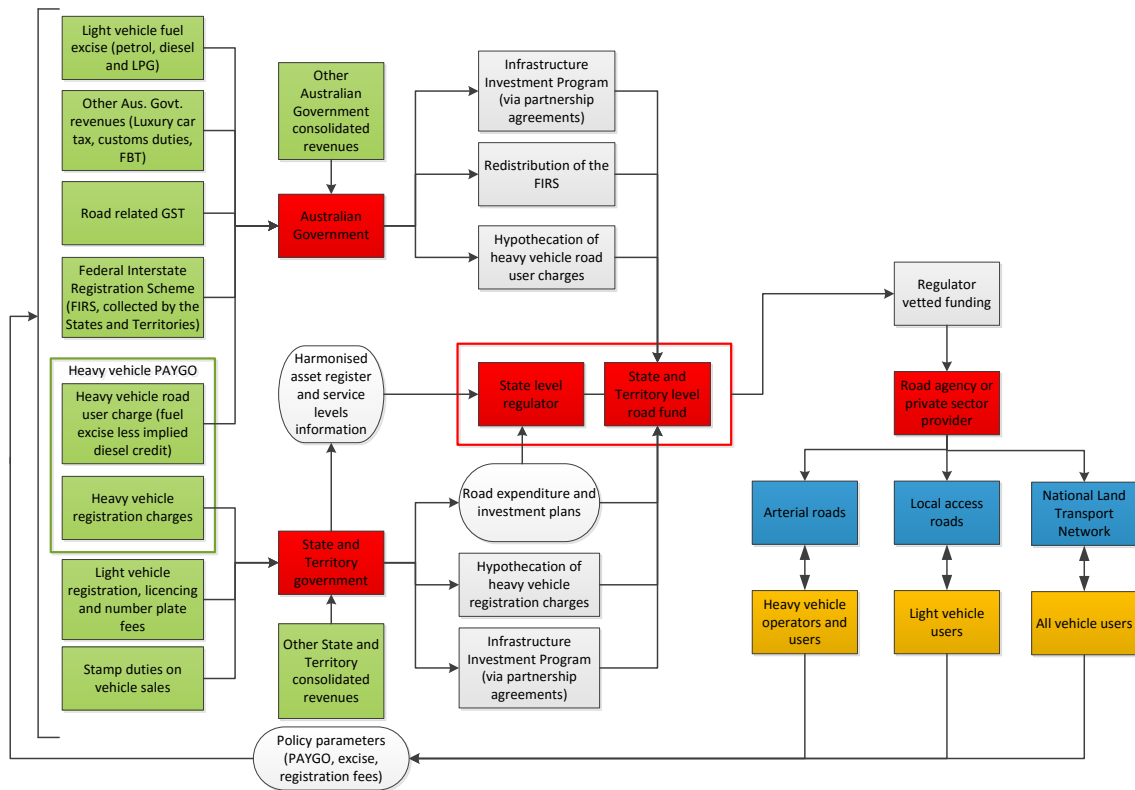
It will, however, place more responsibility on State and Territory Governments, in collaboration with Local Governments, to manage revenues and investment plans. Given that the sources of road-related revenues are unlikely to change in the short term, however, establishing these funds requires an ongoing need for Australian Government transfers (chiefly for fuel excise revenues).

There would not need to be any immediate change to current systems of charging for road use to implement Road Funds (that is, PAYGO, light vehicle registration and fuel excise). Requiring Local and State and Territory governments to document their asset bases may identify shortfalls in asset maintenance and investment activity, particularly in regional and remote areas (IA 2013), which could require additional or reprioritisation of expenditure.

Acknowledging the current taxation responsibilities of governments, there is an important role for the Australian Government in aiding transition over the period of reform. Distribution of current Commonwealth revenues to jurisdictions' Road Funds should, to the extent possible, reflect the original jurisdictional source of that revenue. For example, fuel excise revenues levied in one jurisdiction would simply be redistributed to that jurisdiction's Road Fund.

Importantly, the reallocation of revenues to States and Territories should leave decisions on how the money should be spent to the States and Territories. An accompanying element of this role will be providing assurances on funding adequacy (for example, a 'no disadvantage' rule) during the reform transition period.

Figure 4 A Road Fund model for all road users with current revenues



Shifting the revenue base to direct user charging for light vehicles

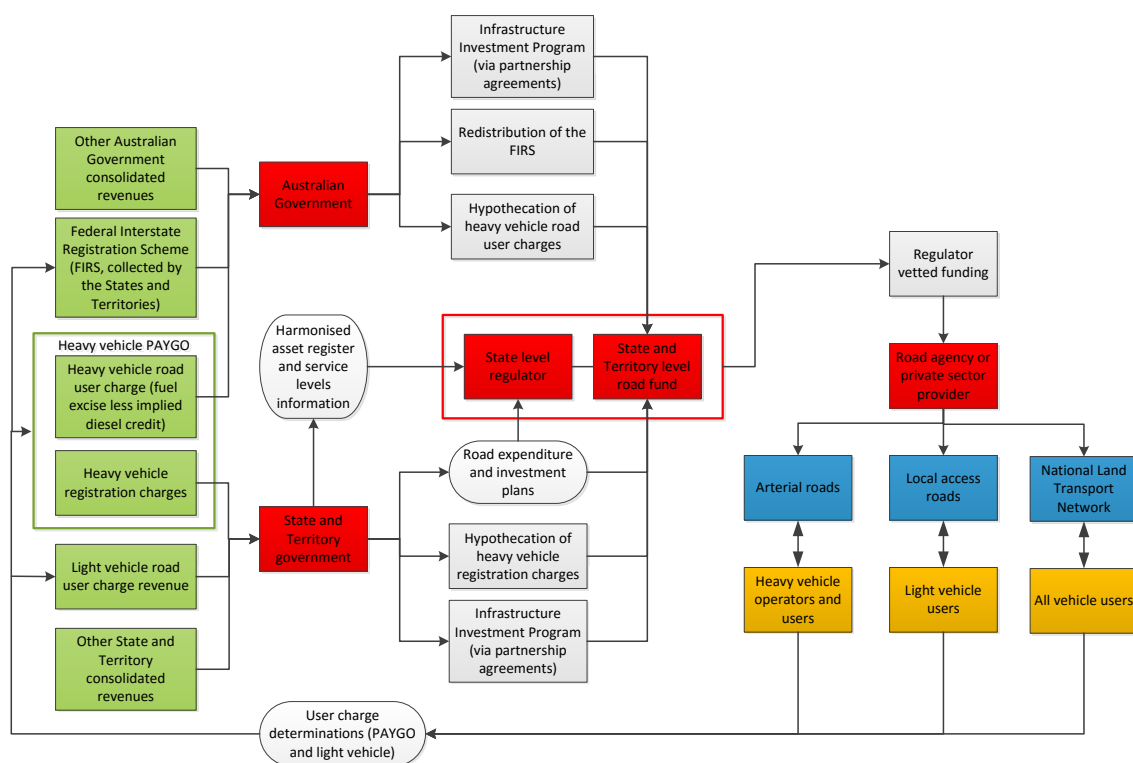
A stylised depiction of a Road Fund system based on road user charges is at figure 5.

In moving from current charges for light vehicle road use to a system of direct user charging (that is, as the sources of revenue flowing into the funds begins to change), the following issues need to be taken into account.

- Whether one-for-one substitution of revenues, and therefore funding adequacy, occurs in practice will depend on factors such as pricing structures employed in the jurisdiction, whether the system is voluntary, and if so, the driving habits of those who do voluntarily move to user charging.
 - Those who do voluntarily move across are those who will more obviously benefit from it; that is, those who do not drive very long distances or very often. A phased approach to these issues is likely to be needed.
 - States may wish to prioritise road user charging arrangements for drivers of electric and hybrid vehicles who presently do not contribute in equal measure to road funding. It may also be advantageous to do so while uptake of such vehicles is both low and concentrated among relatively higher-income drivers.

- Systems will also need to be designed to manage both inter-jurisdictional travel, and use of the system of privately-owned toll roads.
 - Neither present significant obstacles to a system of full network coverage of light vehicles in light of technological developments in recent years (and their continued adoption in modern vehicle fleets). Indeed, trials in the United States and Australia suggest that technological issues, including user concerns about use of personal data, can be overcome.

Figure 5 A Road Fund model under road user charging



The depiction in figure 5 does not predict what reforms may arise for heavy vehicle charging (given this is an active area of government consideration) over any intervening period. It therefore assumes the continued levying of a heavy vehicle charge through diesel excise.

Road Funds do, however, provide an institutional mechanism to reform heavy vehicle charging arrangements at the State and Territory level, and for charges to be levied (and expenditure decisions made) in much the same way as for light vehicles. Ideally, this would involve the continued reform of heavy vehicle charges toward being a direct and cost-reflective charge for use.

CONCLUSION 9.8

Road Funds remain the desired institutional mechanism to effect ongoing reform to the regulatory arrangements for road funding and investment. Consistent with the model proposed in PC (2014), the key functions of Road Funds should be to:

- act as a specific-purpose and ring-fenced financial fund that collects road-related revenues, and directly links road-user preferences with spending decisions
- be an autonomous decision making body (at arm's length from government) that involves road users in project selection, funding, and road charging decisions
- factor in government policy decisions on road related priorities in a transparent manner
- facilitate systematic post-project evaluation and periodic review of key decisions.

Over time, as part of a phased approach to moving toward implementing road user pricing, reforms to Road Funds could be undertaken in three broad stages:

- initially designing Road Funds on the basis of heavy vehicle revenues and expenditures. This would provide a desirable pathway to sequencing reform objectives, and is amenable to future changes in the structure of road-related charges
- augmenting the remit of Road Funds to cover all users by hypothecating all prevailing road-related revenues to expenditure
- effecting a compositional shift in road-related revenues from current fees and charges towards direct user charges, phased in accordance with the uptake of direct charging by users.

5 Adapting regulatory frameworks to emergent technologies

New technologies and business models are rapidly transforming the road transport market. In addition to the ubiquitous example of Uber, other services (including ridesharing services) are increasingly available in Australia, including GoGet, Car Next Door, Flexicar, and Green Share Car. These services can lower the cost of trips relative to owning a car, and generally provide improved accessibility and comfort for those otherwise reliant on public transport, walking or cycling. They also serve to improve the overall efficiency of the vehicle fleet by reducing the amount of time cars spend idle, and in the case of ridesharing, by having more people travelling together in the same vehicle. The Australian market has also seen a degree of specialisation in these services of late. For example, *Shebah* and *SheSafe* operate ridesharing services targeted at women and children.

While all these services potentially reduce the cost of transport services for many individuals, in doing so they could attract higher average demand for trips, as lower relative prices, greater accessibility, privacy, comfort and safety encourage people to travel (on roads) more than they otherwise would.

It is worth noting that to the extent this demand comes from public transport users, or from those who walk or cycle, it could reduce pressures on public transport infrastructure and services at the margin. Just as adding capacity to congested networks tends not to alleviate congestion beyond the short term (the Downs-Thomson paradox), marginally reducing demand (and reallocating it to other parts of the network where the efficiency may not be any greater) is unlikely to result in significant sustained improvements to public transport, and or road, network efficiency.

Looking forward, autonomous vehicles present an opportunity to significantly improve transport safety and the overall utilisation of the national road network. However, the introduction of driverless vehicles can only follow government revision of policies and regulations pertaining to road use, and these can only advance once authorities, in partnership with private companies, adequately test autonomous vehicle technology on public roads. The States and Territories are currently at various stages of trialling these technologies, but they are all a significant way from scaled, real-world trials.

A large part of the regulatory and legislative provisions relating to road use currently rests upon the decision-making capacity of a licensed driver, who it is assumed understands and behaviourally responds to differences in road rules between jurisdictions. This approach will not work in all instances where the obligation to follow various road rules is embodied in the capacities of machines, sensors and the information systems on which they rely. Many rules and regulations will become redundant, while in many areas new ones will be required.

For example, the enforcement of speeding limits is often subject to a grey area, such as in instances where one is speeding up or slowing down between two distinct speed zones (for example, a regional town and a highway leading out of or into it). The rate of acceleration of an autonomous vehicle in these instances ultimately needs to be governed by pre-determined rules.

The issue here is not so much that different States may have different rules (as vehicles' onboard telematics should be able to be used to identify where and how these rules differ and how they apply). Rather, if one jurisdiction has a rule, and another does not, this complicates the ability of any autonomous vehicle to travel safely and lawfully between (state and local) jurisdictions.

Other examples include where autonomous vehicles can stop (or stand) and for how long, as passengers alight. This implies a need for a nationally consistent regulatory framework that facilitates the technological neutrality of road rules across jurisdictions. Road authorities in Australia would desirably consider how autonomous vehicle technologies are introduced and regulated overseas, both to draw on lessons, and to avoid regulatory and or technological barriers that prevent or increase the cost of uptake in Australia.

Where to from here?

COAG's Transport and Infrastructure Council is progressing a range of initiatives aimed at supporting the creation of a nationally consistent regulatory framework for automated vehicles, and to facilitate the testing and trialling of automated vehicle technologies. As part of this work, the National Transport Commission is undertaking work on issues such as needs for data disclosure and access between government and industry, the design of risk management and safety regulations, and legal issues given the current presumption of human driver control in much of regulatory policy and legislation.

One part of developing a regulatory framework for automated vehicles is to define and monitor the road network on which they will operate. Regardless of the initial scale of these networks, a key consideration for network design will be how urban planning and land-use regulations interact with decisions on transport choice. Some issues are immediately relevant, such as the formation of intermodal infrastructure to facilitate mobility, and greater restrictions on the consumption of land from parking spaces in congested areas (which could be facilitated now through better pricing and/or the creation of clearways¹³). More broadly, the network itself could interact with future land uses and the shapes of cities. For example, automated mass transit that allows for high speeds on a dedicated network could enable urban growth in areas at greater distances from centres of employment.

While automotive manufacturers internationally are in somewhat of a race to make autonomous vehicles available to the market (most suggesting around 2020¹⁴), governments internationally generally have not established regulatory frameworks for their rollout.

The net effect of greater fleet efficiency that these services present, matched against potentially higher average demand for trips, will determine whether there is greater average road use, and greater strains being placed on road capacity because of new modes of private transport (including autonomous vehicles). While their overall effect on requirements for road funding and investment remains unclear, one way to gauge it is through case studies of cities where uptake of app-based ridesharing services is most advanced (box 8). The experience of New York suggests that these new services have overall elicited significant increases in average demand for trips, even after accounting for declines in taxi and private vehicle use.

¹³ It is notable that many governments have already begun to do this, such as the Streamlining Hoddle Street Initiative and Punt Road Corridor projects in Melbourne, and Sydney's Clearways Strategy, which implies a limit to gains from this sort of change in future.

¹⁴ This estimate relates to so called Level 4 or 5 'fully' autonomous vehicles, as compared to Levels 1 to 3 in which a driver maintains some degree of control over the vehicle. Level 2 vehicles, such as those provided by Tesla and that offer different degrees of 'assistance', are already available in Australia (such as adaptive cruise control that senses the distance to the car immediately in front).

The impact of these services in Australian cities is difficult to predict. Ridesharing services are presently small and have generally not seen the growth witnessed in the United States. In part, their viability and rate of uptake will depend on the regulatory environment in different jurisdictions (as the experience of Uber shows), and the state of competition and innovation within different markets.

Box 8 New York's experience with app-based ride services

In mid-2014, the price of a New York taxicab medallion (the equivalent of a taxi license) was over USD \$1 million. In March 2017, a medallion sale yielded just over USD \$240 000 — a fall of 77 per cent in less than three years.

New York taxicabs continue to lose market share to app-based services like Uber, and other pooled ridesharing services offered by companies like Uber, Lyft, Via and Gett. A recent study of the growth in app-based ride services in New York found that these services, after accounting for observed declines in taxicab and private car rides, have generated *net increases* of 31 million trips for 52 million passengers, or an additional 600 million passenger miles (966 million kilometres) of vehicular travel since 2013 (Schaller 2017). Putting this in perspective, this has translated to an overall 7 per cent increase in vehicle distances travelled in Manhattan, Western Queens and Western Brooklyn, with the majority of this growth occurring in downtown Manhattan.

The study also found that since mid-2015, and despite the advent of ridesharing services, total mileage continued to grow rapidly because exclusive (that is, personal) trips still dominate, and because most customers are coming from transit, walking and biking. It found that growth in trips, passengers and distances were seen throughout the city as app-based services attracted substitution from not only taxis, but also those who would otherwise use public transport or their personal vehicle, and from people who would not otherwise have made the trip. Migration from public transport translated to increased vehicular travel even if the trips were shared. Trip growth in Manhattan was also concentrated during the morning and evening peak periods, adding to congestion.

Overall, the experience of New York based on these results suggests that there exists significant latent demand for car travel using new app-based services, and that even with ridesharing improving the overall efficiency of the vehicle fleet, substitution from both public and private modes of transport could lead to increases in overall trips taken. The preference for exclusive rides (as opposed to ridesharing) is a clear driver of the results in the study, and this preference (combined with physical limits to the number of ridesharing occupants), likely places a bound on the efficiency gains from such services.

Source: Schaller (2017).

While the experience of New York is obviously not generalisable to all cities, it does suggest that new technologies that improve overall fleet efficiency will not necessarily result in a reduction in average road network use. And to the extent that these technologies imply a shift toward either more fuel efficient vehicles or electric vehicles, they imply continued structural falls in fuel excise revenues relative to expenditure.

It is notable that electric vehicle (including hybrid electric) ownership globally rose from close to zero in 2010 to over 1.2 million in 2015, roughly doubling each year (National

Transport Commission 2016). Moving toward a sustainable source of direct road user charging as soon as practicable will help to mitigate funding imbalances likely to emerge as the uptake of electric and autonomous vehicles continues to grow.

CONCLUSION 9.9

New transport technologies like ridesharing and autonomous vehicles are likely to revolutionise transport, and there are significant opportunities and challenges for the community and governments in adapting to change.

Moves toward creating a nationally consistent regulatory framework for autonomous vehicles will help to incentivise investment, and realise the efficiency and safety gains these technologies offer.

6 Use of pilots to engage the community on reform

There is limited public understanding of the need for road funding reform, partly reflecting the lack of community consultation on infrastructure decisions generally. A good start for reform efforts would be trialling road user charging technologies, which would provide an avenue for engaging the community on road funding issues. The following section considers experiences overseas and some considerations for Australian governments.

International experience: road user charging pilots in the US

Three jurisdictions in the United States (US) have undertaken pilots of road user charging schemes for light vehicles: Oregon; Washington; and California.¹⁵ These schemes remain in the trial phase, and no country or state has fully developed and implemented an operational light vehicle road user charging scheme on a network-wide and non-voluntary basis.¹⁶ California and Washington implemented policy processes after Oregon successfully implemented its own operational pilot (which itself took 14 years). California and Washington's processes, which took 2-5 years, are likely to have benefited from

¹⁵ These three states border each other. They have the highest per capita ownership of electric vehicles in the United States. Electric vehicle charging infrastructure is also relatively dense in that part of the US, which is likely to have encouraged governments to reform Road funding arrangements. In addition to these three states, there are several other states (for example, Minnesota, Iowa, Georgia, Nevada, New York, Texas) that have set up taskforces or other processes to scope the viability of road user charging reform (including assessing design issues), and undertaken tests of user perceptions of road user charging and charging technologies.

¹⁶ Singapore is perhaps an exception to this, but its system more closely resembles a congestion charge and its government exhibits significant control over reform outcomes. Other jurisdictions overseas including London (United Kingdom), Stockholm (Sweden) and Milan (Italy) have also implemented cordon pricing schemes in which the policy objective has been more focused on congestion, liveability and environmental issues.

Oregon ‘showing them how to do it’ before proceeding (Oregon has been prolific in making public the minutiae of their policy processes).

The context for progressing road user charging pilots in these states is essentially similar to that facing Australia: an eroding revenue base given increased vehicle fuel efficiency and the advent of electric vehicles, equity issues arising from registration and other fixed charges (and also from fuel taxation given differences in fuel efficiency by income and region), and longer-term infrastructure funding viability concerns. These issues affect all levels of government in the United States. As such, the US Federal Government has been active in promoting the adoption of road user charging schemes. The *Fixing America’s Surface Transportation Act* (2015) recognised the need to explore road user charging as an option to maintain the long-term solvency of their Federal Highway Trust Fund. The Act created a five-year, \$95 million (USD) grant program, which is eligible to a state or group of states to test the design, acceptance, and implementation of a future road user charging scheme.¹⁷

Common themes have emerged from the three US state trials:

- There was broad consensus on the need to pursue road user charging among the Federal government, the state government bureaucracies, state parliaments, automobile groups and business groups before undertaking pilots.
- Each state initiated policy processes by establishing task forces or commissions to scope the options for road user charging reform, to report the issues publicly, consult, and to design a pilot scheme. At the time of instigating these processes, public perception of road user charging was either unknown or perceived to be negative. Each state’s task force has sought to specifically gauge public perceptions to inform policy design.
- Engagement with the public did not focus on productivity or infrastructure efficiency. Rather, processes established the need for road user charging by communicating a funding problem for roads.
- Taskforces were then tasked with implementing pilots of user charging schemes. The resultant pilot programs were or are small and entirely volunteer-based. Participants generally incur no financial loss and are given degrees of freedom in terms of how they report, what they report, and how they pay (privacy being an issue initially).

¹⁷ The fate of the *Fixing America’s Surface Transportation Act* (2015) will, in part, be determined by the passage of the US 2017-18 Budget through Congress. The Budget does, however, contain incentives for jurisdictions to consider methods to mitigate congestion, which could see the continuation of recently announced trials. For example, a ‘coalition’ of states along the Interstate 95 highway, including Delaware, Pennsylvania, New Hampshire and Vermont are planning a trial using the fund. Connecticut (which was initially involved) recently rescinded from the plan following reportedly inadequate consultation and communication with residents.

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- All three states implemented processes to study, survey and/or model the distributional equity implications of proposed schemes, either prior to launching pilots (Oregon, Washington) or as part of the pilot process itself (California).

Authorities in the US have generally based their communications on the following points:

- attempting to solve an emerging road funding shortfall by raising registration fees, fuel taxes, imposing tolls, increasing taxes or reducing expenditure on other government services, is neither socially equitable or financially sufficient to cover the funding task
- unless drivers are willing to accept fewer or poorer government services in other areas, or higher taxes generally, their expectations for road services are unlikely to be met unless road charging mechanisms are changed.

Of the three states, Oregon is the most advanced, with a legislated and operational trial of 5000 voluntary drivers, named *OreGo*, where users pay for road access based on a simple distance based charge (box 9). The transition from a volunteer based pilot to a statewide mandatory scheme will be of interest, particularly in relation to managing privacy and equity concerns for drivers who would not otherwise have volunteered, developing pricing structures, and achieving technological neutrality. How this transition is managed could provide useful insights for Australian policymakers.

Box 9 Oregon's *OreGo* road funding pilot scheme – how it works

In 2001, the Oregon Legislature formed the Road User Fee Task Force, an independent body of state legislators, transportation commissioners, local government officials and citizens, to explore new ways of funding maintenance needs and improvements to the state's transportation system. The Task Force examined the challenges and benefits of a mileage-based road user charge and conducted pilot projects to gather driver feedback on different options. The Task Force scoped a number of elements of road user charge design and engaged the community and business sector in informing perception of and desirable elements of the scheme.

In 2012, the Task Force reached a major milestone, welcoming 88 volunteers for an initial Road Usage Charge Pilot Program. Following completion of the pilot in 2013, Oregon passed *Senate Bill 810*, which effectively established the nation's first mileage-based road user charging scheme for light vehicles to create a new way to fund road maintenance, preservation and improvements. The so named *OReGO* program launched on 1 July 2015. The first phase of *OReGO* is limited to 5000 cars and light-duty commercial vehicles (No more than 1500 vehicles rated at less than 17 mpg; and No more than 1500 vehicles rated from 17 to less than 22 mpg). Participants pay a per-mile fee of 1.5 cents (USD) instead of the traditional fuel tax of \$0.30 (USD) per gallon, and receive a tax credit on their bill for the fuel tax they pay at the pump.

The operator of the program, the Oregon Department of Transport (ODOT) partnered with private sector partners (termed vendors), to manage participants' *OReGO* accounts, and to also provide an ODOT-sponsored option. Volunteers have choice over different mileage reporting options offered by vendors, and their personal information is subject to strict security and privacy measures. Some vendors offer features like trip logs, 'find my car' functions, and 'badges' that reward good driving behaviour.

Source: Oregon Department of Transportation 2015.

Implementing pilots in Australia

The pilots in the US (and the policy processes that preceded them) have been designed to gather information on implementation and design issues. In Australia, Transurban conducted a Melbourne Road Usage Study in late 2016, which gauged a number of issues relating to community perception and pricing systems (box 10). These would be useful to take into account in designing pilots and implementation processes in Australia.

Conducting trials in major capitals leveraging the opening of new (unpriced) infrastructure and testing behaviour under different pricing regimes (for example, refunding users' excise while measuring their use of the infrastructure with a charge) would inform policy design, as well as create knowledge and awareness among the community.

In addition, the following considerations could help trial design and engagement:

- Involving road users, including business groups, community groups, automobile associations, and those with experience in road service infrastructure delivery in the design of the trial.
- Given the probably small scale of pilots relative to the network itself, pilots may not necessarily elicit significant behavioural change from drivers. However, they should facilitate better understanding of user perception and acceptability issues that may affect the rate of uptake and design of a mandatory scheme. These include:
 - attitudes to the use of and proposed protections for personally identifiable information (for example, while many users are likely to accept some degree of tracking of location data given the ubiquity of tracking in mobile devices, some may not)
 - the interaction between road user charging and existing tolls, fees, charges and taxes. For example, providing a rebate on fuel excise charges incurred is a simple way of making clear to road users how a revenue-neutral switch would work
 - providing feedback to participants on costs incurred relative to a baseline cost for usage under their normal behaviour. This can help to convince users that road user charging need not be a more expensive option than what they incur under current policy settings.
- Pilots could test the applicability and efficacy of different technology solutions for tracking use (access to geographic information; local vs state asset management issues and interoperability between states), and to identify solutions that are scalable over the network and technology neutral over both time and vehicle time.
- Pilots could also be designed to test systems to store data, and manage security and privacy issues.

A further useful result of pilots would be replicable and scalable technology solutions for road user charging. Given that some major roads cross borders, the high desirability of seamless charging mechanisms across those borders, and the necessity of coordinated reform (to the extent that national taxes are replaced with road prices) the Australian

Government also has an interest in advancing reform and could potentially assist the States and Territories to establish and run pilots.

Box 10 Transurban’s Melbourne Road Usage Study

Toll road operator Transurban conducted a pilot of road user charging technologies in Melbourne over 2015 and 2016 (the Melbourne Road Usage Study), involving 1635 private light vehicle motorists. Its stated objectives were to: gauge motorists’ knowledge and understanding of the current road-funding system and assess their attitudes and preferences toward user-pays charging options; understand behavioural responses to different charging and implementation options; and to show that technology is not a barrier to implementing a practical user-pays system. A final close out survey was conducted to gauge participants’ perspectives.

The ‘Usage’ model tested participant responses to a user-pays funding model with three charging options: a per kilometre distance charge of \$0.10/km; a two-tiered flat rate charge for a capped number of kilometres at \$0.10/km and \$0.20/km for all excess kilometres; and a simple per trip charge of \$1.00/trip. The ‘Congestion’ model tested how motorists responded to road charging that used price signals in highly congested areas or at peak travel times. It consisted of two charging options: a time of day charge of \$0.15/km during peak hours (Mon-Fri, 07:00-09:00 and 15:00-18:00) and \$0.08/km at all other times; and a distance and area based cordon charge of \$0.08/km plus \$8.00 access charge per day to enter the cordon area between 07:00-18:00, Monday to Friday (similar to the inner cordon area defined in IV (2016a)).

Participants’ individual accounts were set with an initial dollar balance calibrated to their observed ‘baseline’ driving patterns. Deductions from this amount were based on their charging option and driving behaviour, with drivers eligible to keep any remaining balance at the end of the survey. This points to a number of flaws in design, namely that it does not facilitate loss aversion among participants. It is also unable to elicit behavioural change from any fully-scaled network effects (for example there is no congestion benefit from paying the congestion charge). As such, the Usage’ model elicited no significant behavioural change among participants (in average trip numbers, kilometres travelled), however it did identify a small increase in usage for those on the flat rate charging option. The ‘Congestion’ model also failed to elicit significant behavioural change among participants, under either the time of day charge, or the cordon charge scenarios. The results of user demand should therefore be interpreted with caution. Actual network effects may indeed be significant under a scheme facilitating behavioural responses from all road users (rather than a small, geographically dispersed subset of users).

The study did provide insight, however, into driver education processes and preferences. The educative element helped improve understanding of the road funding system, and participants’ driving patterns. Compared to the initial 88 per cent of drivers with little to no understanding of current government fees and charges for roads, 60 per cent of participants preferred a user pays system in the close out survey (the per kilometre distance based charge being the most preferred option). 50 per cent of participants were comfortable with the time of day system of charging, and over 60 per cent with cordon charging.

The study also suggests that privacy issues are manageable (and will differ depending on the policy, with for example, only distance data and a binary indicator of being in or out of the cordon area required for the cordon charging scenario). Notwithstanding some self-selection bias among the participants, 80 per cent were comfortable with global positioning systems being enabled in their car, while 60 per cent were comfortable with the idea of global positioning systems being left indefinitely (contingent on data being safe and their use specified). Importantly, participants also saw a need for transparency (hypothecation) in the funding system, with revenues being used specifically for transport infrastructure (including public transport). In part, this would mitigate equity issues if associated investment is demonstrable and improves overall access and mobility.

Sources: Transurban (2016), IV (2016a).

CONCLUSION 9.10

To communicate the need for road funding reform with the community, State and Territory governments should consider the use of road user charging pilot programs, as has been successful in overseas jurisdictions.

Conducting trials in major capitals to leverage the opening of new (unpriced) infrastructure and testing behaviour under different pricing regimes would inform policy design, as well as create knowledge and awareness among the community.

Appendix A: Road reform recommendations to date

In addition to the Commission's Public Infrastructure inquiry (2014), several recent reviews have proposed various types of road user charging and alternative funding models for roads. At the federal level, these include the Harper Competition Policy Review (2015), and Infrastructure Australia's (IA's) inaugural Infrastructure Plan (2016). At the State level, they include Infrastructure Victoria's (IV's) 30 year Infrastructure Strategy (2016b). This appendix briefly summarises the relevant recommendations of these reviews, and government responses to them (where available).

Harper Competition Policy Review (2015)

The Harper Competition Policy Review similarly recommended governments introduce cost-reflective road pricing, subject to independent oversight and with revenues used for road construction, maintenance and safety (Recommendation 3). While it did not specify the exact mode of revenue hypothecation, it noted that as direct pricing is introduced, indirect charges on road users should be reduced, and that the revenue implications for different levels of government require alternative arrangements to those currently in place.

The Australian Government response to Harper similarly supported implementing cost-reflective road pricing as a long-term reform option. The government response noted it would investigate the benefits, costs and potential next steps of options to introduce cost reflective road pricing for all vehicles, noting the current priority of progressing heavy vehicle road reform (Australian Government 2015).

Infrastructure Australia's Infrastructure Plan (Feb 2016)

IA's Infrastructure Plan made a number of recommendations for how to achieve a network-wide road user charging scheme, namely by establishing further reviews into existing funding frameworks for roads and the desired reform pathway, and into the design of a corporatised road delivery model, which it favoured on the basis that it is used in other utility networks. (Recommendations 5.3 and 6.13, respectively). It also sought commitments from governments on reform timeframes (Recommendations 5.4 and 5.5).

In November 2016, the Australian Government announced it would establish a study into the potential impacts of road user charging reform on road users, which will commence later in 2017. The Government considered that the merits of IA's recommendation that Australia eventually move to a corporatised road service delivery model could not be properly assessed until the conclusion of the aforementioned study (Australian Government 2016).

Infrastructure Victoria's 30-year Infrastructure Strategy (Dec 2016)

IV's 30-year Infrastructure Strategy recommended introducing a transport network price regime within 5 to 15 years to manage congestion and obtain the most efficient use of the transport network. It considered that such a regime should incorporate all modes of transport and focus on addressing any implications for equity that arise from the regime (Recommendation 10.2.2). A related research paper released by IV examined the options, challenges and opportunities for transport network pricing in Victoria (IV 2016a), noting that direct road pricing is the first step towards a network-wide pricing regime as it offers the greatest efficiency gains for Victoria's entire transport network, and that road pricing in Victoria should complement efforts toward national road pricing reforms.

IV recommended that the Victorian Government respond to its proposed strategy within 12 months, and indicated that it will develop a five-year plan as part of its response. IV has also indicated it will have an oversight role for the delivery of the Victorian Government's plan.

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