Urban transport in Australia: Has it reached breaking point?*

By

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Urban transport problems have become major community concerns in Australian’s largest cities, a reflection of significant market failures in facility and service provision. This paper suggests that a lack of focus on transport system planning is a major reason for the current concerns. The challenges posed by climate change are argued to require transformational changes in the way we approach urban transport problems, with radical reform of pricing system an early priority for action. Infrastructure development priorities are then outlined.

**KEY WORDS:** Climate change, road congestion, road pricing, transport infrastructure, transport planning.

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1. Introduction

Scarcely a day goes by in the mainstream Australian media without some lead article complaining about the state of our transport systems or services. The subjects of concern range from the condition of the interstate rail tracks to port congestion, gaps in the freeway/tollway networks, overcrowded public transport services, congestion of our metropolitan roads and the high levels of tolls. Unsurprisingly, transport concerns in the cities receive greatest attention: that is where most Australians live. Standing back somewhat from the media focus, it is clear that there are a number of major issues confronting transport in our cities. These problems reflect pervasive externalities, which are typically large and growing rapidly, and the challenges associated with planning and supporting complex spatial road and public transport networks (in contrast to a focus on corridors, as if they stand alone).

The (then) Bureau of Transport and Regional Economics (2007a) assessed the scale of road traffic congestion costs in Australia. Using the economic notion of ‘deadweight loss’ as its measure, the Bureau has estimated a cost of almost A$10 billion in 2005, with Sydney (A$3.5 billion) and Melbourne (A$3.0 billion) as the highest-cost locations. As a result of the high elasticity of marginal congestion cost curves in very congested conditions, these costs are projected to double by 2020 (Sydney: $7.8 billion; Melbourne: $6.1 billion). Brisbane’s congestion costs are projected to grow most quickly, from $1.2 billion in 2005 to $3.0 billion in 2020. These costs represent a significant economic waste and are an indicator of how poorly road use is priced in our cities. Much more efficient use can be made of scarce road infrastructure.

The second big externality plaguing urban traffic is its contribution to Australian greenhouse gas (GHG) emissions. Transport is Australia’s third-largest source of GHG emissions and the second-fastest growth sector for emissions. Road transport (passenger and freight) accounts for almost 90 per cent of transport sector emissions and is the major source of transport GHG concern in urban areas, reflecting its dominance in both freight and person movement tasks. Australia’s total road transport GHG emissions increased from 55 Mt in 1990 to an estimated 74 Mt in 2007. The Bureau of Transport and Regional Economics (2007b) projected an increase to 90 Mt by 2020, some 65 per cent above 1990 levels. Urban road transport accounts for a little over half of these road transport emissions. This trend is inconsistent with international pressures for lower GHG emissions.

As our cities have grown and spread, there is a concern about the mobility difficulties facing many people without access to motor vehicles and about those who are ‘forced’ to spend a substantial proportion of their household budget on motor vehicle travel in order to meet their access requirements. Such concerns have been very significant in Melbourne, for example, in underpinning a substantial increase in local bus services in outer suburban areas to ensure that most people have the opportunity to travel for most purposes, most of the time. These service improvements, funded under the Victorian Government’s Meeting Our Transport Challenges programme, have resulted in significant patronage gains on bus services (for example, 12 per cent in 2008). This programme has been generically labelled ‘social transit’, to reflect its primary purpose.

The scale of the above three key external costs of the current Australian city transport patterns depends, in part, on the structure of our cities. Low-density development patterns, flowing from a central core, are associated with a high reliance on cars for personal travel and trucks for freight movement. Public transport typically plays an important role in peak radial work trips (for example, 78 per cent of all trips to the Sydney central business district (CBD) in the two-hour morning peak, in contrast to a total of 11 per cent of all trips in the Sydney metropolitan area being by public transport) and otherwise caters mainly for those without car availability. Rail plays only a minor role in urban freight movement. There has been increasing focus in most cities in recent years on increasing urban densities to help minimise the three external costs outlined above. Achievement in increasing densities, however, has tended to lag
aspiration. The big challenge is to establish origin–destination densities, in contrast to origin and/or destination densities.

This Forum examines the future prospects for transport in Australian cities. The present article looks, in particular, at the policy directions implied by an expectation that the GHG emissions from all sources will need to be cut dramatically in the coming decades. It considers future infrastructure priorities in this light, linking these to the shortcomings in current transport pricing arrangements. The article also considers the institutional arrangements in urban transport, where recent history indicates an inability or unwillingness to sustain a long-term sense of direction.

Graham Currie (Chair of Public Transport at Monash University) then looks at the links between mobility and social inclusion, drawing partly on a current Australian Research Council-supported research programme being undertaken in Victoria. The notion of ‘forced car ownership’, in particular, is examined in Professor Currie’s work, as it applies to low income groups living in outer suburban areas.

Rob Adams (Director of Development for the City of Melbourne and also a Professor at The University of Melbourne’s School of Architecture and Planning) then presents a radical vision of how our cities might be shaped in coming years in order to improve their sustainability against a number of criteria. This approach involves channelling much future urban growth along high-capacity, linear public transport corridors, reflecting (for example) the developments in Curitiba (Brazil). The successful implementation of a low-rise, high-density development strategy of this kind would substantially remove the pressures for greenfield developments at the suburban fringe and lower the ecological footprint of urban living.

The ideas presented in all three articles comprise a transformational approach to our cities. They pose questions for economists and other professionals and challenge the current paradigms, which are essentially incremental. The authors of the three Forum articles believe that approaching the transport problems in our cities incrementally has been a key reason why there are major problems today and that transformational change is the only way forward.

2. Shortcomings in strategic thinking

Congested roads, overcrowded public transport services and delays in agreeing, and then implementing, the kinds of changes that are needed to respond to such challenges in our cities are symptomatic of a long-term lack of strategic planning and investment in Australia’s transport systems and infrastructure more generally. From about 6 per cent of gross domestic product (GDP) in the early 1960s, the gross fixed capital formation (GFCF) in the key economic infrastructure sectors (transport and storage, electricity, gas and water, communications services) fell to a little over half of this share in the 1990s. Over half of this decline in share was in the transport sector. National competition and national road transport reforms have helped to deliver improvements in the efficiency of infrastructure utilisation over the last decade and a half, including in the transport sector, and investment levels have recovered somewhat in the last decade. Yet, there remains a considerable catch-up in store and much thinking to be done about long-term priorities.

European transport researchers separate the strategic (S = policy), tactical (T = system design) and operational (O) stages of transport service and infrastructure planning and provision (Figure 1), a generic model that can be applied to any infrastructure sector (van de Velde 1999; Hensher 2007).

It is at the tactical level (T) that sectoral system development directions are determined for a jurisdiction and where the priorities between competing policy objectives are ultimately resolved, to the point of directional priority setting. It is here in the urban transport sector (for example) that questions, such as how the desired balance between public and private transport will be achieved, the importance to attach to rail/road freight priority and how to deliver such
priority, the future development requirements of major air and sea ports, the links between transport systems/services and land settlement patterns, the choice of public transport service levels (including the roles of bus, bus rapid transit (Golotta and Hensher 2008), light rail and heavy rail), including the service levels to meet social equity goals, and the details of transport pricing systems (public transport fares, road user charges), are settled.

The international and Australian experience is that, though comprehensive transport policy statements that set out the governmental goals to be pursued in a sector, like transport, might be unusual, the existence of integrated transport plans (for example, for a city or larger region) that set out system development requirements (including infrastructure development needs) to meet these goals, with clearly defined roles and responsibilities for delivering and updating the plans and maintaining long-term plan currency (with regular updates), is equally unusual. This has become known in some conversations as the ‘tactical level gap’.

This tactical level weakness reflects an inability, or unwillingness, on the part of governments, mainly at state level, where most infrastructure development responsibilities lie, to take a long-term strategic view of sectoral development needs and to maintain the commitment. While the states generally have been poor in this area, the Commonwealth has typically seen little need to apply pressure for systemic change, other than in isolated cases (for example, the Auslink programme and National Water Initiative).

The recent establishment of Infrastructure Australia, to advise the federal government on infrastructure funding priorities from the Building Australia Fund, presents an opportunity to substantially improve the strategic processes that underpin transport investment in Australia. Transport projects figure prominently among the state government funding submissions to Infrastructure Australia (including several multi-billion dollar metropolitan rail proposals and proposals for major road network additions). The way in which such initiatives are assessed, and the conditions attached to any funding flows, provides an opportunity to substantially improve strategic planning processes across the country in a short space of time.

3. The climate challenge

Stanley, Hensher and Loader (2008) have prepared estimates of the kinds of changes that Australia’s road transport sector might need to achieve if emissions from the sector in 2050 were to be reduced by 80 per cent on 2000 levels. Although this ‘target’ exceeds the current national commitment of a 60 per cent reduction, there is a growing interest in this scale of reduction from a number of advanced countries and Professor Ross Garnaut canvassed such a figure in his work (Garnaut Climate Change Review 2008). If Australia is to even consider reductions on this scale, then all the major emitting sectors will need to play an important part. Accounting for almost 90 per cent of transport sector emissions, road transport performance will be central to outcomes.

Table 1 presents three alternative road transport GHG emissions scenarios, all of which would deliver an 80 per cent cut by 2050, against a 2000 base. The changes include six broad types of measures, ranging from changes in car km and changing modal shares towards less GHG-intensive modes, to increased car occupancy rates and efficiency improvements in freight operation that cut fuel use (and GHG emissions), to improvements in the emissions performance of the vehicle fleet. The table also shows the base 2007 starting points.

The final three columns in Table 1 are labelled as ‘2050 extreme efficiency’, ‘2050 very high efficiency’ and ‘2050 high efficiency’, as a reflection of the assumed improvement rates in vehicle emissions performance shown in row 6 of the table. This is the most critical driver of outcome possibilities. If the ‘2050 extreme efficiency’ outcome can be achieved (about 90 per cent improvement in unit emissions intensity compared to 2007), then urban car mode shares substantially exceeding 50 per cent of the total trip rates are consistent with the 80 per cent target (but below the 2007 urban modal share shown, of 77 per cent). However, if only the ‘high efficiency’ improvement is achieved, still some 75 per cent better than the 2007 unit emissions
intensity for cars and heavy vehicles, then drastic reductions in motor vehicle mode share are implied to achieve an 80 per cent total reduction for the sector. The table shows a substantial growth in the roles of walking, cycling and public transport use in all scenarios, suggesting that these areas should be priorities for investment that will help to facilitate their growth.

The changes implied in the table are transformational, not the kind of result that will flow from a ‘more of the same’ approach to policy, planning or investment. They are an indicator of the kinds of investment priorities that should figure strongly in candidate projects being considered by Infrastructure Australia, a point to which we return below.

4. **Getting the prices right**

As noted above, Australian capital city congestion costs have been estimated to be almost $10 billion annually (Bureau of Transport and Regional Economics 2007a). These are only one part of the total external costs of urban transport, albeit a very significant part. For road users, other such costs include, for example, road damage (where only heavy vehicle users are specifically charged for their attributed road damage on a basis that reflects axle numbers), air pollution (where emission control legislation internalises some external costs) and noise and accident costs (part of which are an externality). The Bus Industry Confederation (2001) has estimated such costs at well over twice the revenues collected by governments from road users. Clarke (2008) points out that parking costs also should be included in a full listing of externalities.

The state governments (and Brisbane City) partly support urban public transport operations as a counter to the under-pricing of urban road use, especially in peak periods. For example, the LECG (2008) has shown in a report for the Independent Pricing and Regulatory Tribunal of New South Wales that substantial fare subsidies to City Rail in Sydney are economically justified by reductions in the external costs of road use. However, this is a competitive neutrality (or levelling the playing field) strategy that perpetuates the under-pricing of all modes of urban transport.

Getting the prices of road use ‘right’ also would enable public transport fares to increase, subject to concerns about the access needs of transport-disadvantaged people being protected. The total urban travel would be reduced, but increases in rural and regional travel would be expected, where road users (for example) currently more than pay their way.

Prices based on marginal social costs (MSC) are generally recognised by economists as the appropriate direction for reform, albeit that there remains much room for debate about the ‘right’ measures of MSC, both in terms of obtaining estimates and the selection of the correct theoretical basis for MSC (for example, given problems of ‘second best’). Urban transport pricing, based on MSC, should be able to significantly cut the current $10 billion congestion cost burden and lower other external costs.

Safirova, Houde and Harrington (2007), at Resources for the Future, have examined recently the welfare impacts of a number of alternative ways of charging for the MSC of road use, using Washington, DC as their study area. They examined three toll cordons (one particular form of congestion pricing), a road toll on freeways and bridges, a comprehensive road toll by distance and time of day (close to the economist’s ideal of a congestion tax) and a vehicle mile tax. They examined the welfare impacts of the congestion costs and of a wider set of social costs, including air pollution, accidents, GHG emissions, oil dependency externalities and noise. The vehicle mile tax to cover all externalities was estimated at 14.6 cents per mile (or about 9 cents per km).

Safirova, Houde and Harrington (2007) concluded that including the broader set of external costs raises the expected welfare gains from pricing reform by a considerable margin, compared to congestion pricing alone. They also found that road-based charges can be very effective in reducing both the congestion externalities and other external costs of motor vehicle use and that the vehicle mile charge is almost as efficient as comprehensive, variable time-of-day pricing when the full set of social costs is included. Their charging scheme, based on the vehicle miles
Hensher et al. (2008) have modelled the impact of a number of pricing policy options for Melbourne on road and public transport traffic volumes, GHG emissions and a range of other indicators. They suggest that a $10 charge to enter the Melbourne CBD would have little impact on the road traffic volumes or GHG emissions (−0.07 per cent), given the small part that the CBD road traffic plays in the total vehicle movements. However, increasing fuel prices to $2.00 per litre (from $1.25 for petrol and $1.40 for diesel) was estimated to cut the GHG emissions by 6.8 per cent. A 10 cent per km variable user charge (similar in magnitude to the charge used in the Washington, DC study cited above) was estimated to cut road use by 8 per cent and GHG emissions by slightly more (the emissions intensity is reduced as congestion falls). These lower impacts suggest lower demand elasticities in the Melbourne model but they still indicate the potential for improved pricing systems to contribute to lowering a range of external costs of road use. From a purely marketing and political perspective, given that a focus on the CBD is somewhat easier to manage than the entire metropolitan area, there might still be value, however, in introducing a CBD-focused congestion charging regime, to at least show a commitment.

There is increasing international experience with congestion pricing systems in London, Stockholm, some Norwegian cities, Milan, Malta and Singapore, London being perhaps the most publicised scheme (albeit one of the least administratively efficient, as a large proportion of the revenue is required to cover the scheme’s costs). There are also a range of pricing systems now being applied to charge for the use of congested freeways. Such experience should enable Australia to reform its system of road pricing in order to provide road users with more cost-reflective price signals (enabled as far as possible by smart network operating systems), while also delivering scope to use more cost-reflective prices on urban public transport.

For road use, this pricing reform could be achieved by replacing the existing taxes and charges on road use (except the GST) by a suite of charges that better reflect the MSC of road use. This general position is supported by the peak lobby group for road users, the Australian Automobile Association (2008), which has proposed replacing existing federal and state road taxes with a user charge, consisting of two parts:

- An access charge to cover the costs of vehicle registration and to enable monitoring for enforcement, security and consumer protection purposes.
- A user charge to cover road wear that is levied on vehicle and axle classes, an environmental charge that is levied on engine type and the fuel used, a charge to help fund the external cost of crashes and a congestion charge, collected on the basis of the road location, time of day and type of vehicle and collected only if the vehicle contributes to congestion.

Clarke (2008) argues convincingly that parking pricing also needs reform as part of a broad approach to reforming road pricing. Part of the environmental charge suggested by the Australian Automobile Association (that part relating to GHG emissions) would, in principle, be replaced in the long term by the relevant cost arising within the Carbon Pollution Reduction Scheme. That scheme has, somewhat surprisingly, given an offset for cars for three years, negating the price signal benefits of the scheme for this application.

As an illustration of a dramatic institutional reform linked to the provision of road infrastructure, satellite-based road user charging will be implemented throughout the Netherlands, to reduce congestion and to finance future road infrastructure. The ‘kilometre price’ proposed is to be differentiated by the location, environmental properties of the vehicle and time of day (effectively, a peak/off-peak or congestion charge). The scheme is to be introduced for all vehicles on all roads in the entire country, starting with trucks in 2011 and phasing in a scheme for cars from 2012 to 2016. The Dutch government plans to scrap road tax,
as well as purchase tax on new cars when the system is introduced. This is expected to provide a fairer system that taxes vehicle use, rather than ownership. More than half of Dutch road users are expected to pay less under the road user charging scheme, with only motorists who drive more than 18,000 km per year likely to be worse off under the new scheme. Importantly, the Dutch government has determined that the costs of operating the national road user charge will not exceed five per cent of the proceeds.

International experience has shown that an essential requirement for the successful implementation of any such pricing reform programme is the transparent and accountable hypothecation of a substantial part of the revenue earned from the charges (particularly the congestion charge) into improved transport systems and services and environmental enhancement associated with transport. This removes the public perception that the charges are simply another tax on consumers. Any such pricing reforms should take into account the consequences for socially disadvantaged people and include measures to manage such impacts.

The major part of the quantified benefit from urban road and public transport infrastructure investment is the saving in congestion costs that flow from such initiatives. For example, in an unpublished evaluation of a major public transport improvement programme in Melbourne, undertaken by one of the present authors, about half of the expected benefits were road congestion cost savings. The high elasticity of the marginal congestion cost curve means that only small reductions in traffic volumes are needed to deliver very significant congestion benefits. For example, UK research suggests that MSC-based pricing in all UK urban areas would cut congestion costs by almost half, but would only reduce road traffic volumes by about 6 to 10 per cent (Department for Transport 2004).

In the absence of prices based on the MSC, the benefits from new transport infrastructure investments are likely to include a substantial component that is more properly attributable to poor pricing than to good investment! An implication is that the implementation of a reformed transport pricing regime can be expected in some circumstances to lead to reduced investment needs, or at least to changed priorities. Infrastructure Australia should take this into account in assessing priorities, given the long life of significant urban transport infrastructure projects. The probability of the significant reform of transport pricing being implemented during the economic life of such projects is judged as high by the current authors.

5. Infrastructure priorities

It was noted above that over half of the decline in the share of infrastructure GFCF in GDP from the early 1960s to the late 1990s was accounted for by declining capital formation in the transport sector. It is of little surprise, then, that transport infrastructure requirements are high on most political agendas around Australia, in both urban and regional areas. Transport proposals figure very prominently in the published bids for funding support through Infrastructure Australia processes.

The public and private capital investment in transport infrastructure reached a record $17.5 billion in 2007. Recurrent government expenditure on roads, rail and public transport exceeds $5 billion per annum (ADC 2009). An analysis of the planned expenditures by state and federal governments that was undertaken for the Australian Davos Connection’s October 2008 Infrastructure Summit suggests that there might be demand for something like $20 billion of new transport investment per annum to 2020.

That summit identified a range of demand and supply side opportunities to improve the effectiveness with which existing infrastructure is used, including pricing options, but it also recognised that there will need to be a large commitment to new and upgraded transport infrastructure in our cities (ADC 2009). The GHG scenarios outlined in the current article suggest that transforming our city transport systems to accommodate a significantly larger role by low-emissions modes (walking, cycling and public transport) for personal travel requirements should be central to policy directions, including investment priorities. Transport
infrastructure investments that encourage more compact forms of urban settlement, rather than encouraging further urban sprawl, are fundamental to achieving such shifts in travel choices. The linear corridor redevelopment model in existing built-up areas, outlined in the accompanying article by Rob Adams, is the type of initiative that should receive extensive policy and programme funding support in this regard. The comprehensive reform of transport pricing also would be supportive of more compact settlement patterns (Clarke 2008).

The development of new underground metropolitan rail systems is a key element in many proposals put by the states to Infrastructure Australia in order to increase the capacity of the central rail systems and to facilitate future patronage growth. Figure 2 shows the growth in public transport passenger km by city, compared to population growth, over the decade to 2007. Brisbane and Melbourne, in particular, stand out as having achieved very strong patronage growth. Adelaide and Perth also have performed solidly. Sydney is the exception, with growth barely exceeding population growth. If this outcome is due to a lack of system capacity, there is a case for investment. If it is not, there is a case for major institutional reform. The NSW transport plans for Sydney have featured Metro rail proposals and funding support through Infrastructure Australia processes will be critical to possible progress. There is little doubt that such proposals have the potential to be transformational. Convincing evidence of the capacity to achieve very substantial patronage growth is needed, given the project costs.

The cost of the Metro proposals is daunting and not all will be fundable in the medium term. However, it is important that a start is made with one or two such transformational investments, as demonstration studies of what is (or is not) possible. Urban rail investments more generally should focus on getting the existing systems running more efficiently, with adequate rolling stock, track (capacity and condition), signalling and control systems and station upgrades receiving investment support.

Road improvements should focus most closely on the needs of freight movement, where road is dominant and will remain so. Bridge strengthening programmes, to accommodate higher-mass freight vehicles, should be a priority.

The most suitable freight access/egress arrangements to/from sea ports and the future location of such ports, given the forecast tonnage growth, must be priority areas for attention, including efforts to move freight distribution out of the morning and evening peak periods. Road access becomes increasingly incompatible with inner-urban locations as tonnages grow. Rail transfers (through intermodal hubs) and subsequent port relocations should figure prominently in investment evaluation programmes (for example, Port Botany and Port of Melbourne). Intermodal freight hubs should be an important growth area in the coming years and investment in these facilities needs support. A lack of MSC-based road pricing has meant that some facilities have struggled. Pricing reform would assist their viability. In the meantime, some governmental funding support, in recognition of the externality benefits generated by such facilities, is merited.

Apart from road improvements focused on freight movement, the major road improvements that are likely to be sustainable in the long term will be those that support the development of suburban nodes or linking corridors, but do not add to the pressures for urban sprawl. New links and major upgrades that facilitate the operation of cross-town Bus Rapid Transit (BRT) services to/through major urban activity centres would meet sustainability tests and are usually far more cost-effective than rail in similar locations. These initiatives have been shown internationally to deliver value for money. Brisbane is a world leader in this technology but there is a great opportunity for an extensive roll-out in other cities, both in own right-of-way and on existing arterial roads (see Hensher and Golob 2008). The relatively low capital costs of BRT compared to heavy rail generally have made the roll-out of this technology possible within a relatively short time frame (often up to 5 years). Whether this is a transition strategy to other forms of public transport or an end in itself should be determined by how the market responds.

Radial road upgrades on the edges of our cities would seem to be the least valuable urban land transport investments, unless long-term improvements in emissions intensity of the scale
indicated by ‘extreme efficiency’ in Table 1 are delivered. Arterial upgrades to cater for urban growth are important, with the challenge being to ensure that such improvements are not simply a means of accentuating further urban sprawl.

Importantly, it is the commitment to a network of routes (and not a corridor view of planning per se) that gives a metropolitan area the opportunity to enhance the accessibility and urban renewal benefits from the corridor level to the metropolitan-wide level.

The Australian Davos Connection’s October 2008 Infrastructure Summit emphasised the importance of vision-based planning as a foundation for infrastructure development, consistent with the emphasis on substantially improving the strategic and tactical thinking outlined earlier in this article (ADC 2009). The planning of major urban transport infrastructure needs to look beyond the near horizon towards a ‘vision’ of the way Australians would like (and need) to live in the future, recognising the links between transport systems, urban settlement patterns and outcomes that are sustainable in triple bottom-line terms. New infrastructure should be justified by its contribution to economic productivity, environmental sustainability and social factors.

Solving today’s problems is a key part of planning, but if this alone is allowed to drive the planning process, the opportunity to shape the future will be lost and the transport problems identified above will remain and intensify. The urban transport project identification and justification procedures need to demonstrate how the options under consideration have the potential to change and shape the city or region in directions that are consistent over the long term with lower GHG emissions, continued economic development and social inclusion.

6. Tough choices

There is a need to radically overhaul the policy and system planning processes that drive urban transport infrastructure and services in Australian cities. An inability or unwillingness to take a long-term, vision-based approach has given us incremental approaches, which change with election cycles, or quicker. This will not resolve the long-term problems of transport in our cities.

The article has argued that the long-term pressures of responding to climate change, in particular, should drive a transformation in the way that Australian cities approach their transport systems. The related article by Rob Adams argues that this should flow through to how we shape our cities in the coming years, pointing out that a carefully targeted approach, affecting only a small part of our cities, can meet requirements.

Although the transport infrastructure requirements attract most media attention, the present article has proposed that major transport pricing reform must accompany infrastructure development to ensure that we make the best use of existing capacity. Pricing reform is a virtuous initiative, delivering its own direct welfare benefits and pushing travel choices in a direction that are more sustainable in the long term.

The infrastructure requirements in urban transport are substantial, partly reflecting three decades of declining investment share from the 1960s. The responses to investment backlogs and to emerging pressures must be framed in a way that helps to shape a more sustainable future, not simply be a response to ‘apparent’ transport problems. Transformational change is required, not more of the same.

International experience suggests that champions can be very important in achieving transformational change of the scale suggested in this article. This is currently a case of ‘situation vacant’ in Australia. The federal government’s creation of Infrastructure Australia provides a unique opportunity to change this dynamic.
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References


Note: PT pkm denotes public transport passenger km.
Source: Data provided by Professor Peter Newman.
### Table 1: Road transport emission reduction scenarios that achieve an 80% cut below 2000 levels by 2050

<table>
<thead>
<tr>
<th>Measure</th>
<th>Target</th>
<th>2007</th>
<th>2050</th>
<th>2050 very high efficiency</th>
<th>2050 high efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fewer or shorter car trips</td>
<td>Less car km</td>
<td>–</td>
<td>10%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>2. Shift from car to walk/cycle</td>
<td>Active transport urban mode share</td>
<td>16%</td>
<td>29%</td>
<td>45%</td>
<td>53%</td>
</tr>
<tr>
<td>3. Increase public transport mode share</td>
<td>Public transport mode share (% of all urban trips)</td>
<td>7.5%</td>
<td>16%</td>
<td>33%</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td>Car share (% urban)</td>
<td>77%</td>
<td>57%</td>
<td>23%</td>
<td>11%</td>
</tr>
<tr>
<td>4. Increase car occupancy rate</td>
<td>People/car</td>
<td>1.4</td>
<td>1.7</td>
<td>2.6</td>
<td>2.8</td>
</tr>
<tr>
<td>5. Freight efficiency gain</td>
<td>Less fuel</td>
<td>–</td>
<td>30%</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>6. Car emissions intensity</td>
<td>Less than 2007</td>
<td>–</td>
<td>92%</td>
<td>84%</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>(g per km)</td>
<td>220</td>
<td>18</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>Truck emissions intensity</td>
<td>Less than 2007</td>
<td>–</td>
<td>89%</td>
<td>83%</td>
<td>75%</td>
</tr>
</tbody>
</table>


1. The road user charge scheme will be facilitated by global positioning system/speed sensor vehicle tracking, calculated by onboard electronic accumulating odometers that remotely assess travel from central computers that are capable of applying a range of charging regimes. These include uniform road-use charges and congestion pricing (differential charging according to traffic conditions), including adjusted-upward charges for road use in remote areas (perhaps, excluding local residents) where the maintenance costs are high and the distances travelled are relatively less. Graded distance fees also can be introduced if desired, possibly on equity grounds.