Submission to the Inquiry into the investment of Commonwealth and State funds in public passenger transport infrastructure and services

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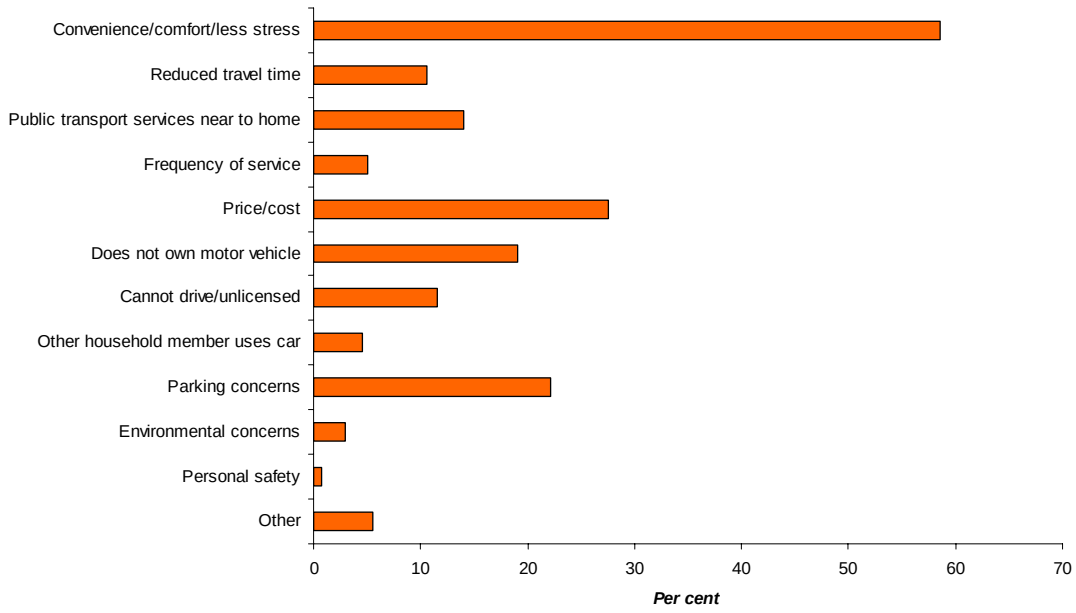
1 An audit of the state of public passenger transport in Australia

1.1 Audit methodology

An assessment of the state of public transport in Australia should be based around key criteria that have been shown to influence mode choice.

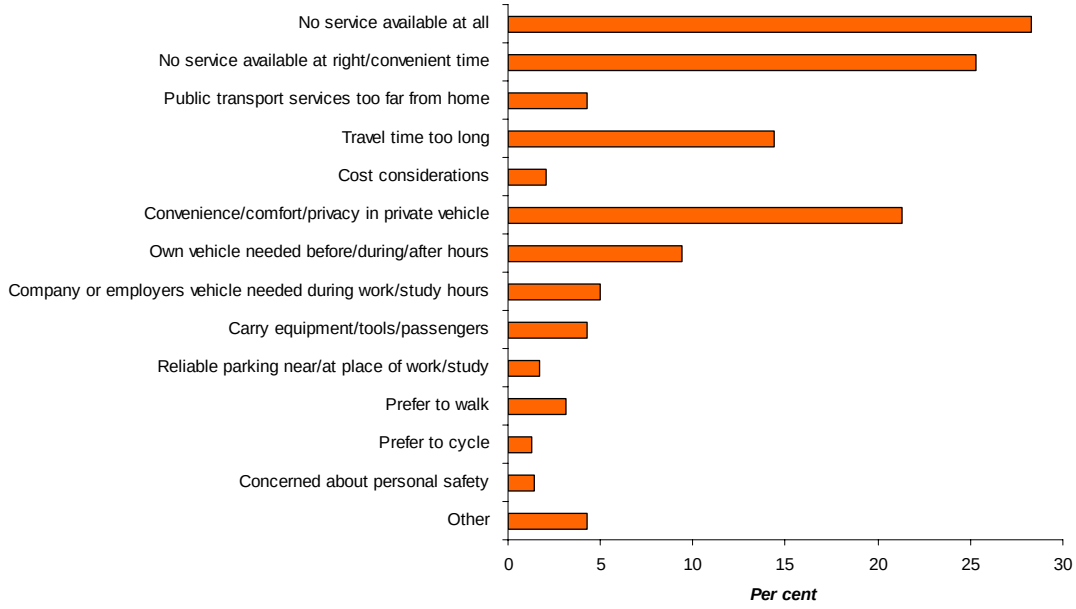
The ABS (2006) found that most people who took public transport to work or study did so largely because it was the most convenient or cost-effective option available to them (Figure 1.1). People not taking public transport largely cited service availability, convenience and journey time factors as reasons for driving or using other modes (Figure 1.2). The corollary is that most Australians are willing to use public transport if it is available and offers a time-competitive and cost-competitive alternative to private transport.

Figure 1.1: Reasons for using public transport on usual trip to work or study



Source: Australian Bureau of Statistics

Figure 1.2: Reasons for not using public transport on usual trip to work or study



Source: Australian Bureau of Statistics

Echoing the themes of availability, convenience and time-competitiveness, Booz, Allen & Hamilton (2001) found that people are willing to switch to public transport services that are:

- extensive in coverage,
- frequent,
- reliable,
- well publicised, and
- well integrated.

A wide range of international research has made broadly similar findings regarding the key factors driving mode choice (Taylor 1982; Gray 1992; Kenworthy 2000; Black, Collins & Snell 2001; Asensio 2002; Bento *et al* 2005; Hughes 2006; Mann & Abraham 2006; Lumsdon, Downward & Rhoden 2006; Chorus, Molin, Van Wee, Arentze & Timmermans 2006). These have been categorised by Gray (1992) under the following headings:

- Safety
- Comfort
- Accessibility
- Reliability
- Cost
- Efficiency

It should be noted that the quantity of infrastructure *per se* does not fall under Gray's headings. Many of the world's best public transport systems have relatively low capital requirements per capita; nor is an extensive programme of capital works for public transport a guarantee of high patronage or significant mode shift. This point is frequently overlooked, particularly in a country like Australia where there is a genuine funding imbalance that structurally disadvantages public transport. While there is an

urgent need to realign funding mechanisms for public transport according to the pattern long established for roads, policy makers need to resist the tendency to throw money at public transport infrastructure projects in a belief that this will solve the long-standing problems with service provision.

Rather, the provision of infrastructure is merely one of a number of elements underlying a reliable, accessible and efficient system, through which services that are fit-for-purpose are delivered. This topic is discussed further with reference to world's best practice in Section 6.

1.2 Safety

Safety is one of the most fundamental of human needs identified by psychologist Abraham Maslow. Public transport will be unable to fulfil its potential if it is perceived as dangerous by prospective passengers.

While public transport compares very favourably to private motor vehicles in terms of accidental death and injury (Figure 3.8), many people are deterred from using public transport by fear of physical assault or robbery. According to Department of Transport surveys, about half of Melbourne's public transport users are dissatisfied with safety on the system.

According to Victoria Police figures, 18 per cent of people feel unsafe using public transport during the day, and 60 per cent of people feel unsafe using public transport at night (Carnovale 2007). Whether or not these fears are well-founded is to some extent irrelevant since it is perceptions, rather than statistics, that will guide travel behaviour.

Perceptions of safety are only likely to be properly addressed by boosting the presence of staff across the system and by implementing Crime Prevention Through Environmental Design (CPTED) or "design out crime" measures where possible around public transport interchanges and access routes.

A comprehensive staff presence can also boost passenger confidence by providing customer information and assisting mobility-impaired passengers, as well as deterring fare evasion. An increase in off-peak and evening public transport patronage would also boost occupancy rates when there is significant under-utilised capacity and thereby boost the average energy efficiency of the public transport system and extract greater benefit from investment in public transport infrastructure.

Unfortunately Australia's performance on safety for pedestrians and cyclists compares unfavourably to international best practice, reflecting a fairly one dimensional approach to road safety in Australia (Parker 2001). International research shows that fatality rates for pedestrians and cyclists decline as the rate of walking and cycling increases (Leden 2002; Jacobsen 2003; Robinson 2005). Greater attention to encouraging walking and cycling through measures such as traffic calming and better connectivity of paths and cycle routes would boost levels of walking and cycling and encourage motorist behaviour that is better suited to the presence of unprotected road users (PTUA 2008b, pp.37-38).

1.3 Comfort

Higher levels of comfort and more personal space are often key reasons why people drive instead of taking public transport (Mann & Abraham 2006). Other considerations can include the smoothness of ride, cleanliness and exposure to noise and exhaust emissions (Gray 1992, p.625).

Department of Transport surveys reveal that passenger satisfaction with comfort on trains has declined over the last few years, which reflects service levels that have not kept up with patronage growth. Increasing service levels is hampered by the premature scrapping of rolling stock in the early part of the decade (PTUA 2008d, p.10).

In addition to comfort while onboard, effective public transport agencies seek to make transfers between services and modes as comfortable and seamless as possible through measures such as minimising obstacles and distance between bus stops and platforms at railway stations, ensuring protection from the elements while transferring, adequate lighting, customer information and provision of well-maintained facilities such as seating and toilets (TfL 2001).

Some major intermodal interchanges work against transferring passengers by requiring a long transit time between modes. At Box Hill in Melbourne, passengers must negotiate two sets of escalators and a walk through a busy shopping centre between train platforms and buses. At Melbourne Central station, thousands of passengers switch between trains and trams, an exchange made more difficult in 2003-04 by the removal of a direct escalator connection. Awkward and time-consuming changes between public transport services add to the total travel time and further undermine the competitiveness of public transport against car travel.

1.4 Accessibility

In order to use public transport, public transport services must first be available from the point of origin, to the destination, at the time required, with adequate capacity to cater for demand. If these fundamental pre-requisites of geographic coverage, operating spans, service levels and capacity are not satisfied, public transport ceases to be a realistic or "convenient" option as identified by surveys mentioned above (e.g. ABS 2006), and potential passengers will instead add to pressure on the road network in the form of private motor vehicles.

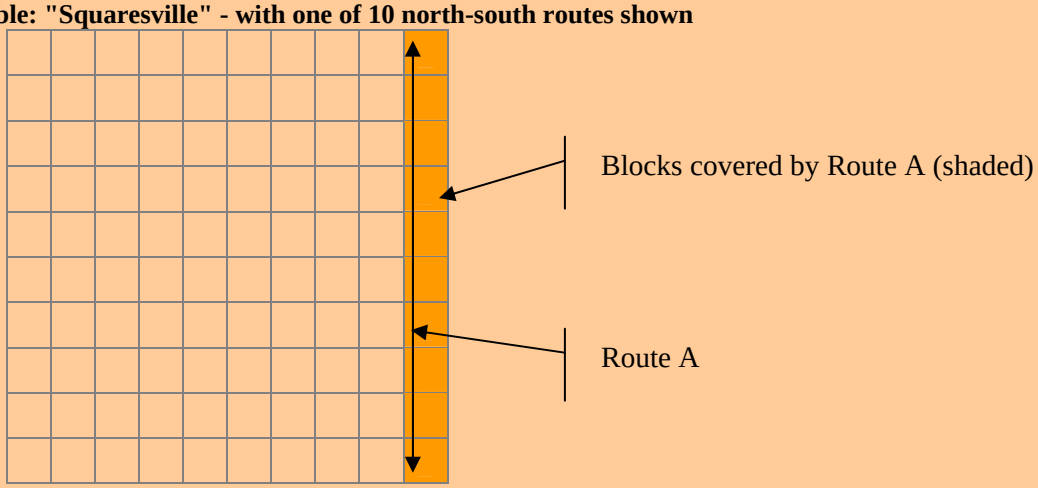
1.4.1 Geographic coverage

Potential passengers will only be able to travel by public transport if services are available to take them from their point of origin to their destination. Given diverse travel patterns, many trips require a *network* of services that enables passengers to transfer to intersecting services that are travelling to the desired destination (see Box 1).

Box 1: The Network Effect

Imagine the city of Squaresville has 100 blocks and that destinations are evenly distributed across the grid of 100 blocks. Exactly 99 journeys to other blocks originate in each block – a total of 9,900 trips therefore being made within Squaresville.

Table: "Squaresville" - with one of 10 north-south routes shown



If public transport Route A runs from one end of Squaresville to the other, it would pass through 10 blocks which together generate 990 trips to other blocks (i.e. 10 blocks x 99 journeys to other blocks). However, Route A only travels to nine other blocks in Squaresville, so it could only serve 90 journeys (i.e. 10 blocks x 9 other blocks) – or 9 per cent of trips. If, for example, 30 per cent of these 90 journeys are made by public transport, then overall mode share will only be 2.7 per cent.

If frequencies on Route A were doubled and as a result 60 per cent of the 90 journeys were made by public transport, overall mode share would also double to 5.5 per cent.

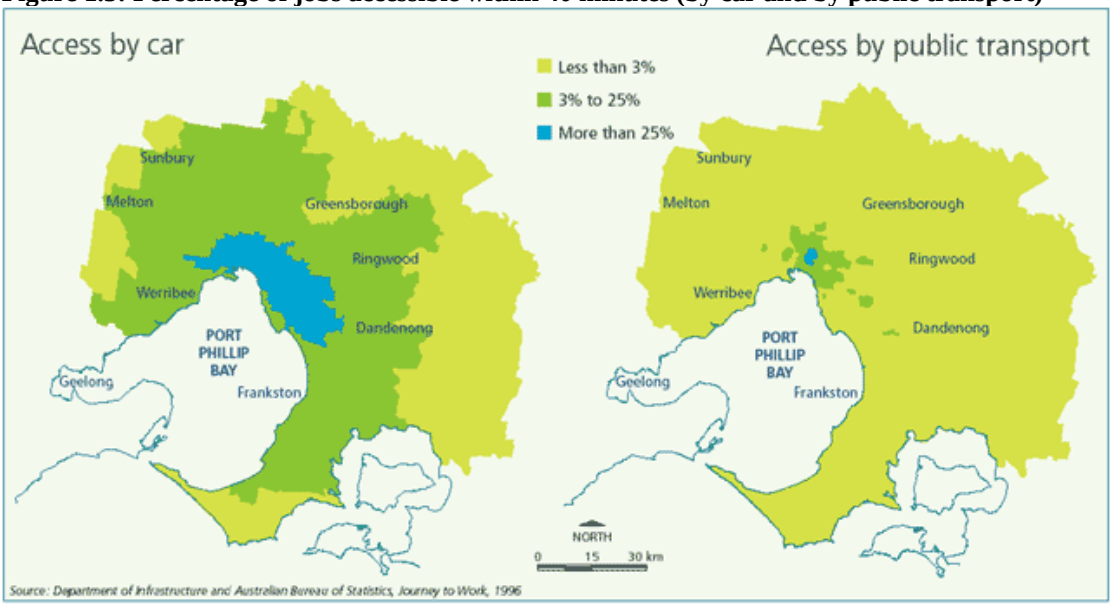
If, instead of doubling frequencies on existing routes, the extra resources were used to introduce 10 new east-west routes, it would become possible to travel to all other blocks by public transport. Instead of only nine other blocks being accessible, 99 other blocks could be reached by public transport – or 100 per cent of the 990 trips originating along Route A.

Even assuming only 30 per cent of these 990 journeys were made by public transport – the same as before doubling frequencies on Route A above – modeshare would leap from 2.7 per cent to 30 per cent – a proportional increase in patronage and fare revenue about 10 times greater than without the 'network effect'. The impact on congestion and emissions would also be proportionally much more significant.

Based on Mees (2000), pp.138-142

Booz & Co (2008, p.10) note that "Melbourne has the second lowest coverage of rail system in comparison to its population size" among Australian cities. Combined with inadequate bus services, the impact of key gaps in Melbourne's rail network – such as long-awaited lines to Doncaster, Rowville and South Morang –is exemplified by the poor access to employment offered by public transport across large parts of the city (Figure 1.3).

Figure 1.3: Percentage of jobs accessible within 40 minutes (by car and by public transport)



1.4.2 Operating spans

With Australians working among the longest hours in the world (ABC 2008), increasing casualisation of the workforce and increasing opportunities for studying and socialising after hours, there has been an increase in travel undertaken outside the traditional peak period. Meeting these travel needs requires public transport services that operate right through the day, every day.

Many public transport services in Australia still operate according to 1950s travel patterns and have failed to keep up with modern travel needs and changing urban form. Many public transport services cease operating before people are returning home from working late or attending social functions. Many services do not operate at all on Sundays, or start too late to cater for potential passengers. This lack of services when people need them forces people to depend upon their motor vehicle or to disengage from professional and social activity.

Booz & Co (2008, p.5) noted that "Melbourne weekday minimum [bus] service finish times are considerably below the standard of all other Australian cities. Melbourne has a finish time of 9p.m. whilst almost all other cities suggest finish times between 11p.m. and midnight". They also point out that "Melbourne's rail span of hours is generally shorter than Sydney and Perth. The Sunday service span is shorter than all Australian comparison cities" (ibid., pp.7-8).

1.4.3 Frequencies

Urban public transport services operating at frequencies inferior to every 15 minutes will generally struggle to attract discretionary passengers. On the other hand, frequencies of every 10 minutes or better offer "turn up and go" convenience that strengthens the *network effect* discussed above and is more likely to entice people away from the convenience of their motor vehicle.

High service levels or frequencies are a common feature of cities with successful public transport systems. One approach to measuring service levels is to compare public transport vehicle kilometres per unit of area or per person. Cities with higher public transport service provision per hectare generally have higher modeshare for public transport (Booz & Co. 2008, p.12). Unfortunately Australian cities compare poorly to examples of good practice in terms of service levels.

Booz & Co (2008, p.11-13) found that cities in Eastern Europe have 137% more services per person and over four times as many services per urban hectare compared to Melbourne. Western European cities have service levels that are 57% higher than Melbourne's in terms of vehicle kilometres per person, and over 13 times more services per urban hectare.

1.5 Reliability

Poor reliability is a major deterrent to potential passengers and a constant source of frustration for existing passengers (Taylor 1982; Chorus *et al* 2006; Mann & Abraham 2006). Reliability on Melbourne's rail network has declined significantly since privatisation (Mees 2007).

The Australian climate has also recently had a noticeable effect on the reliability of rail services. Hot weather in the summer of 2008-09 caused large numbers of cancelled trains in Melbourne in particular, attributed to the reliability of the train fleet in the warm weather, and also to buckling of tracks due to heat. Perth, Adelaide and Melbourne are upgrading timber sleepers to concrete, which can prevent buckling, however while Perth and Adelaide are well-advanced with this programme, Melbourne's is not scheduled to be completed until 2024, meaning continuing reliability issues each summer for the next 15 years.

Sections of single track railway result in poor frequency and reliability, as vehicles can only pass at specific points along the route. Any delay can have severe flow-on effects, and to prevent this, sections of single track should be duplicated in metropolitan areas, and more generous passing opportunities provided in regional areas.

Neglect of regional rail infrastructure has also harmed reliability of regional rail services, with hot summer weather continuing to result in speed restrictions and cancellations due to lack of progress on concrete resleepering (and standardisation). In Victoria, this neglect was exacerbated by the flawed privatisation of regional rail infrastructure in the late 1990s and absence of integrated, long-term asset management.

1.6 Cost

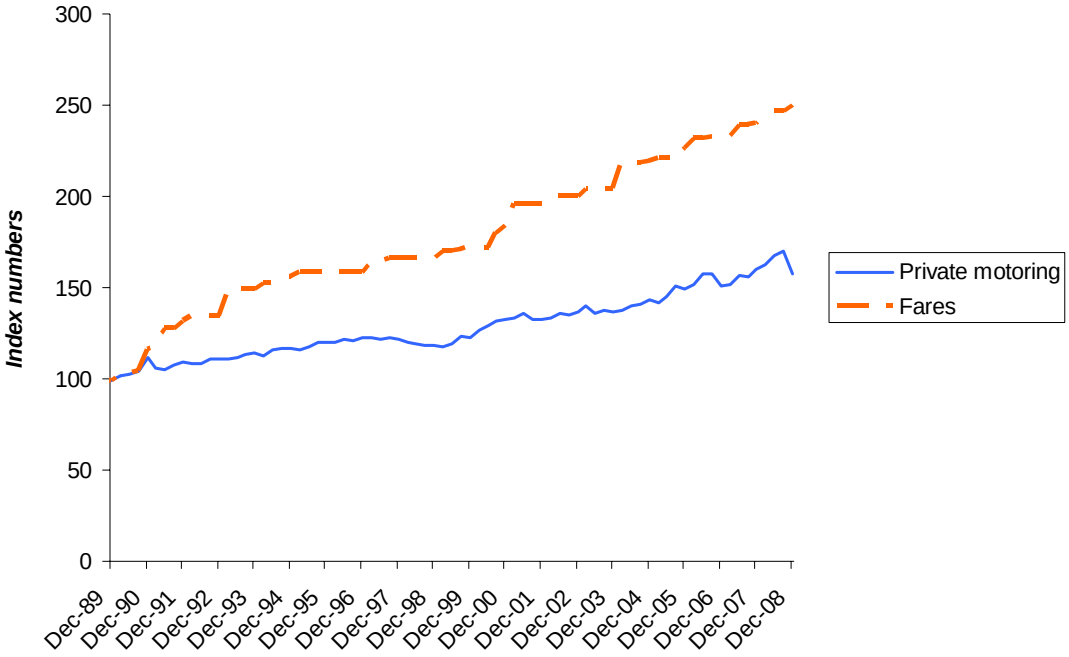
The cost of using public transport must compare favourably to car use to attract passengers. This goal is complicated by the undercharging of motor vehicles relative

to their full social costs including externalities such as pollution and congestion (see Section 5.1).

Public transport can be made more cost-competitive by offering generous discounts on periodical tickets, ensuring tickets are valid across all modes (i.e. train, tram, bus, ferry), and structuring fares around easily understood zones that cap fares at attractive levels.

Even before factoring in an above-inflation fare increase at the beginning of 2009 and two further large fare increases proposed under the Victorian Transport Plan, Melbourne's public transport fares have been increasing faster than the cost of motoring for many years (Figure 1.4).

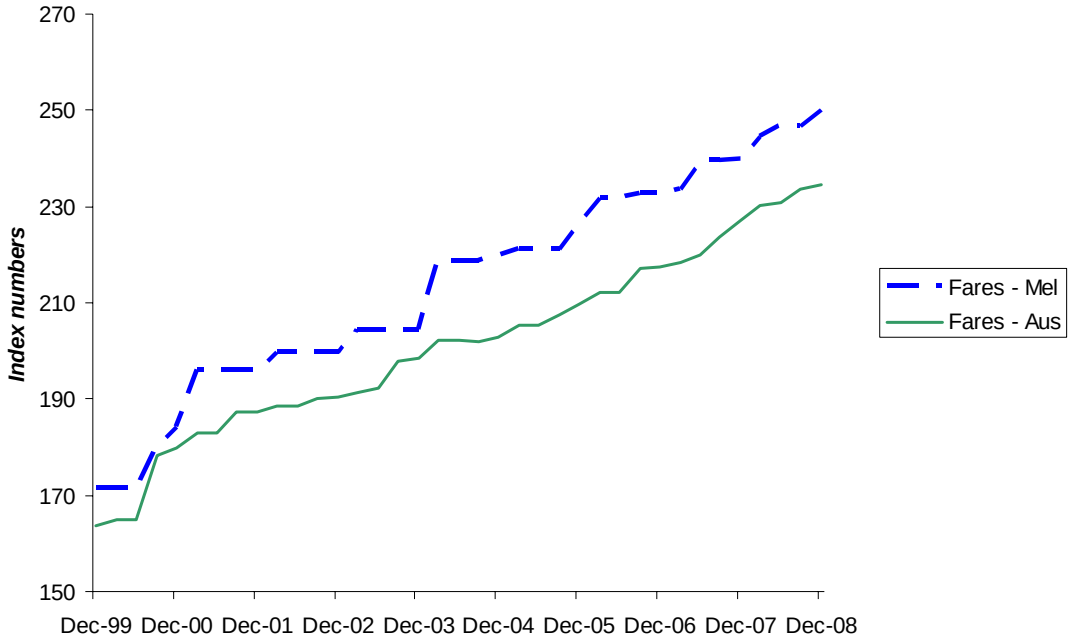
Figure 1.4: Comparison of public transport fare and motoring inflation - Melbourne



Source: Australian Bureau of Statistics

The loss of cost-competitiveness has been particularly acute since Melbourne's rail network was privatised. Since 1999, Melbourne's fares have grown significantly faster than those in other Australian cities (Figure 1.5).

Figure 1.5: Comparison of public transport fare inflation - Melbourne & Australian average



Source: Australian Bureau of Statistics

After years of claiming that privatisation was saving taxpayers money through more efficient operations, the Victorian Government has now admitted that it would cost no more to bring services back under public control (Lucas 2009).

1.7 Efficiency

To attract passengers, public transport must offer journey times that are competitive, conveniently located stops and effective coordination between services and modes to simplify transfers (Gray 1992, pp.625-626).

1.7.1 Vehicle speed

Category A rights-of-way generally offer the most competitive journey times by fully segregating public transport vehicles from general traffic (Vuchic 1999, pp.42-43).

Even where public transport vehicles must cross intersections at grade (i.e. Category B and C rights-of-way), active or dynamic signal priority as used in cities such as Munich can reduce delays for trams and buses by around 20 per cent[1].

Public transport in Australia is quite slow relative to general traffic speeds when compared to international cities (Booz & Co 2008, p.14). This relative speed (i.e. the ratio of the speed of public transport compared to the speed of cars), as distinct from the absolute speed of public transport, is a key factor in mode choice.

[1] http://www.rec.org/rec/programs/telematics/cape/goodpractice/trnsprt/doc/MUNICHBalance.doc

Table 1.1: Comparative speed of road traffic and public transport

	Melbourne	Sydney	Brisbane	Perth
Average road network speed (km/h)	43	36	50	46
Average road-based public transport speed in km/h (% of road network speed)	21 (49%)	21 (58%)	27 (54%)	25 (54%)
Average segregated rail transport speed in km/h (% of road network speed)	40 (93%)	47 (131%)	48 (96%)	50 (109%)

Source: Scheurer et al 2005

The relative speed of Melbourne's public transport compares particularly poorly against other cities, as shown in Table 1.1. Trams in Melbourne spend as much as one third of their time waiting unnecessarily at traffic lights (Morton 2007). Effective implementation of dynamic signal priority in Australian cities would go a long way to eliminating unnecessary constraints such as these. The relatively low proportion of Melbourne's public transport routes that are segregated from general traffic in terms of its urban area (Booz & Co 2008, p.14) highlights the need for more ambitious traffic priority measures to enhance the competitiveness of public transport.

Many regular bus and tram users will also be accustomed to sitting stationary at timing points mid-journey, or vehicle speeds that seem unnecessarily slow given traffic conditions, due to the service being ahead of schedule. This typically results from generous timetabling which gives services extra time to travel the route in case of delays caused by lack of traffic priority. While the generous timetabling may create an illusion of punctuality in performance statistics, it unnecessarily lengthens journey times for passengers and wastes operational resources. More extensive traffic priority, including dynamic signal priority, would reduce variability in bus and tram journey times, increase reliability, and reduce the amount of "fat" that needs to be built into timetables. In addition to more competitive journey times for passengers, this would also result in more efficient utilisation of capital assets and offer operating cost savings.

Regional and intercity rail services in Australia are generally very slow compared to best practice examples internationally. Long stretches of railway line used by passenger services in Victoria are restricted to speeds of only 80-90km/h, compared to extensive networks of high-speed railway in Europe allowing speeds in excess of 300km/h and travel times that are competitive with flying.

> "Now is a good time for the Commonwealth Government and the governments of New South Wales, Victoria, Queensland, South Australia and the Australian Capital Territory to examine why intercity passenger train services in Australia are inferior to those in European and high-income Asian countries, with a view to removing barriers to the emergence of high-quality inter-regional rail services in Australia."
> Garnaut Climate Change Review, pp.523-524

1.7.2 Transfers

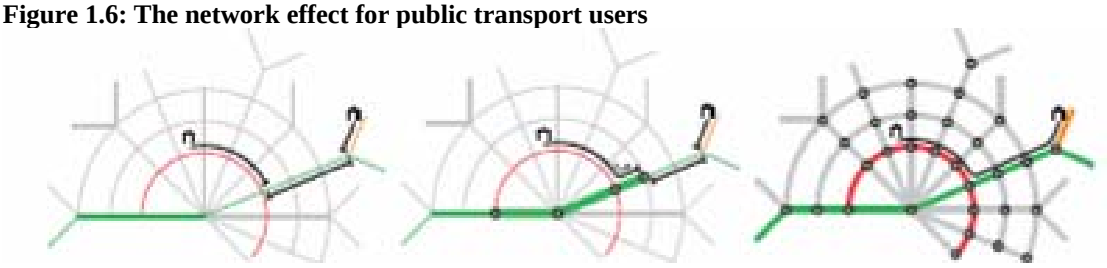
Given modern travel and land-use patterns, it is not feasible to offer scheduled public transport services that enable all passengers to travel from every point of origin to every destination without at least one transfer along the way. If public transport is to attract anything more than a small minority of trips, these transfers should be as easy and convenient as possible.

Waiting for connecting services can be a significant component of overall journey times. Passengers will be deterred from using public transport if waiting times are perceived as excessive or the physical environment of the interchange is unpleasant (see also Sections 1.2 and 1.3 above).

Waiting times can be minimised by operating frequent services and harmonising timetables so that connecting services meet each other rather than deliver passengers to an interchange moments after the connecting service has departed. An effective network effect (see Section 1.4 above), relies on frequent and/or co-ordinated services. Public transport frequencies in Melbourne are discussed in Section 1.4.3.

Where high frequencies are not viable (e.g. rural areas), services should be harmonised using "pulse timetables" in which services converge on an interchange at the same time to allow transfers with minimal waiting time despite the low service levels. Service coordination such as this is typically best achieved within an integrated public transport authority (see Section 6.1 - Governance below).

Figure 1.6: The network effect for public transport users



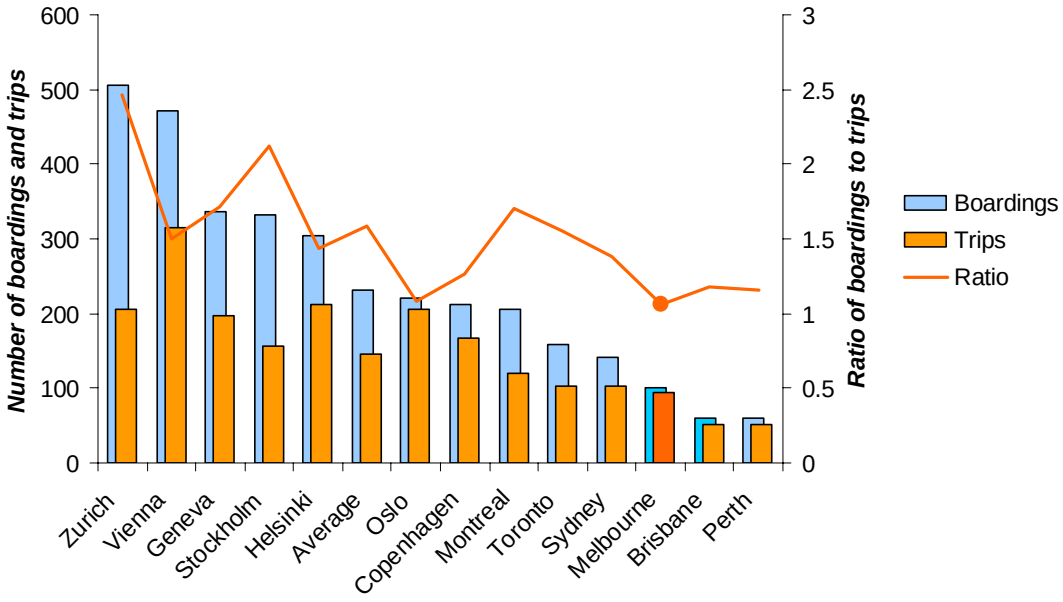
An unlinked collection of low-frequency routes (a non-network)
The area you can reach by a simple journey is restricted to walking distance from your closest line. Users need to have detailed information about timetables.
Transferring is difficult and crossing points have little value.

Some high-frequency services
Good service along high-frequency lines makes some transfers more attractive, but only in the direction towards the high-frequency service.
Increased frequencies on the best sections will do little to improve general conditions.

The full network effect
Many lines operating at high frequencies, or with coordinated timetables, create a network.
In the same way that motorists use intersecting roads, travellers can go anywhere, anytime.
Transfers open up many travel options.

Source: HiTrans 2005; Stone 2007

Figure 1.7: Ratio of Public Transport Trips and Boardings



Note: A larger difference between the number of boardings and trips indicates a greater proportion of linked journeys, i.e. journeys requiring transfers to connecting services. Despite multi-modal ticketing, linked journeys are relatively uncommon in Melbourne compared to cities with higher public transport modeshare, indicating a low level of integration.
Source: Scheurer et al 2005

2 Current and historical levels of public investment in private vehicle and public passenger transport services and infrastructure

A decade and a half ago, Laird (1994) pointed out that federal road funding over the previous two decades had dwarfed expenditure on intercity rail infrastructure and urban public transport.

Table 2.1: Commonwealth funding for transport 1973-74 to 1992-93 (1992-93 prices)

Rail (after loan repayments)	$3 billion
Roads	$31 billion
Urban public transport	$1.3 billion

Source: Laird 1994, p.ii

While the Commonwealth's road funding comfortably averaged over $1.3 billion per annum (1992-93 prices) over those two decades, the total urban public transport funding for the entire two decades of $1.3 billion (1992-93 prices) was concentrated around the Whitlam and Fraser governments' State Grants (Urban Public Transport) program of the mid-1970s and the Building Better Cities program of the early 1990s. In some years there was negligible federal funding of urban public transport or none whatsoever (Laird 1994, p.41).

Webb (2004) showed that Commonwealth road funding remained at similar levels through to the early 2000s while public transport funding largely dried up after the termination of the Urban Public Transport program in 1992-93 and the Better Cities Program by the Howard Government (Webb 2000, p.9). Federal road funding has since grown sharply (BITRE 2008), while public transport continues to be overlooked by the Commonwealth Government.

Russell (2008) points out that the historical bias towards roads has continued in recent times under AusLink and looks set to be maintained by future AusLink allocations. Russell also points out how state transport expenditure has been distorted by the imbalance in federal transport funding and the bias subsequently institutionalised in state bureaucracies.

Even where state governments make commitments to public transport improvements, there is a tendency to promise them as "future" commitments while continuing to direct most immediate funding towards roads. Although the Victorian Government's *Meeting Our Transport Challenges* (MOTC) document theoretically allocated a good proportion of the total package to public transport, many of the public transport proposals were in the distant future (PTUA 2006, pp.32-34) or poorly directed (ibid.). Meanwhile, many of the large road projects have already been completed or are nearing completion only three years later (Lucas 2008a; Property Council 2008). A number of the MOTC public transport proposals now appear to have been dropped in the government's latest Victorian Transport Plan which reveals where the true commitment lay in the earlier document (Lucas 2008b).

With the exception of Brisbane City Council, local government has generally played a minimal role in financing public transport in Australia. Local governments do, however, spend in the region of $2.5 billion to $3 billion per annum on roads (BITRE 2008).

In addition to public sector financing, governments have encouraged "off balance sheet" financing of major roads through Public Private Partnerships (PPPs) which have received generous government contributions and tax concessions. For example, the Commonwealth Infrastructure Bonds Scheme and Land Transport Infrastructure Borrowings Tax Offset Scheme provided tax concessions valued up to $20 million per annum (Treasury 2009), and the private operators of the EastLink and City Link tollroads in Melbourne continue to receive land tax exemptions from the Victorian Government worth about $27 million per annum. These tax expenditures are effectively subsidies for road construction funded by taxpayers in general.

Government facilitation of non-public sector expenditure on roads results in additional annual funding of up to $650 million in recent years (BITRE 2008). Examples include the $2.5 billion Eastlink motorway in Melbourne's eastern suburbs.

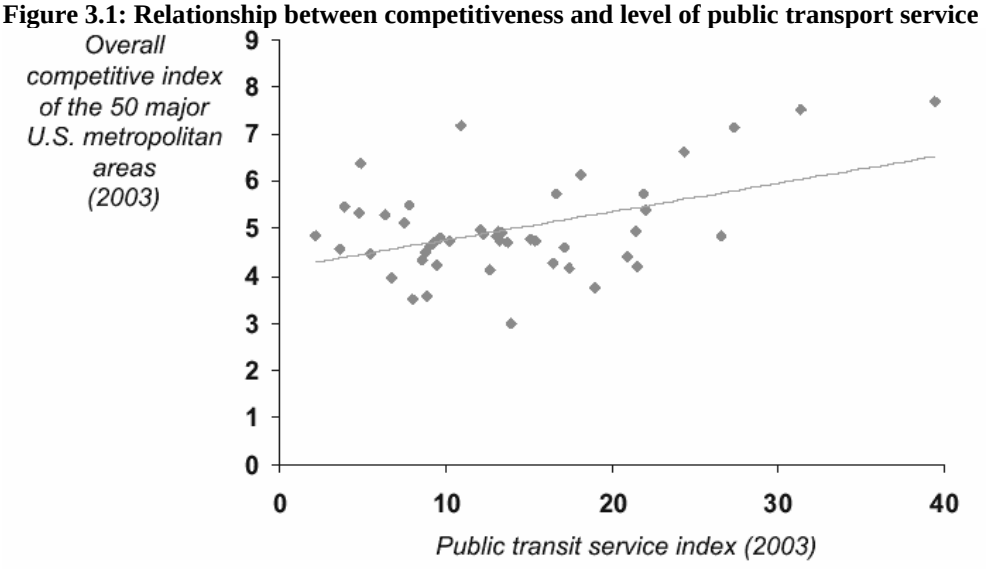
This long-standing expenditure imbalance must be recognised when considering current mode choice and travel patterns. Given the massive incentive to private motor vehicle use and disincentive to public transport use that this imbalance represents, it is almost a miracle that public transport is used at all.

3 An assessment of the benefits of public passenger transport, including integration with bicycle and pedestrian initiatives

3.1 Economic benefits

Effective public transport networks are an essential component of competitive, liveable regions. High quality public transport services are associated with the competitiveness of metropolitan areas in North America (Figure 3.1).

Figure 3.1: Relationship between competitiveness and level of public transport service



Source: Board of Trade of Metropolitan Montreal 2004

Expenditure on public transport also contributes more to local economic activity than automotive expenditure, and this effect is likely to be strengthened as Australia's domestic oil supplies continue their relentless decline (Table 3.1).

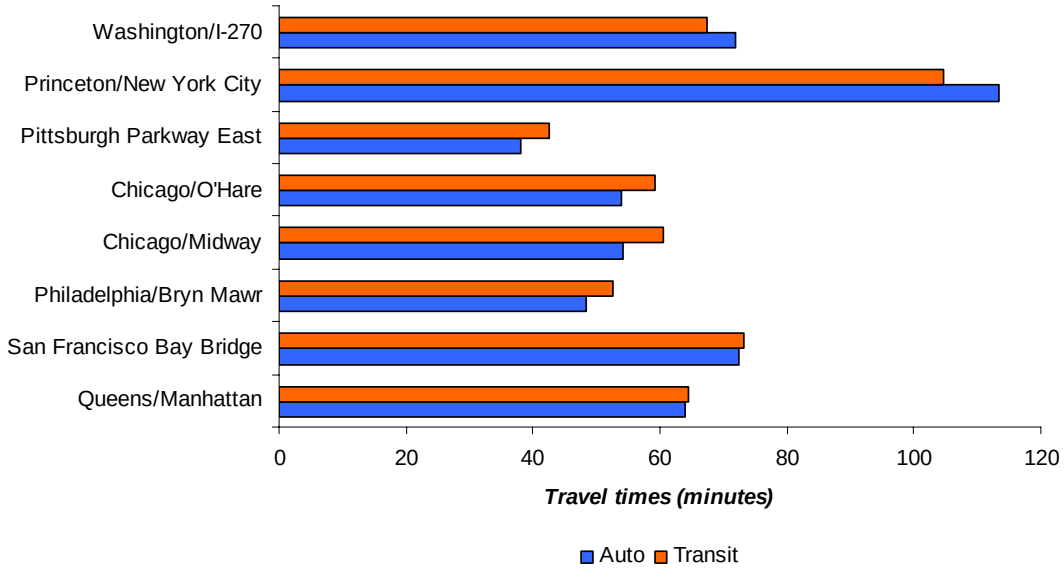
Table 3.1: Impact of $1 million expenditure

Expenditure category	***Regional income****	***Regional jobs****	***Full-time jobs#***
Petroleum			4.5
General automobile expenditure	$307,000	8.4	7.5
Non-auto consumer expenditure	$526,000	17.0	
Public transport	$1,200,000	62.2	21.4

** Analysis performed in Texas, USA (Miller et al 1999)*
 # Analysis performed in British Columbia, Canada (BC Treasury Board 1996 in Litman & Laube 2002)

Public transport's contribution to congestion minimisation can also belie its relatively small share of overall journeys. Traffic speeds on road corridors around the world have been shown to converge with that of the next best alternative (Figure 3.2).

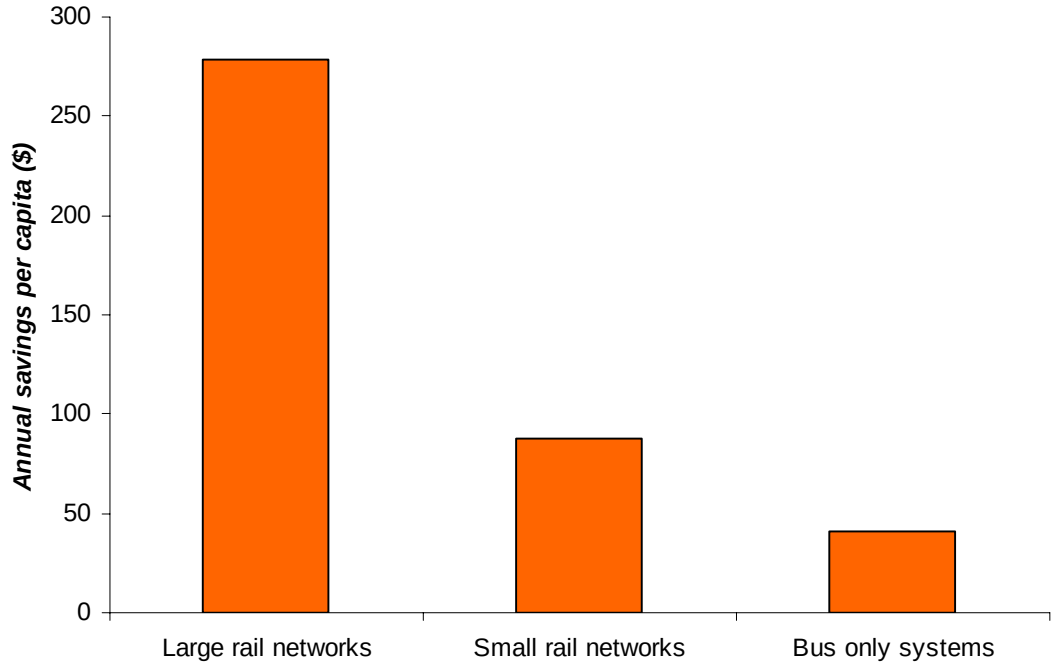
Figure 3.2: Door-to-door travel times for peak journeys



Source: Lewis & Williams 1999, p.112

This observable behaviour is entirely consistent with the *Downs-Thomson Paradox* which explains how road capacity expansion does not provide sustainable, long-term relief from congestion. Private motor vehicle journey speed is dependent upon the quality of public transport alternatives. Commuters will tend to switch to the mode offering fastest journey times, and alternatives to private car use will set the lowest acceptable travel speed for motorists. Public transport that is independent of general traffic speeds (i.e. grade separated mass transit systems), offer a "relief valve" for congested roadways that prevent deterioration of traffic speeds below that of the public transport alternative. This effect is evident in the greater congestion cost savings enjoyed by cities with extensive rail systems (Figure 3.3).

Figure 3.3: Annual congestion cost savings from transit



Source: Litman 2006, p18

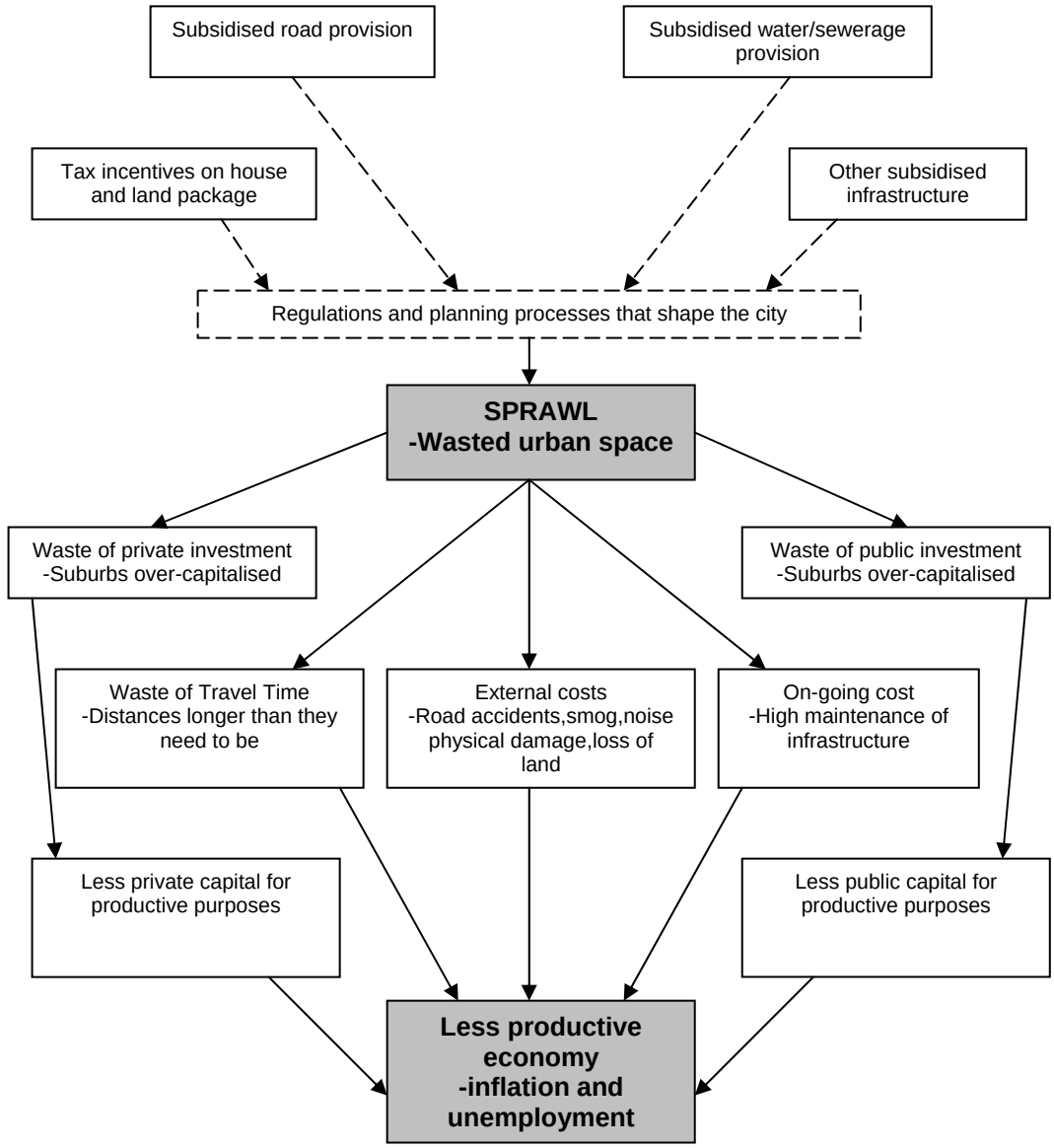
Attempts to cater for demand by increasing road network capacity have led to excessive and costly car-dependence in Australian cities. In many ways, poor urban design is simply another way of saying car-dependent urban design. According to Raad (1998), car dependence "is defined as a series of convergent land use and transportation conditions in a city that leaves people with few non-car options for urban travel".

The social, environmental and economic costs of such poor design are a huge burden on car-dependent communities and on governments that must deal with the consequences. We estimate the unrecovered costs or "road deficit" to be at least $15 billion per annum *excluding* congestion (Table 5.1).

The various external costs and opportunity costs resulting from poor urban design and car dependence divert resources away from more productive activities and reduce economic performance, as outlined in Figure 3.4.

> "Outside sparsely populated areas, the car is clearly less efficient than public transport. Based on the MDC city sample… per passenger x km transported, public transport consumes 2.25 times less energy and costs the community 1.75 times less than the car. The advantage of public transport is even greater when external mobility costs (eg. consumption of space, pollution, noise, traffic accidents) are taken into account"
> (Vivier, Pourbaix & Mohamed 2005)

Figure 3.4: Possible mechanisms linking excessive provision of roads, urban sprawl and economic problems



Source: Kenworthy, Laube, Newman & Barter 1997

Burchell & Mukherji (2003) also outline the negative economic impacts of urban sprawl and associated car-dependence. They found that such conditions led to increased expenditure on local infrastructure (eg. provision of utilities) and public services (eg. policing, street cleaning and waste management).

High car-dependence also leads to increased traffic congestion. The economic impacts of traffic congestion include a decrease in retail vitality as it deters visitors and shoppers (Lautso 2004, Litman et al 2002).

Annual household expenditure on transportation is also increased in areas of high car-dependence (Litman & Laube, 2002). This has several negative economic impacts. For example, the more household income that is spent on transport costs, the less remains to be spent in other consumer areas. This negative impact is further magnified

by the fact that the most significant of these transport expenses (the vehicle itself and the fuel) are mostly imported. Hence any economic benefits of increased car-dependence are felt predominantly offshore (Litman & Laube, 2002).

People living in areas further from the CBD with poor public transport coverage are more economically vulnerable to rises in oil prices (Dodson & Sipe 2006). As oil supplies become more scarce, sensitivity to fuel price increases will have increased economic impacts for both residents and real estate prices in outer-suburban, car-dependent areas.

Car dependent societies also limit access to employment and education for those who do not own cars (Social Exclusion Unit 2003). This will inevitably have significant long-term economic impacts.

3.2 Environmental benefits

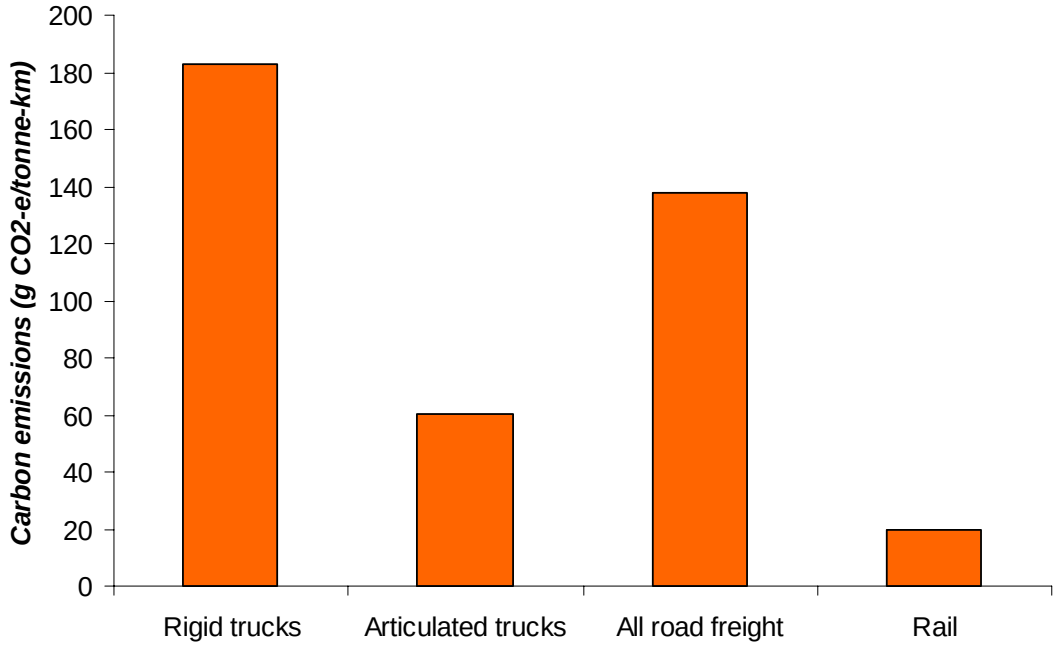
3.2.1 Greenhouse gas emissions

The negative environmental effects of car-dependence are evident in the Australian Government's own figures on climate change. According to the Australian Government Department of Climate Change (2008), the transport sector is currently the third largest source of greenhouse gas (GHG) emissions in Australia. Within the transport sector, road transport is the highest emitter of GHG's with an increase of 26 per cent in its emissions contributions since 1990. Of the road transport emissions, passenger cars contributed the highest emissions recording a 21 per cent increase since 1990 (DCC 2008). These transport emissions trends are totally incompatible with a safe climate, and there appears to be little prospect for vehicle efficiency alone to bring about emission reductions that are either deep enough or rapid enough to prevent climate disruption (PTUA 2008e).

Furthermore, at a societal level, transport is now the largest component of household GHG emissions, comprising 34 per cent of a household's emissions (Australian Government Department of Environment, Heritage, Water and the Arts 2009). The bulk of these domestic transport emissions come from the use of a private car for transport.

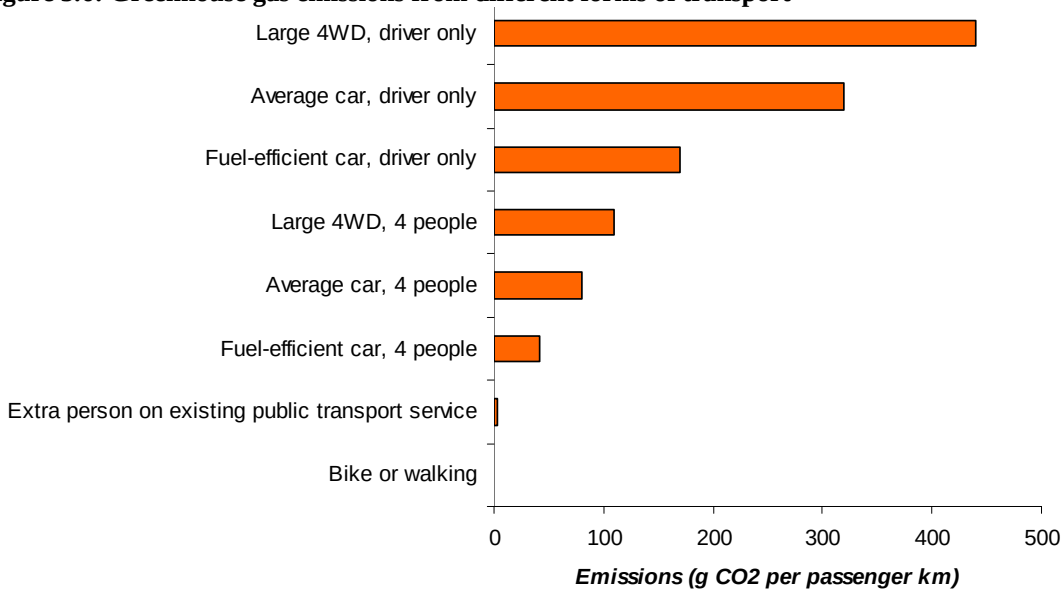
Such alarming figures indicate that current policy, such as the *Victorian Transport Plan*, is already hopelessly outdated and comprehensively fails to recognise the urgency of the situation or to commit to sufficiently ambitious measures to reduce car dependence and transport emissions. There are now clear signs that Australia will have to adopt much more ambitious targets than the current 60 per cent emission reductions proposed for 2050 (Debelle 2008; Hansen *et al* 2008). This will require greater use of rail freight (Figure 3.5) and a shift to walking, cycling and public transport (Figure 3.6).

Figure 3.5: Carbon intensity of freight transport



Source: Australian Greenhouse Office

Figure 3.6: Greenhouse gas emissions from different forms of transport



Source: Australian Greenhouse Office

Expenditure on expanding road capacity has induced more and more traffic and failed to provide sustainable relief from congestion (Litman 2007). In a carbon-constrained world, the current dominance of road transport will become a major economic burden for Australia and a significant deterrent to high-value industries that wish to minimise their climate risk.

3.2.2 Other pollution

3.2.2.1 Air pollution

In addition to the transport sector's significant contribution to GHG emissions, its effects on pollution (particularly air, water and noise pollution) are also considerable. Motor vehicles are the dominant source of urban air pollution (see Table 3.2) which is a major risk factor for a range of respiratory diseases and a trigger for asthma attacks. The blending of ethanol in fuel can also lead to increased emissions of acetaldehyde and formaldehyde, which is a highly toxic organic solvent. Ethanol blends also result in higher emissions of oxides of nitrogen which are a powerful GHG in their own right and also contribute to the production of smog.

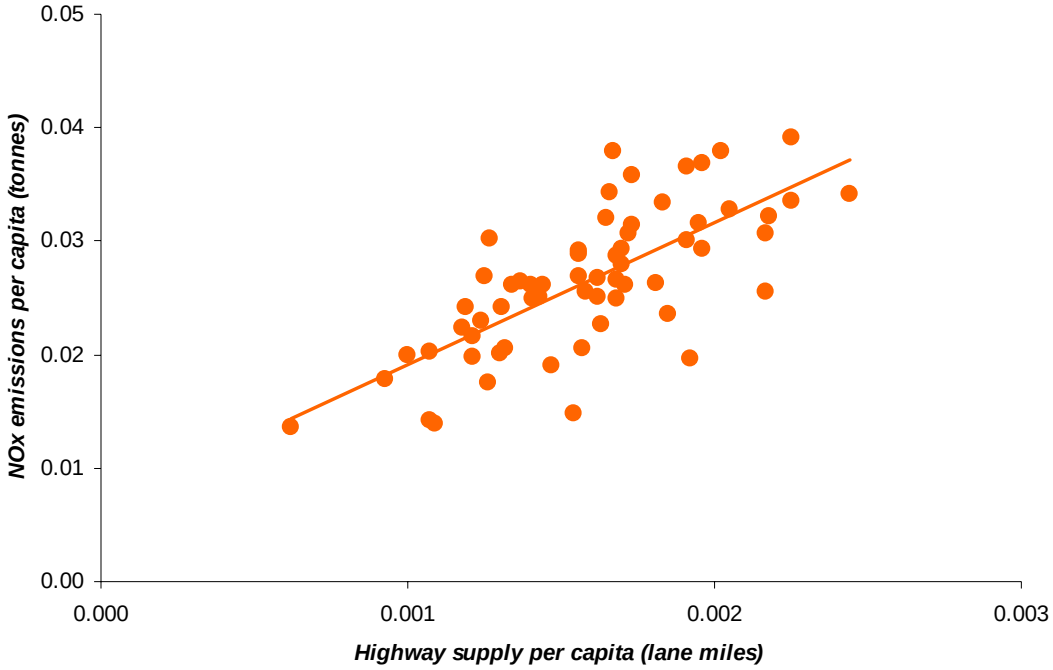
Table 3.2: Major air pollutants

Pollutant	Motor vehicle contribution	Effects and comments
Carbon monoxide (CO)	80%	Affects essential body processes and causes tissue damage.
Nitrogen oxides (NOx)	60%	Emphysema and cellular damage to throat & lungs. Combines with VOCs to form smog.
Volatile organic compounds (VOCs)	40%	Combines with NOx to form smog which causes eye, nose and throat irritation, and worsen heart and lung conditions.
Particulate matter (PM)	30%	Aggravate respiratory and cardiovascular disease, decrease lung function, exacerbate asthma. Recently linked with lung cancer.

Source: EPA Victoria

With Australia's population growing rapidly, especially in currently car-dependent urban areas, there is no room for complacency on air quality. Walking, cycling and electrified public transport produce no local emissions and the latter is able to source electricity from any primary energy source including renewables and geothermal. In contrast, large road networks are associated with higher pollution (Figure 3.7).

Figure 3.7: Relation between road supply and air pollution



Source: Cassady et al 2004

3.2.2.2 Water pollution

Water pollution is also caused by road transport. Road run-off is a major source of heavy metal pollution in stream systems, especially lead, zinc, copper, chromium and cadmium. Roads also accelerate water flows and sediment transport, which raise flood levels and degrade aquatic ecosystems (CfPT 2006).

3.2.2.3 Noise pollution

The contribution of road transport to noise pollution is highlighted in a recent survey the New South Wales Department of Environment and Climate Change (2009). They found that 46 per cent of people in NSW perceived local road traffic noise as problematic and that one in five people in Sydney were exposed to road traffic levels above those recommended by the World Health Organisation. In addition, noise from cars and trucks (which is responsible for about 70 per cent of noise in urban areas) can result in headaches, stress, sleep disturbance and high blood pressure (CfPT 2006).

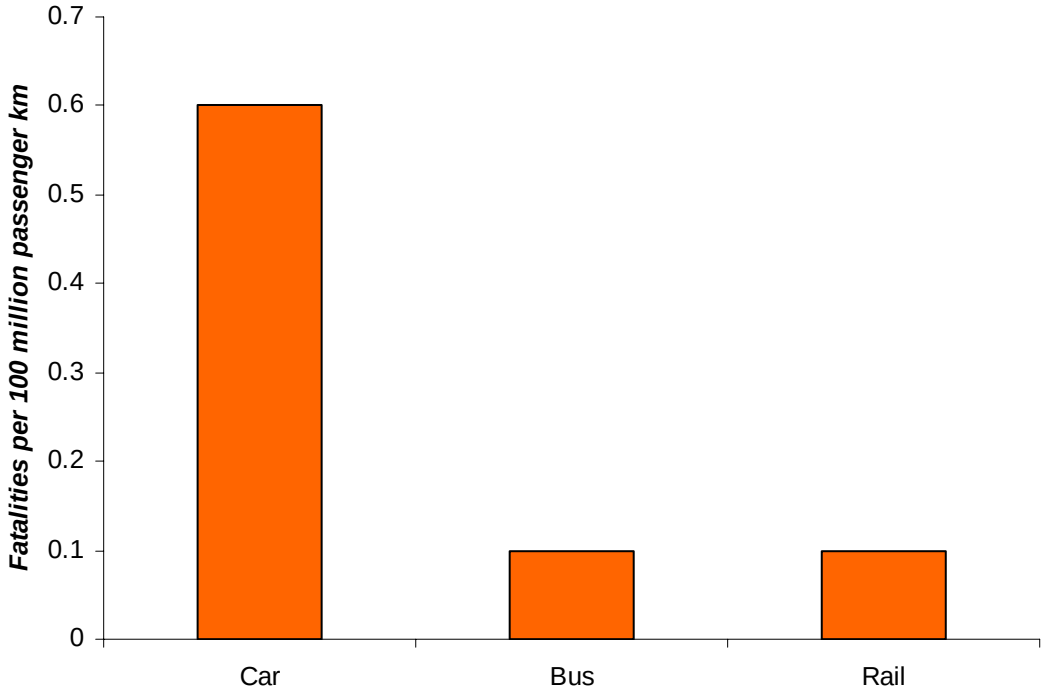
3.3 Social benefits

3.3.1 Health impacts

The direct and indirect health effects of car-dependence are stark. Road traffic injuries, diseases related to physical inactivity and urban air pollution are among the most significant adverse health effects of car-dependence and climate change

(Woodcock *et al* 2007). For example, annually in Victoria, approximately 400 people are killed as a result of road accidents, 6,000 are hospitalised and a further 17,000 are injured (Coalition for Public Transport 2006). Physical inactivity is contributing to the current obesity epidemic (Stubbs & Lee 2004) and air pollution contributes to increased mortality, heart attacks, non-allergic respiratory disease and has been possibly linked to lung cancer (Woodcock *et al* 2007).

Figure 3.8: Fatality risk by transport mode



Source: Australian Transport Safety Bureau

Furthermore, an Australian study by Chertok *et al* (2004), indicated that car commuters were exposed to the highest levels of Benzene, Toluene, Ethylbenzene, and Xylene (BTEX), toxic compounds emitted in petrol vapour. Meanwhile, train (light and heavy rail) commuters were exposed to the lowest levels of all pollutants measured. Walking and cycling commuters were exposed to significantly lower levels of BTEX than car commuters.

Further discussion of the health impacts of transport policy is included in Attachment A – *Moving Australians Sustainably* (PTUA 2007, pp.9-12).

3.3.2 Social inclusion

In such a car-dependent country as Australia, it is also pertinent to reflect that there are many groups within our society who are reliant solely on walking, cycling or public transport to meet their transport requirements. For example, in Melbourne around 1/3 of the population cannot drive. This includes: people who do not own a

motor vehicle; are too young to drive; have a disability affecting their mobility; or are elderly and have stopped driving for safety reasons (Coalition for Public Transport 2006).

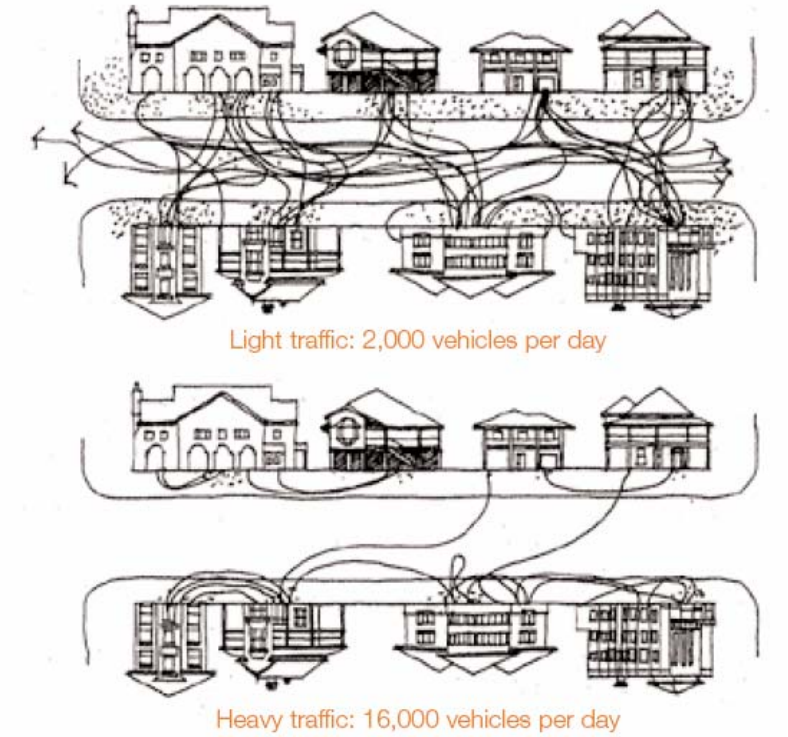
In a car-dependent society, groups, such as those above, are already experiencing significant transport disadvantage. Transport disadvantage contributes to social exclusion and difficulty accessing community resources such as employment, retail areas and health centres (Social Exclusion Unit 2003). Policies that further encourage car dependence will increase and exacerbate this existing inequality (Woodcock *et al* 2007). For example, people who may already be experiencing social isolation due to living on a very low income will be further excluded when living in a car-dependent neighbourhood (Harrington *et al* 2008).

Car dependence and traffic congestion also decrease social connectedness by causing community severance. Community severance occurs where pedestrians, cyclists or people with disabilities have difficulty crossing roads due to high traffic levels. The impact of community severance on social connectedness is illustrated clearly in Figure 3.9 below.

In contrast to the negative health and social effects of car-dependence, the benefits of public transport and its integration with walking and cycling are many. Firstly, public and active transport options positively influence community connectedness. Evidence suggests that neighbourhoods designed to encourage "walkability" are more likely to have higher levels of social capital (Baum and Palmer 2002). This is because there is greater opportunity for residents to spontaneously encounter each other and engage socially. In addition, residents of suburbs with high "walkability" are more likely to know their neighbours, trust others and participate actively in their community (Leyden 2003).

In addition, the health benefits of encouraging walking, cycling and public transport as modes of travel are well-documented. For example, Mason (2000) indicates that encouraging active and public transport has the dual health benefits of increasing individuals' physical activity whilst causing a decrease in GHG emissions (and subsequent negative health impacts). As increasing active transport also increases levels of physical activity, the subsequent risks of developing coronary heart disease, obesity, adult onset diabetes, depression and anxiety are lessened (VicHealth 2009).

Figure 3.9: Traffic levels and social relationships



Top: *2,000 vehicles per day: at relatively low traffic levels, residents engage freely with their neighbours, having on average 3 friends and 6.3 acquaintances in the street.*
Bottom: *16,000 vehicles per day: with high traffic levels, social engagement is limited and residents have only 0.9 friends and 3.1 acquaintances in the street.*
Source: Engwicht 1992

As walking and cycling are the major ways that people access public transport options, the integration of safe and accessible walking and cycling options with regular public transport options will increase people's ability to utilise non-car dependent transport options. Therefore, an integrated approach to reducing car-dependence is essential.

4 Measures by which the Commonwealth Government could facilitate improvement in public passenger transport services and infrastructure

4.1 Governance

As discussed in Section 6.1 below, effective governance incorporating all tiers of government is a fundamental pillar of effective transport planning. Integrated institutional arrangements are essential to ensure consistency between transport planning, land-use planning, the funding programs of each level of government, and transport infrastructure investment and service delivery.

The Commonwealth Government could drive improvements in transport investment and service delivery by making federal funding conditional upon best practice integrated transport and land use planning, including the establishment and maintenance of statutory regional public transport authorities modelled on those in best-practice cities discussed in Section 6 below. Such agencies are not without precedent in Australia. TransPerth has successfully delivered a large rollout of improved public transport services in Perth. VicRoads has very successfully driven an agenda of road network expansion in Melbourne with Commonwealth cooperation. The effectiveness of such bodies has also been recognised in Queensland with the announced establishment of a regional authority for Brisbane.

The Major Cities Unit appears to be the logical place to locate responsibility for the Commonwealth's involvement in such regional authorities since the Unit is intended to "provide a more coordinated and integrated approach to the planning and infrastructure needs of major cities"[2].

4.2 Financing

Although the expected allocation of funding to public transport from the Building Australia Fund is a welcome development, public transport still appears to be excluded from the Commonwealth's centre-piece land transport funding program, AusLink. This exclusion makes a mockery of AusLink's claimed "integrated" approach that will supposedly meet passenger needs "irrespective of the transport mode" (DoTaRS 2004, p.ix).

This arbitrary exclusion not only denies public transport access to a major federal transport funding program for much need network expansion and upgrading, but also distorts state transport expenditure by drawing state funding towards those projects that are eligible for matching Commonwealth grants - i.e. AusLink-eligible projects which effectively excludes public transport (Russell 2008).

[2] http://www.infrastructureaustralia.gov.au/mcu.aspx

The Inquiry into Australia's future oil supply undertaken by this Senate committee recommended in 2007 that AusLink "corridor strategy planning take into account the goal of reducing oil dependence" and that "existing Auslink corridor strategies should be reviewed accordingly". Prior to that, the House of Representatives Standing Committee on Environment and Heritage made a number of similar recommendations as part of its Inquiry into Sustainable Cities, including that:

- the Department of Transport and Regional Services, in consultation with the Department of the Environment and Heritage, investigate options to extend the Roads to Recovery programme to include other modes of transport as a step towards including sustainability in the funding criteria;
- the Australian Government significantly boost its funding commitment for public transport systems, particularly light and heavy rail, in the major cities; and
- the provision of Australian Government transport infrastructure funds include provision of funding specifically for sustainable public transport infrastructure for suburbs and developments on the outer fringes of our cities.

With both of these previous bipartisan inquiries highlighting the need to give public transport equal access to federal transport funding, the time is now ripe to expand AusLink to include urban and regional public transport and active transport networks, and to reduce our nation's oil vulnerability.

Specific proposals for investment have been outlined in our submissions to other fora (e.g. PTUA 2008c, pp.5-15), however it is important for all transport planning and implementation to be undertaken under best-practice governance arrangements as discussed below (Section 6.1).

5 The role of Commonwealth Government legislation, taxation, subsidies, policies and other mechanisms that either discourage or encourage public passenger transport

5.1 Road deficit

As mentioned in Section 1.6 above, public transport must compete with motor vehicles that are not charged for their full social cost including externalities such as emissions and congestion (PTUA 2008a, p.2). This puts public transport at a competitive disadvantage and is a key factor underlying the development of unsustainable transport and land-use patterns.

Table 5.1: The road deficit (not counting congestion costs)

Annual costs imposed by road users		**Annual revenue collected from road users**	
Item	***Expenses ($million)***	***Item***	***Revenue ($million)***
Road construction & maintenance	9,000	Excise (net of rebates)	9,900
Land use cost	6,000	GST on fuel & vehicle	4,000
Road trauma	17,300	Registration fees	3,500
Noise	700	Insurance premiums	10,400
Urban air pollution	4,300	Tolls	800
Climate change	2,900	Other revenue	2,300
Tax concessions	5,800	Total (2)	$30,900
State fuel subsidies	600		
Total (1)	$46,600	Road deficit (1-2)	$15,700

Source: http://www.ptua.org.au/myths/petroltax.shtml

The magnitude of this road deficit is exacerbated by the large scale of road expenditure across all three tiers of government and the under-recovery of this expenditure through motor vehicle taxes and charges. The existence of a road deficit is a drain on government finances which limits the resources available to other portfolio areas such as health, education and regional development, and places upwards pressure on other taxes such as income tax, stamp duty and land tax.

5.2 Taxation

Kraal, Yapa & Harvey (2008) found that the statutory formula for valuing motor vehicle fringe benefits encourages employees to undertake additional driving to obtain more favourable tax concessions. This additional driving results in unnecessary congestion, pollution and business costs as well as discouraging use of alternatives such as public transport.

This perverse distortion is not effective at serving public policy objectives (Warren 2006, pp.19-20) and has been criticised by groups ranging from environment organisations and accounting professional bodies through to state governments and

parliamentary inquiries. The Commonwealth Government should make it a priority to replace the statutory formula with an approach that encourages the minimisation of motor vehicle use while also redirecting the $2 billion cost of this taxation expenditure to direct investment in public transport and active transport improvements.

5.3 Expenditure

As mentioned above, Russell (2008) identified entrenched institutional bias towards roads in state transport bureaucracies and a heavy imbalance in favour roads under AusLink. Despite the theoretical ability of Building Australia Funds to be invested in public transport, the dominant role of these state transport bureaucracies in undertaking the national infrastructure audit has ensured that roads continue to dominate infrastructure proposals.

This bias should be remedied by giving urban and regional public transport at least equal, and preferably priority[3], access to AusLink funding.

[3] Priority access is arguably justified by the major "catch-up" required following decades of imbalance in funding outlined in Section 2, in addition to the pressing carbon constraints of climate change and peak oil.

6 Best practice international examples of public passenger transport services and infrastructure

Kennedy *et al* (2005) found that sustainable transport relies upon the presence of four key pillars, namely governance, financing, infrastructure and neighbourhoods. While noting that all four pillars are required for success, they also recommend that the pillars be pursued in order starting with governance, through financing, infrastructure and then on to neighbourhoods (Kennedy *et al* 2005, p.410). To support this prioritisation they note, for example, that "[w]ithout suitable regional governance, it is hard to see how either integrated land-use planning or sustainable funding mechanisms can be achieved" (Kennedy *et al* 2005, p.410).

6.1 Governance

Colin Buchanan and Partners (2003) found a range of anecdotal and circumstantial evidence regarding the importance of a regional transport authority. Examples cited where the regional body enabled or expedited important improvements included:

- Integration of urban and interurban bus services, and the creation of an integrated public transport tariff system (Helsinki, Madrid and Arnhem-Nijmegen in the Netherlands);
- Reversal of long-term downwards trends in public transport patronage (Madrid and Berlin) and growth in public transport patronage (London);
- Metro extensions, and integration of public transport services (Stockholm);
- Reduced operating costs for public transport (Berlin); and
- The delivery of major improvements to bus services (Berlin and London).

MVA (2005a, p.84) noted the importance of integrated ticketing and passenger information to make public transport easy to use. Such a goal is well-served by integrated institutional arrangements.

WS Atkins (2001, pp.47-55) also found that a single public transport authority and regional planning and coordination were key essential features of best practice. For example, they noted that that cities they studied "have benefited from the creation of a single public transport authority responsible for planning routes and timetables and developing and managing common tariffs" (WS Atkins 2001, p.33), and that such authorities "had contributed to a more holistic approach to transport infrastructure, for example, that ensures that new stations have provision for cyclists, bus stops have shelters, seating and passenger information, etc that makes public transport easier and more pleasant to use" (WS Atkins 2001, pp.52-53).

WS Atkins also found effective regional governance arrangements to be crucial in rural areas, including decentralisation of planning and modal integration (WS Atkins 2001, pp.61-65).

In many rural areas of Australia, a range of transport services are provided by various government agencies including school buses, scheduled public transport services for the general public, non-critical patient transport, community transport and subsidised taxi services. Effective integration of transport provision at the local level could

leverage the resources available and deliver substantially higher service levels (PTUA 2008b, pp.24-25).

> "One of the biggest challenges to implementing sustainable urban travel strategies is that of overcoming institutional and organisational barriers… Creation of a single [regional] entity may go a long way to furthering institutional co-operation, not only among planning agencies, but also with other municipal institutions such as local police for enforcement of, for example, parking and traffic policies. A number of urban areas around the world are looking to co-coordinated structures for solutions to tackle their travel problems, among them, Atlanta and Dublin." (ECMT, 2002:36.)

Colin Buchanan and Partners (2003, p.85) found that "in no region or city that can be considered to be delivering better or exemplary practice in transport policy implementation is the local roads-based public transport system deregulated". MVA (2005b, p.38) point out that Nottingham Council's decision not to sell the council-owned bus company in the late 1980s is "a key factor in its success". They attribute this to the "large Council stake in the company [providing] a mix of public transport expertise and local interest to maintain a commitment to the bus network in the city".

Van der Maas (1998, p.64) noted that "the regional organisation must have the power to implement things, and autonomy", however that success was contingent upon a combination of factors, such as supportive land-use and traffic restraint policies, as Kennedy *et al* (2005) also found.

As observed by Colin Buchanan and Partners (2003, p.29), "There is no region that has achieved better practice in transport delivery in Europe that is without a regional body".

MVA (2005a, p.84) noted a key lesson from world cities was the need to "resist urban sprawl to slow the trend in rising journey lengths and development in areas that are not served by public transport as these factors lead to increased car use".

> "All of the cities are trying to integrate transport and development planning, but this is sometimes hampered by institutional structures which split responsibility for transport and land use and the timing of delivery. In Zurich, the regional and state objectives are closely aligned and care has been taken to ensure that new development is 'sustainable' with mixed use and good public transport links in place." (MVA 2005b, p.69)

6.2 Financing

Colin Buchanan and Partners (2003, p.25) note that transport funding must "be spent on services and infrastructure that relate to [transport policy] objectives (e.g. spend the money on public transport if the objective is to increase use of public transport)."

MVA's (2005a, p.82) study of world cities found availability of funding to be a key factor and that integrated planning is crucial and that "all the cities have had access to high levels of funding from national, regional and local sources".

WS Atkins (2001, p.47) also found funding of public transport to be a key essential feature to encourage sustainable transport outcomes. Furthermore, they noted that "stronger commitment to addressing and implementing transport at a regional and sub-regional level is only likely to be achieved where funds and implementation responsibilities for area-wide policies are vested in regional authorities" (WS Atkins 2001, p.51).

Of great relevance given current economic challenges however, MVA (2005a, p.82) added that "the declining availability of future funds or greater pressure to reduce spend, has helped to raise the importance of demand management".

MVA (2005b, p.67) noted that public transport tends to be a better use of scarce funds: "Comparison of the investment programmes of the cities indicates that the share of expenditure devoted to public transport appears to increase as the total level of investment falls. Major highway improvements require high levels of spending, which are considered unnecessary, undesirable, or perhaps just impossible, in some cities."

"Depending on the current level of congestion and environmental conditions, cities are seeking to get the best use out of the existing road system, by managing traffic, reducing speed limits, increasing priorities for public transport services, and improving conditions for residents, walkers and cyclists." (MVA 2005b, p.69).

Vivier (2006, p.9-12) found that the cost of transport to the community falls as the proportion of journeys made by walking, cycling and public transport increases.

6.3 Infrastructure

MVA (2005a, p.72) noted that most world cities and large comparator cities "have come to view continued spending on highways as no longer feasible because of a number of factors including the lack of available land, unacceptable environmental impacts, and recognition that increasing capacity generates additional demand". The one exception to this, Tokyo, is notable as the only city of the group witnessing a shift of journeys away from walking and public transport towards driving (MVA 2005a, pp.75-76).

Initially, infrastructure investment should be targeted toward areas and corridors where there is currently little capacity for carrying large numbers of people by public transport. Examples in Melbourne include the City of Manningham (the only municipality without any fixed rail infrastructure), the City of Knox, Melbourne Airport, and the growth corridors of Whittlesea and south Casey.

6.4 Neighbourhoods

> "Investing in major infrastructure alone, however, is likely to be ineffective unless accompanied by actions at the local scale. There are many local policies and smallscale investments that might improve the attractiveness of walking, cycling and transit use. Although there is contention in the literature, these local actions may potentially boost ridership on more environmentally sustainable transportation modes, ensuring that major investments are cost effective. This attention to detail at the community scale, while concurrently planning major transportation corridors, lies at the heart of successful integrated land-use transportation planning." (Kennedy *et al* 2005, p.395)

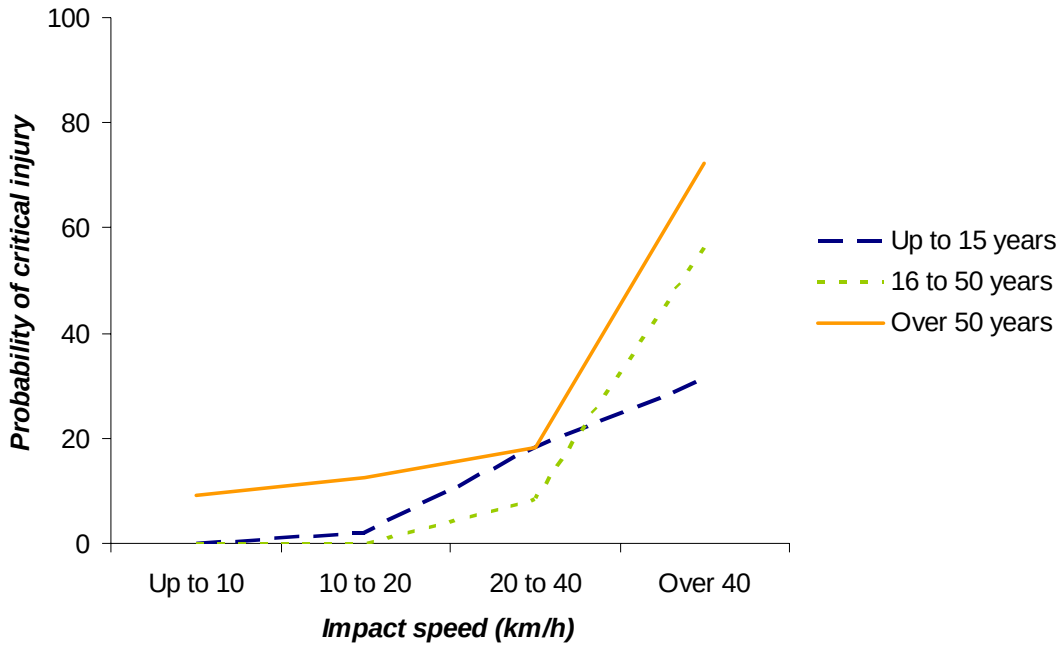
MVA's (2005a, p.82) study of world cities also found integrated planning to be crucial and that "the cities that have had greater success in reducing car dependency have adopted a combination of public transport, land use and traffic restraint policies." The importance of public transport improvements to increase public acceptability of traffic restraint measures was also noted by MVA (2005a, p.82).

Colin Buchanan and Partners (2003, p.29) identified measures "such as traffic calming, pedestrianisation and car park charging - that restrain car use; and land-use planning that complements public transport use" as "particularly helpful in the attainment of mode shift objectives".

WS Atkins (2001, p.22) found that balanced use of road space was a common theme among best practice examples of integrated transport in Europe, including in rural areas (WS Atkins 2001, p.66). This included:

- 30km/h speed limits in urban areas, villages and towns to improve actual and perceived safety (Figure 6.1),
- pedestrianisation to improve amenity for people walking and cycling and strengthen economic vitality, and
- better provision for cyclists to produce a more comprehensive and connected network that allows people to (safely) leave their car at home.

Figure 6.1: Probability of critical injury by age and impact speed



Source: McLean et al 1994

6.5 Common themes

The following cities have been identified as representing good or best practice:

- Madrid, Spain;
- Barcelona, Spain;
- Jonkoping, and Sundsvall, both in Sweden;
- Berlin-Brandenburg, Germany;
- Copenhagen, Denmark;
- Helsinki, Finland;
- Stockholm, Sweden;
- London, UK;
- Munich, Germany;
- Zurich, Switzerland; and
- Vancouver, Canada.

(Colin Buchanan and Partners 2003, p.4)

The characteristics of these cities in terms of the four fundamental pillars of sustainable transport are summarised in Table 6.1.

Table 6.1: International examples of best-practice transport management

City	Governance	Funding	Infrastructure	Neighbourhood
Madrid, Spain	Regional transport consortium (CRTM) comprising national, regional and municipal governments, and representatives of operators, trade unions and consumer groups. Undertakes infrastructure planning, modal and fare integration, marketing and influences land use planning.	Jointly funded by national, regional and municipal governments in the consortium.	Undertaken significant expansion of metro system, electrified suburban rail network and renewed rolling stock, construction of improved multi-modal interchanges, substantial increase in bus services.	Regional transport consortium has some influence on strategic land-use planning. Pedestrianisation and traffic calming schemes being pursued.
Barcelona, Spain	Voluntary consortium (ATM) between regional and municipal governments. Formed to coordinate public transport, integrate fares, services, interchanges and marketing. Also undertakes infrastructure upgrading, setting and monitoring service standards and general management of public transport.	Funding from national, regional and municipal governments, as well as European Union.		City of Barcelona pursuing supportive land-use and transport policies, however outer municipalities less supportive, hence public transport ridership for urban area steady. Access controls to restrict car use, reduced car parking, pedestrianisation.
Jonkoping and Sundsvall, Sweden	Regional public transport bodies which procure regional rail and bus services and ensure integration of services and fares.	Funded by national government (rail) and counties (buses).	Investment in modern, low-floor buses, traffic signal priority and on-street bus priority measures.	
Berlin-Brandenburg,	Coordination of local and	Funding from constituent		

Germany	regional public transport undertaken by Berlin-Brandenburg transport community (VBB). Regional train services operated by state governments (Laender).	Laender, cities and counties. National rail services delivered by federal government.		
Copenhagen, Denmark	Greater Copenhagen Authority coordinates, develops and conducts region's transport, develops and implements regional plans and traffic plans. Strong support from central government.	Funded by county income taxes and national government, as well as land sales along new metro lines.	Recent developments include Orestad metro, higher quality bus links, rail link to Sweden and rolling stock replacements.	Long-standing integration of land-use and transport. Supportive policies such as pedestrianisation, traffic calming, parking policy and cycling policy.
Helsinki, Finland	Helsinki Metropolitan Area Council (YTV) produces a transport system plan in collaboration with municipalities, including investment and implementation plans, approves fare structures, procures inter-municipality bus services and tram and metro services, provides customer information and allocates subsidies.	Funded by national government and cities.	Measures include upgrade of bus routes to tram or metro, high quality orbital bus services on reserved rights of way, new rail lines and bicycle parking at stations.	Supportive parking policy, especially in central Helsinki.
Stockholm, Sweden	Regional public transport body (SL) responsible for translating Stockholm County transport objectives	Funded by Stockholm County Council. National government contributes to large projects.	Recent projects include metro extensions, rolling stock replacement, implementation and	Supportive parking policy, integrated land-use and transport planning including concentrating development

	into operational plan.		expansion of light rapid transit.	along rail lines.
London, UK	Transport strategy implemented by regional transport agency, Transport for London (TfL).		Expansion of Underground, light rail and tramways, new buses and priority measures.	Parking and traffic restraint, walking and cycling strategies.
Munich, Germany	Munich Planning and Tariff Union (MVV) integrates ticketing and timetables as well as planning, research, budgeting, marketing and promotion. City of Munich, districts and Bavarian regional government are stakeholders in MVV.	Funding received from the City of Munich, the Bavarian regional government and surrounding districts. Transport funding geared heavily towards public transport ahead of roads.	All areas not within 600m of a metro station and 400m of a tram stop are served by feeder buses.	Traffic and parking restraint, speed restrictions, pedestrianisation, integrated land-use planning.
Zurich, Switzerland	Regional public transport body providing integrated, multi-modal ticketing,			Traffic restraint, high parking costs, strong public transport priority, integrated transport and land-use planning.
Vancouver, Canada	Greater Vancouver Transportation Authority (TransLink) plans and finances regional transport across the Greater Vancouver Regional District. Services are delivered by TransLink subsidiaries and contractors.	Range of tax revenue sources including hypothecated fuel tax, utility bill levy, property tax and parking tax.		Densifying land-use. *Livable Region Strategic Plan* prioritises road users in the following order: 1. walking 2. cycling 3. public transit 4. goods movement 5. automobiles

Source: Colin Buchanan and Partners 2003, MVA 2005a, WS Atkins 2001

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