Enhancing Victoria's Liveability

Submission to the Inquiry into Enhancing Victoria's Liveability

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PUBLIC TRANSPORT USERS ASSOCIATION

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1 What is liveability?

The terms 'liveable' and 'liveability' are widely used and abused and are often used interchangeably with terms such as 'quality of life' (Rogerson 1999; Brook Lyndhurst 2004, p.5). Although a set of seemingly objective themes permeate most discussions of liveability (e.g. standards of health care, education, infrastructure), the 'quality of life' experience for most people is ultimately personal and subjective (Helburn 1982; Risser *et al* 2003) and can vary unrecognisably within the same broad location due to factors such as income inequality and mobility impairment (Rogerson 1999, p.982; Atkinson 2006).

Liveability could therefore be thought of as the interplay between various environmental, geographic, demographic, social, cultural and economic factors that contribute to personal quality of life outcomes for the heterogeneous inhabitants of a city or region. Any definition of liveability must also explicitly recognise the fundamental requirement to live within ecological limits otherwise the ability of a location to support life of any quality will be fatally undermined.

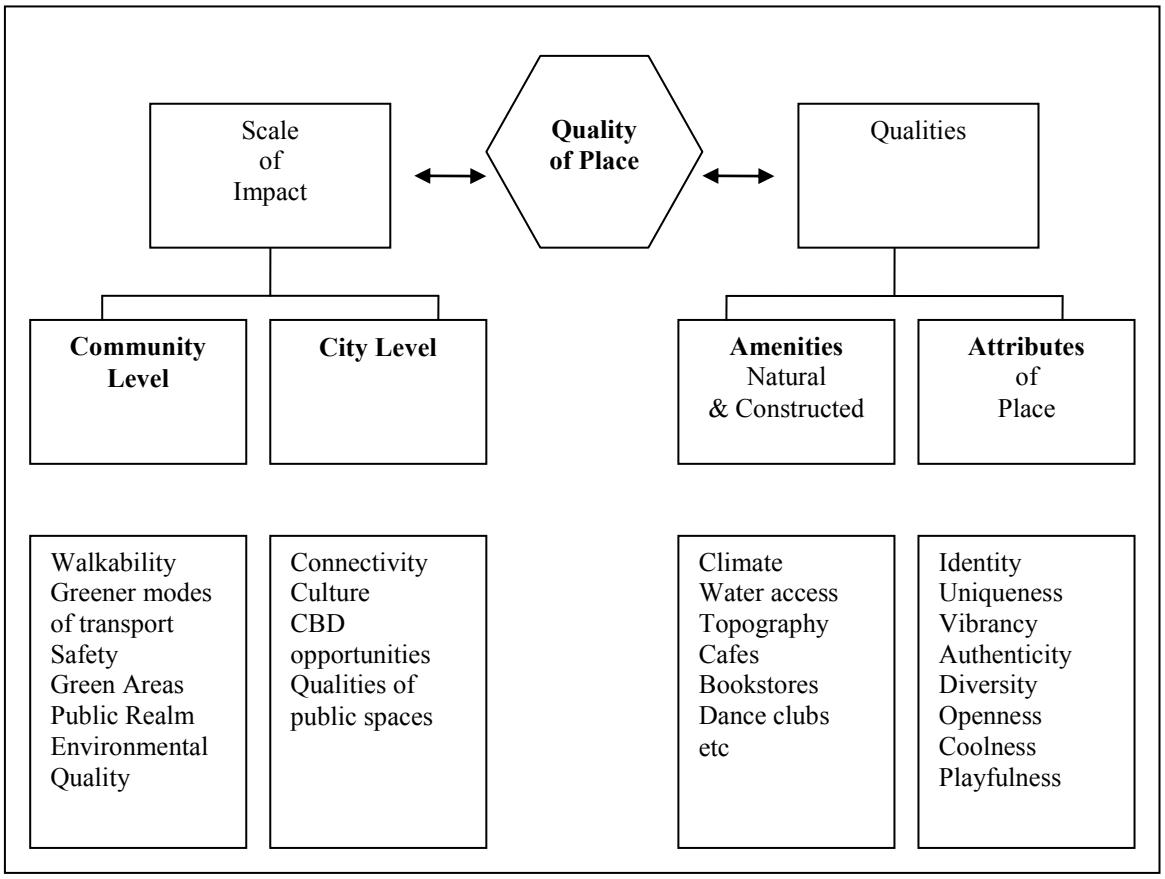
If the concept of liveability is to have any value beyond a quick and simple indicator of destination quality (for people and/or capital), and if a good liveability rating is to be maintained beyond the short term, the factors underlying liveability must be understood and monitored separately on an ongoing basis. In some cases the liveability outcomes being measured may not be one and the same as the underlying determinants of that outcome. In other words, a single composite measure of liveability is largely useless for policy making. Performance on individual components of liveability and the factors influencing them must be monitored, and underperformance acted upon in order to make any difference to peoples' lives and to maintain a healthy composite score over the longer term.

Since quality of life is such a subjective matter for the providers of skilled and productive labour, the range of components that are monitored must not be restricted just to environmental attributes[1], but also extend to broader measures of well-being so that ostensibly good 'quality of place' measures do not mask underlying concerns held by the people whose quality of life we are endeavouring to advance.

Baum *et al* (2007) have synthesised a number of frameworks for describing the components of quality of place into the following diagram (Figure 1.1). Table 6.2 also lists some less tangible items.

[1] In the broader sense including the built environment, and cultural and social environment.

Figure 1.1: Dimensions of urban quality



Source: Baum et al 2007

The inadequacy of current transport measures and approaches to address issues raised in this submission lead us to conclude that there is poor integration between policies influencing Victoria's liveability. For example, while new housing developments are springing up around Melbourne without adequate access to high performance mass transit, a procession of costly motorways are being built or proposed in a vain attempt to deal with the consequent car dependence and congestion.

2 Liveability and competitiveness

2.1 Linkages between liveability and competitiveness

There is evidence that location (beyond simple indicators such as access to infrastructure) can be a part of a firm's competitive advantage, although clearly a 'good' location is no guarantee of competitiveness and success by itself. In contrast to firms seeking the lowest cost factors for producing undifferentiated goods and services, 'embedding' into a potentially higher cost location can provide advantages to a higher value or differentiating firm. For example, the availability of trusted suppliers and sub-contractors can reduce costs and risk for firms (Cox 1995).

2.1.1 Attracting and maintaining a healthy and productive workforce

Diversity and proliferation of business opportunities depends on the ability of a city to attract and maintain a diverse workforce. This means that at one end of the spectrum the city needs to attract workers who will demand high wages and diverse, challenging work opportunities; at the other end it will also need to cater for unskilled workers who require low-cost housing, utilities and food.

The existence of a large pool of skilled and creative workers helps firms to innovate and maintain competitive advantages in areas such as technology and design. Rather than this being a firm specific advantage, the existence of a talented skills pool within a location can aid cross-fertilisation of ideas and skills across firms and aid competitiveness of the area as a whole.

The existence or otherwise of a skilled pool of creative workers will be the result of a number of factors including the local education system and industry structure. While demand for skilled workers will obviously be a key factor in attracting talent from outside the area and retaining the talent that is already there, lifestyle issues will also be a strong influence on locational decisions. Firms contemplating investment will make their recruitment and retention task a great deal easier if they locate in an area seen as desirable among their target workforce. As Florida (2005, p.4) notes: "Wherever talent goes, innovation, creativity, and economic growth are sure to follow".

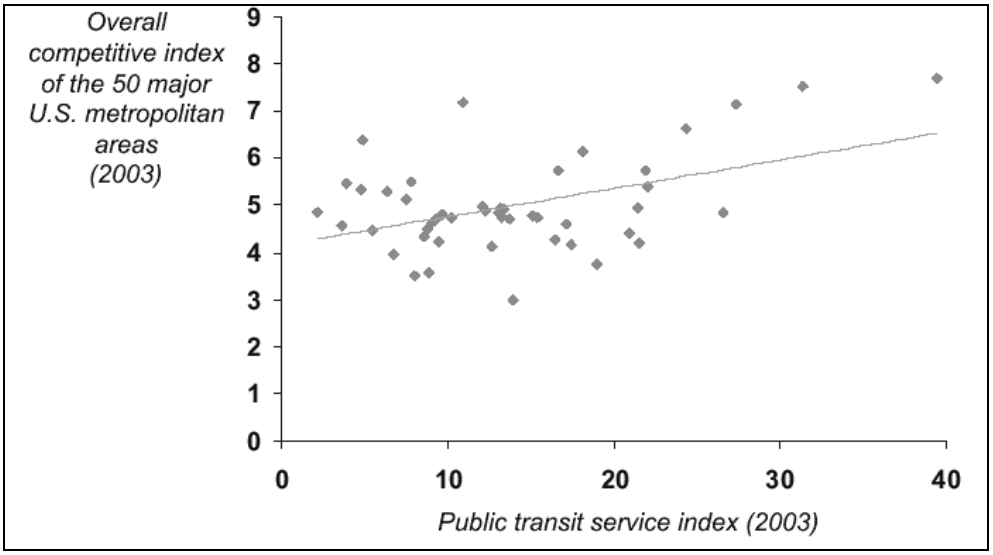
A study of technology-based companies in the UK and USA found that place-based attributes were a significant factor in location decisions:

> "...the factors valued by start-ups related to the characteristics of the local community and its residents. These included where the founders/directors lived, where existing employees lived, the quality and availability of the local workforce, the presence of local contacts and networks, and the quality of the residential environment." (Baxter *et al* 2005, p.24)

Firms in an area will also benefit if the workforce is healthy and not burdened with excessive levels of stress. Workforce participation and productivity are likely to be substantially higher if an area successfully reduces significant risk factors for major chronic diseases that harm productivity. A healthy, liveable urban environment can significantly reduce many of these risk

factors by encouraging more active lifestyles and reducing levels of pathogens in the local environment (Brook Lyndhurst 2004, p.31; PTUA 2007b, pp.9-12).

Figure 2.1: Relationship between competitiveness and level of public transport service



Source: Board of Trade of Metropolitan Montreal 2004, p.11

Baum *et al* (2007, pp.9-25) provide a good discussion of the linkages between quality of life and competitiveness in the global knowledge economy. Rather than attempting to reinvent the wheel, we refer the inquiry team to their discussion.

2.1.2 Generating tourism

Tourism is not only a significant industry itself, but the experiences of visitors also play a big part in forming international perceptions of a city and supporting or undermining its 'brand'.

In an increasingly competitive tourism environment tourists seek clean, safe, attractive and diverse environments with distinct and accessible cultural elements. Enabling tourists to easily navigate an effective, fast and affordable public transport network has direct positive outcomes for businesses and creative industries. By their nature, many tourists do not own a car (locally) and may not be comfortable using a car in an unfamiliar environment with different road rules such as driving on the left hand side of the road. A comfortable, legible, reliable and time-competitive public transport system greatly enhances the experience for visitors and is frequently one of the travel experiences recounted to family, friends and colleagues back home.

2.2 Trade-offs between liveability and competitiveness

Proposals to expand the road network are often premised on the assumption it will improve competitiveness and freight efficiency[2]. Not only is road supply expansion an expensive and inefficient method of addressing congestion (see Section 3.1.3 below), the induced traffic on the new road capacity and on roads downstream severely harms local amenity and adds to vehicle emissions. The focus therefore should be on solutions that simultaneously improve liveability, sustainability and competitiveness, such as giving high value road users priority access to road space, better transport and land use integration and ensuring the availability of genuine alternatives to using low occupancy private vehicles which are the main impediment to the efficient movement of freight (see Figure 3.9).

[2] See also http://www.ptua.org.au/myths/freight.shtml and http://www.ptua.org.au/myths/growth.shtml

3 Planning and design

3.1 The cost of poor planning

> "Outside sparsely populated areas, the car is clearly less efficient than public transport. Based on the MCD 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 are taken into account (consumption of space, pollution, noise, traffic accidents)." (Vivier *et al* 2005, p.39)

In many ways poor urban design is simply another way of saying car-dependent urban design. According to Raad (1998), car (or automobile) dependence "is defined as a series of convergent land use and transportation conditions in a city that leave 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 around $20 billion per annum for Australia as a whole (*excluding* congestion), with a sizable share of this attributable to Victoria due to low state vehicle taxation.

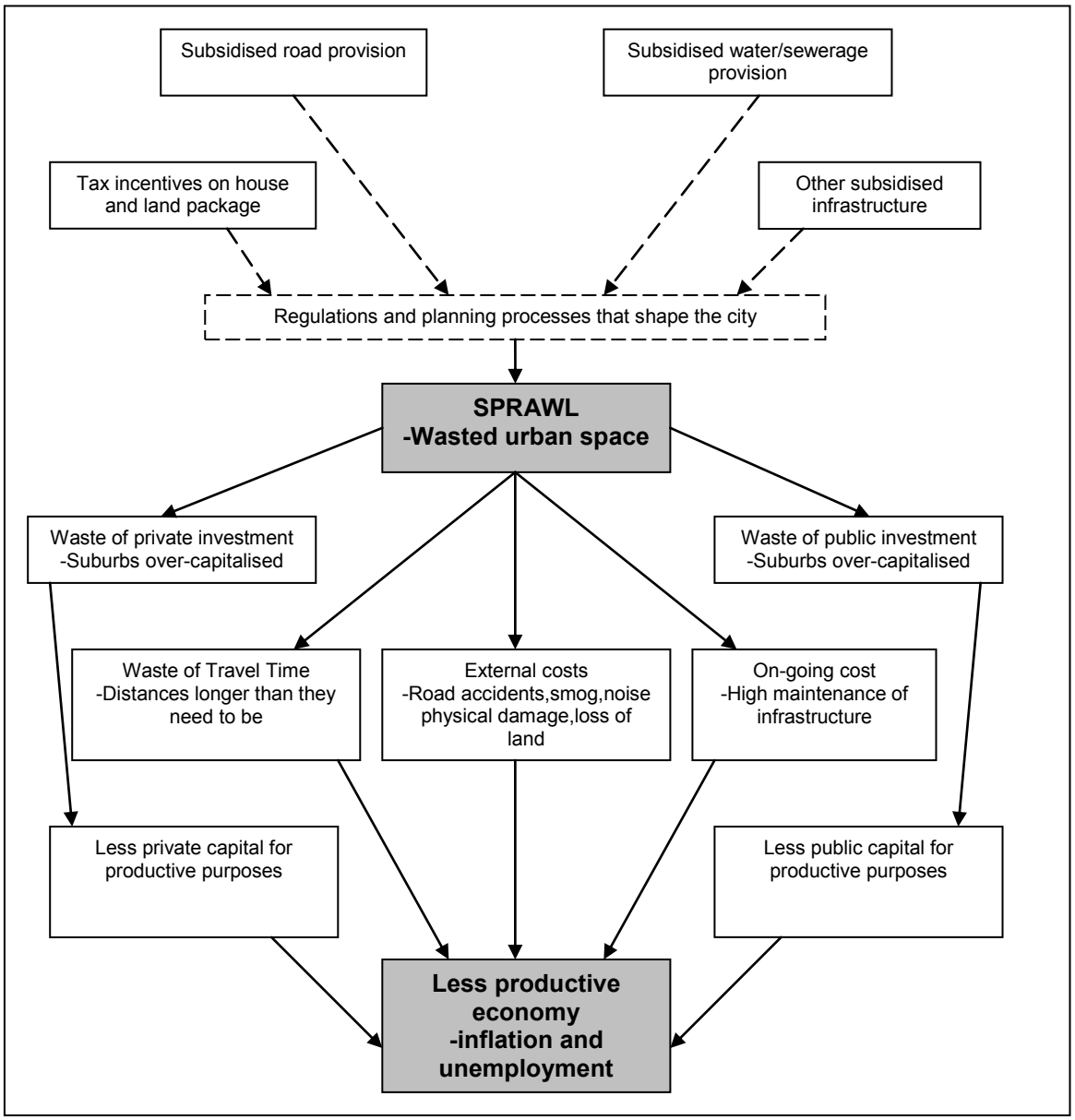
Table 3.1: The Road Deficit - annual road-related revenues and costs

Annual costs imposed by Australian motorists		**Annual revenue collected from Australian motorists**	
Item	***Expense ($ million)***	***Item***	***Revenue ($ million)***
Road construction & maintenance	8,800	Excise (net of rebates)	9,800
Land use cost	6,000	GST on fuel	1,700
Road trauma	17,300	Vehicle registration fees	3,250
Noise	700	Insurance premiums	9,700
Urban air pollution	4,300	Tolls	750
Climate change	2,900	Other revenue	2,300
Tax concessions	5,200	Total (2)	$27,500
State fuel subsidies	600		
Total (1)	$45,800	Road deficit (1-2)	$18,300

Source: http://www.ptua.org.au/myths/petroltax.shtml
Note: In addition to congestion, other costs excluded are the health costs and associated productivity losses relating to sedentary lifestyles and the additional costs of providing non-transport infrastructure to sprawling urban areas.

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 3.1.

Figure 3.1: Possible mechanisms linking excessive provision of roads, urban sprawl and economic problems



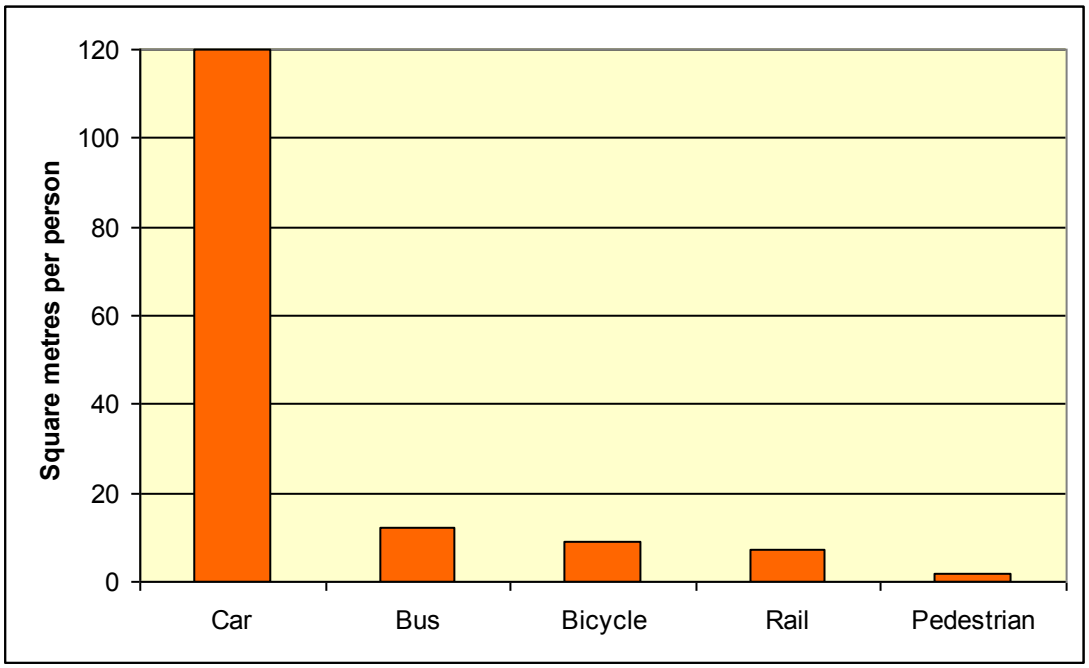
Source: Kenworthy, Laube, Newman & Barter 1997

3.1.1 Environmental costs

3.1.1.1 Land use

Cars require a large amount of space in the form of roads and parking (Figure 3.2). It is estimated that provision for cars consumes about one third of our cities' areas. If more space-efficient forms of transport were used, this land could be used for housing, public green space, community gardens, sporting fields or left in its natural state as wildlife habitat. Its use for cars forces our cities to sprawl inexorably onto productive farmland and into sensitive habitat.

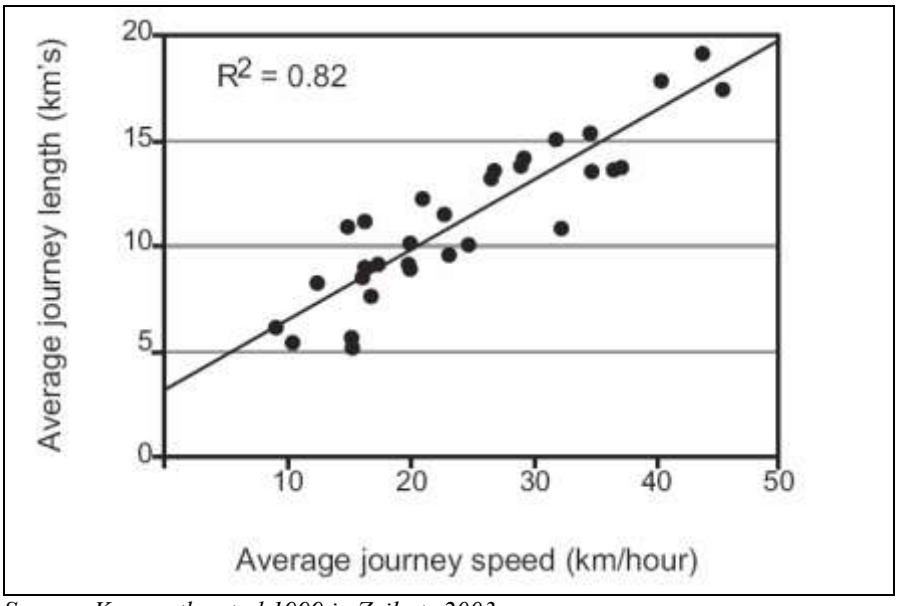
Figure 3.2: Road space requirements by mode



Source: Teufel 1989

The expansion of roadways also encourages longer commutes (Figure 3.3) which further encourage urban sprawl and land use change. Rather than saving time, motorways have encouraged greater travel in line with the phenomenon of *travel time budget constancy*. Added to this are the emerging problems of deforestation and food crop displacement resulting from biofuel production.

Figure 3.3: Average journey length vs. average journey speed



Source: Kenworthy et al 1999 in Zeibots 2003

The trend towards higher speed motorways also creates a 'barrier effect', which creates physical barriers for travelling between nearby communities, particularly for low-energy transportation modes such as walking and cycling. Often, high volume roadways actively discourage or even prohibit use by cyclists and pedestrians, making short distances across them impossible or more time consuming. This increases the likelihood of people using their cars to travel short distances if these kinds of 'barriers' exist between their home and a local activity centre, such as a supermarket. Once in their car, there is also the possibility they will drive to more distant retail outlets which undermines the vitality and diversity of local activity centres.

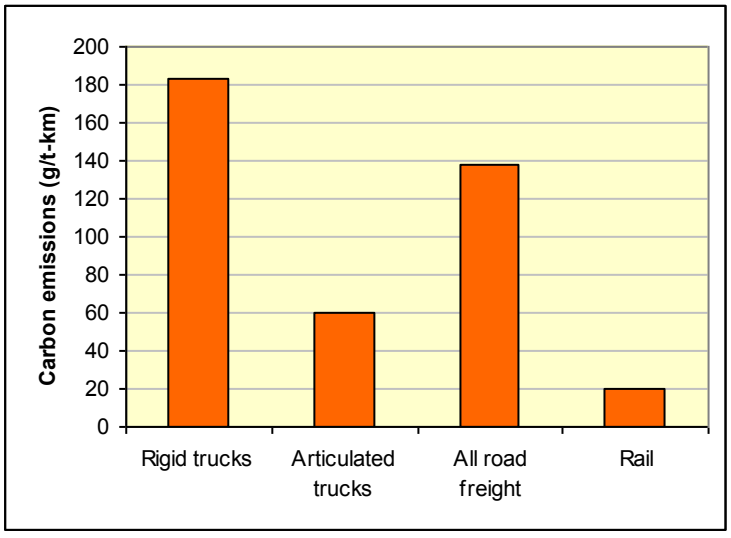
3.1.1.2 Greenhouse gas emissions

The transport sector is the second largest and fastest growing source of greenhouse gas (GHG) emissions in Victoria. Transport is also a large component of domestic emissions, often making up about half of a household's emissions. Much like climate policy more broadly (Spratt & Sutton 2008), the response in transport strategies such as *Meeting Our Transport Challenges* is now 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% emission reductions proposed for 2050 (Debelle 2008).

Expenditure on expanding road capacity has induced more and more traffic and failed to provide sustainable relief from congestion (See Section 3.1.3 below). In a carbon-constrained world, the current dominance of road transport will become a major economic burden for Victoria and a significant deterrent to high-value industries that wish to minimise their climate risk.

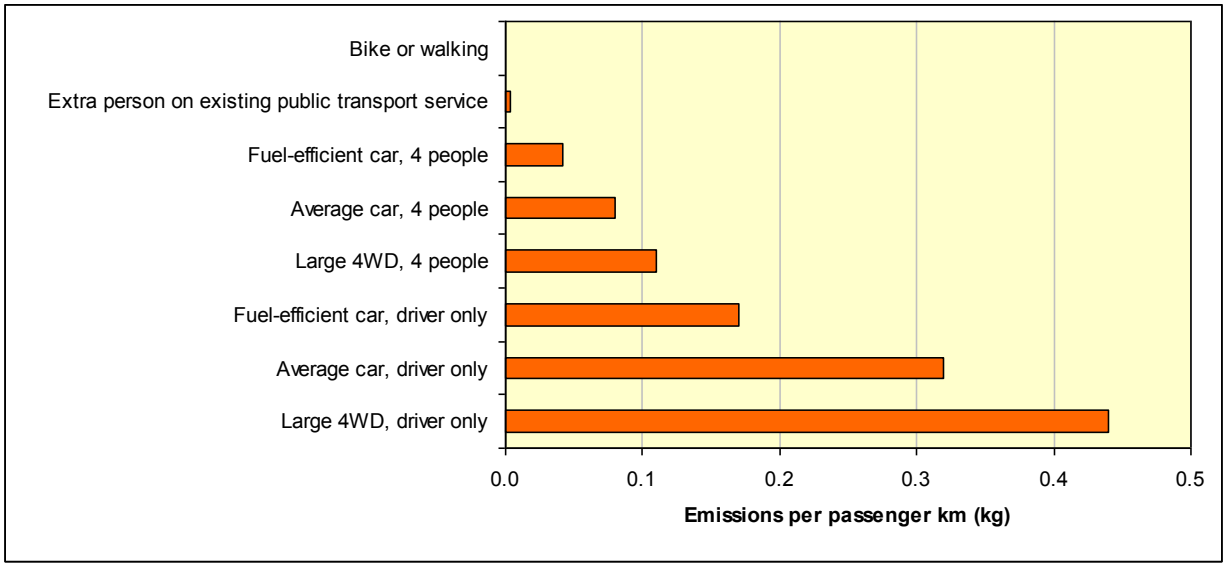
Rather than promising carbon-free motoring, recent research demonstrates that production of biofuels can result in higher carbon emissions than conventional petroleum (Searchinger *et al* 2008). There is a clear need to reduce fuel demand instead of relying on unproven alternative fuels. This will require greater use of rail freight (Figure 3.4) and a shift to walking, cycling and public transport (Figure 3.5).

Figure 3.4: Carbon intensity of freight transport



Source: Australian Greenhouse Office

Figure 3.5: Greenhouse gas emissions from different forms of transport



Source: Australian Greenhouse Office

3.1.1.3 Other pollution

Air pollution

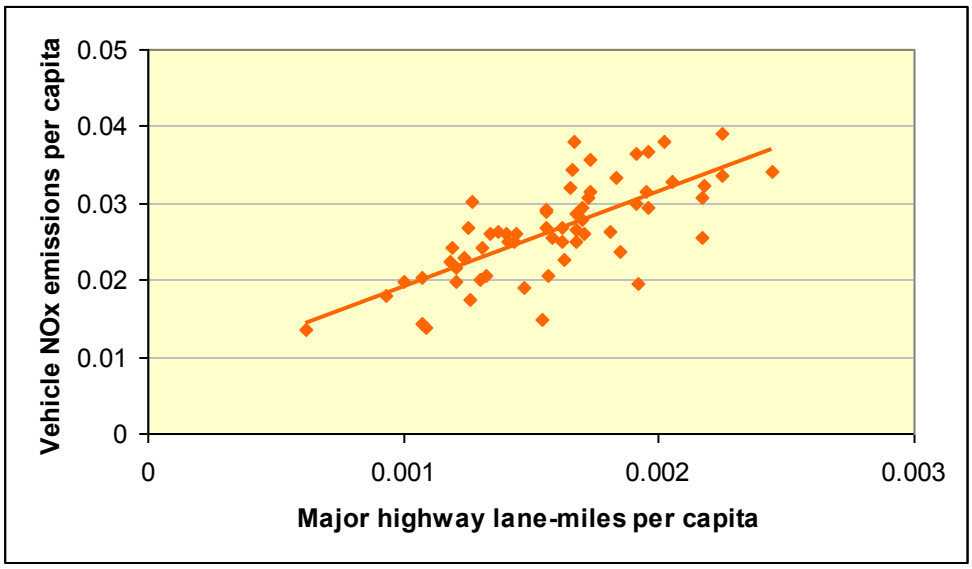
Motor vehicles are the dominant source of urban air pollution which is a major risk factor for a range of respiratory diseases and a trigger for asthma attacks. The blending of ethanol in fuel can also lead to increased emissions of acetaldehyde and formaldehyde, which is a highly toxic organic solvent. Ethanol blends also result in higher emissions of oxides of nitrogen which are 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

Figure 3.6: Highway supply and vehicle emissions



Source: Cassady et al 2004

With Melbourne's population growing rapidly, especially in currently car-dependent growth areas, there is no room for complacency on the city's 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. Air quality improvement can also be obtained by restraining vehicle speeds (PTUA 2007a, pp.42-43). A reduction in motorway and arterial road speeds to 80 km/h where they are currently above this level would:

- reduce fuel consumption;
- reduce emissions by up to 25%;
- reduce crash risk;
- increase road capacity by reducing the space needed between vehicles; and
- reduce road noise.

Water pollution

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, p.6).

Noise pollution

Cars and trucks are responsible for about 70% of noise in urban areas which can result in headaches, stress, sleep disturbance and high blood pressure (CfPT 2006, p.6).

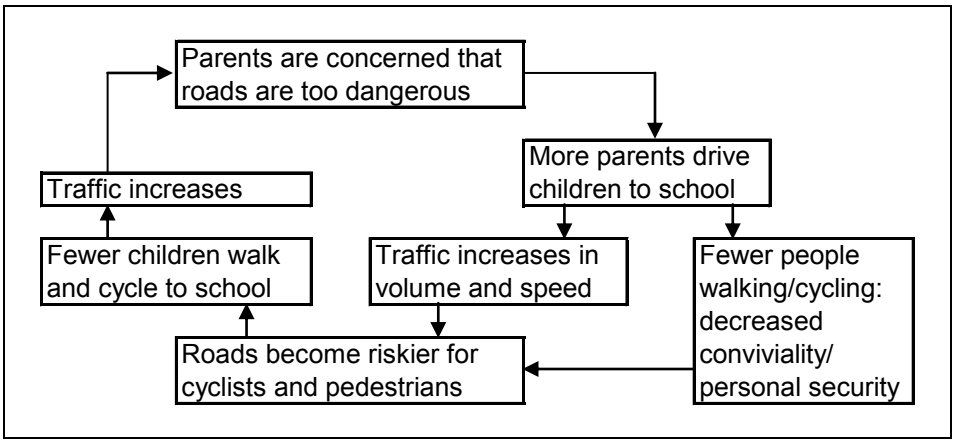
3.1.2 Health costs

> "Cars make us sick, sad and dead - how cars are managed is critical to public health - and much more important than we previously realised - we need to repopulate the streets. Car centred suburbs are 'obesogenic' (fattening) and foster depression and isolation by discouraging social interaction, walking and cycling." Dr Rob Moodie, Chief Executive Officer, VicHealth. Presentation to Planning Institute of Australia, 2003

The health costs of car-dependence have been explored in a number of reports over recent years (CfPT 2006; VicHealth 2007; PTUA 2007b; Bauman *et al* 2008 (forthcoming)). Transport policy influences health outcomes in a range of ways, including:

- leading to transport and land use patterns that effectively force people to use sedentary transport (i.e. drive) for most of their travel needs instead of using active transport (i.e. walking and/or cycling) on its own or in tandem with public transport;
- making active transport unattractive for other people (see Figure 3.7);
- encouraging the majority of urban air pollution which is estimated to result in more deaths each year than car crashes[3];
- encouraging the bulk of urban noise pollution which is a major cause of stress;
- resulting in road trauma, the leading cause of death among people under 45;

Figure 3.7: Impact of increased travel at the local level



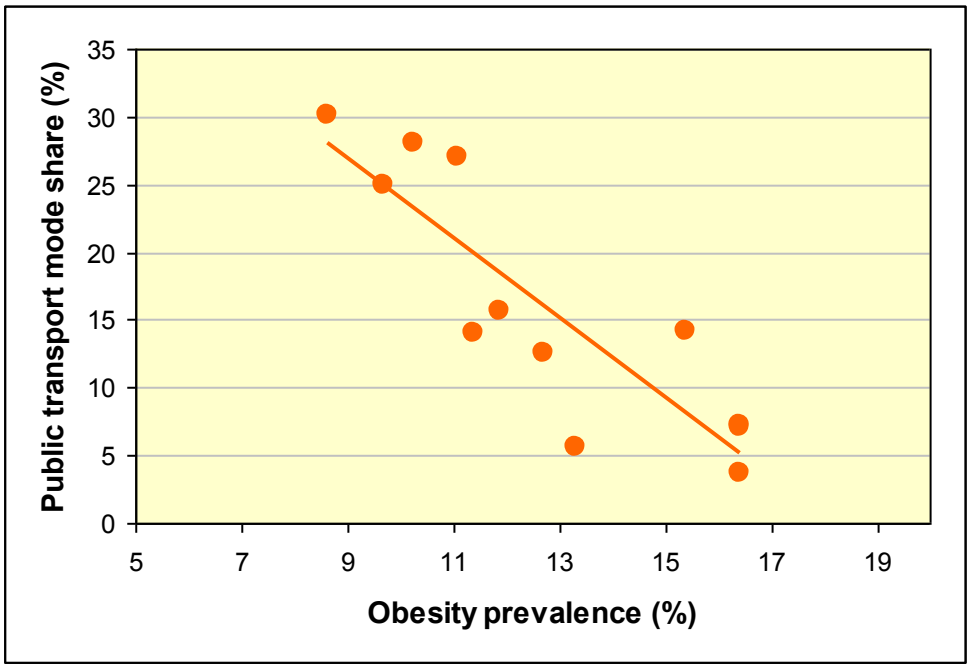
Source: Mason 2000

Obesity has reached epidemic proportions in Australia, with 67.5% of men, 52.1% of women and 19%–23% of children and adolescents being overweight or obese (Proietto & Baur 2004). Mounting evidence shows that car-centric urban planning has contributed to this trend.

Health outcomes are also an important component of personal perceptions of well-being and quality of life (Risser *et al* 2003, p.17; see also Table 6.2). The social isolation and exclusion that people who cannot drive experience in car-dependent communities contributes to mental illness such as depression. On the other hand, walking and cycling can contribute to greater mental and physical well-being, provided the local area is accommodating of pedestrians and cyclists.

[3] http://www.dar.csiro.au/news/2004/mr03.html

Figure 3.8: Obesity prevalence and public transport mode share



Source: PTUA 2007b

Table 3.3: Direct health expenditure on the National Health Priority Areas

Condition group	***Annual expenditure[4]***	***Comments***
Cardiovascular disease	$5.5 billion	Inadequate physical activity doubles the risk of chronic heart disease, as well as contributing to other risk factors for CVD such as obesity, diabetes and high blood pressure. On the other hand, increased physical activity can reduce the risk of high blood pressure by 30% and reduce blood pressure among people already suffering from hypertension.
Cancer	$2.9 billion	Physical activity has been shown to: • reduce the risk of colon cancer by 40-50%, • reduce the risk of breast cancer by up to 40%, and • reduce the risk of prostate cancer by 10-30%. Airborne particulate matter, especially from road traffic, significantly increases the risk of cancer, particularly cardiopulmonary and lung cancers.
Injury prevention	$4.0 billion	The fatality rate for car occupants is five times higher than that for public transport passengers.
Mental health	$3.7 billion	The risk of dementia among elderly men is doubled by physical inactivity. Conversely, physical activity is associated with a 17-28% reduction in the risk of suffering from depression. Mental health outcomes are also harmed by the social isolation that accompanies transport disadvantage, that is the lack of mobility faced by non-drivers in car-dependent communities.
Musculoskeletal	$4.6 billion	Numerous studies have shown increased incidence and severity of arthritis among people who are obese. Not only can moderate physical activity help to manage weight, it can also help arthritis sufferers by strengthening muscles to protect joints, decreasing pain and preventing joints from becoming stiff. Exercise throughout life is also vital for building and maintaining bone strength to guard against osteoporosis, and for maintaining balance and coordination which help to prevent falls and associated fractures.
Diabetes mellitus	$0.8 billion[5]	Walking, cycling or using public transport in place of driving can contribute to a 50% reduction in the risk of developing adult diabetes.
Asthma	$0.7 billion	Air pollution triggers and exacerbates the symptoms of asthma, whereas light exercise such as walking and cycling to destinations or public transport can be an important component of asthma management.

Source: AIHW 2005; PTUA 2007b

[4] Not including household expenditure and indirect costs such as productivity losses.
[5] Does not include costs of cardiovascular and renal diseases to which diabetes contributes.

3.1.3 Congestion costs

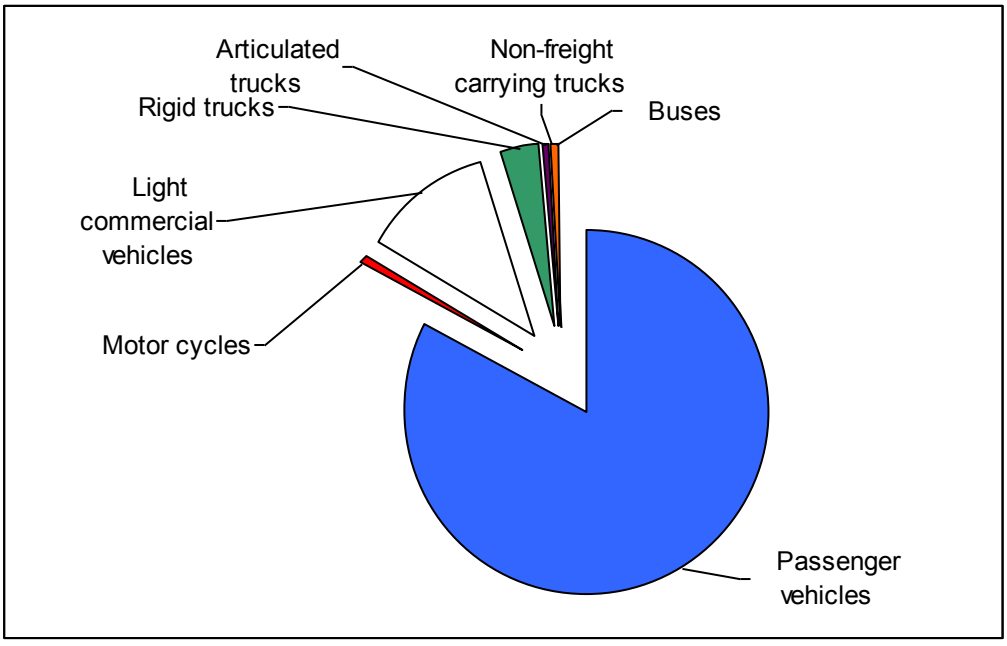
Congestion is a fact of life in modern cities of any significant size. No large city has been able to 'build its way' out of congestion in a sustainable manner, whether that be environmentally sustainably or financially sustainably. Although short-term relief is sometimes apparent, attempts to keep ahead of congestion through road building inevitably result in:

- huge areas of land being smothered in asphalt;
- rampant growth in greenhouse gas and other emissions;
- voracious consumption of energy, particularly petroleum;
- serious degradation of urban amenity;
- budget-busting expenditure on road construction (and maintenance) and on vehicle ownership and operation; and
- constant pressure to build the next 'missing link' as traffic growth inevitably catches up.

Poor urban planning exacerbates and perpetuates problems with congestion by entrenching car dependence, which in turn leads to even higher levels of congestion, which itself leads to pressure for measures (i.e. more road expenditure) that create even greater car-dependence (and social exclusion for non-drivers), and round the cycle goes.

The large volume of private and commuter traffic resulting from car dependence is arguably the largest single impediment to the efficient movement of commercial vehicles and freight. Despite freight dominating the discourse around road infrastructure expansion, the vast majority of traffic on the road network, especially during peak periods when infrastructure is under most pressure, is comprised of passenger cars with an average of 1.2 occupants each.

Figure 3.9: Share of vehicle kilometres in Melbourne



Source: Australian Bureau of Statistics

Vancouver's *Livable Region Strategic Plan* recognises the need to make more efficient use of road space and prioritises road users according to the following hierarchy:

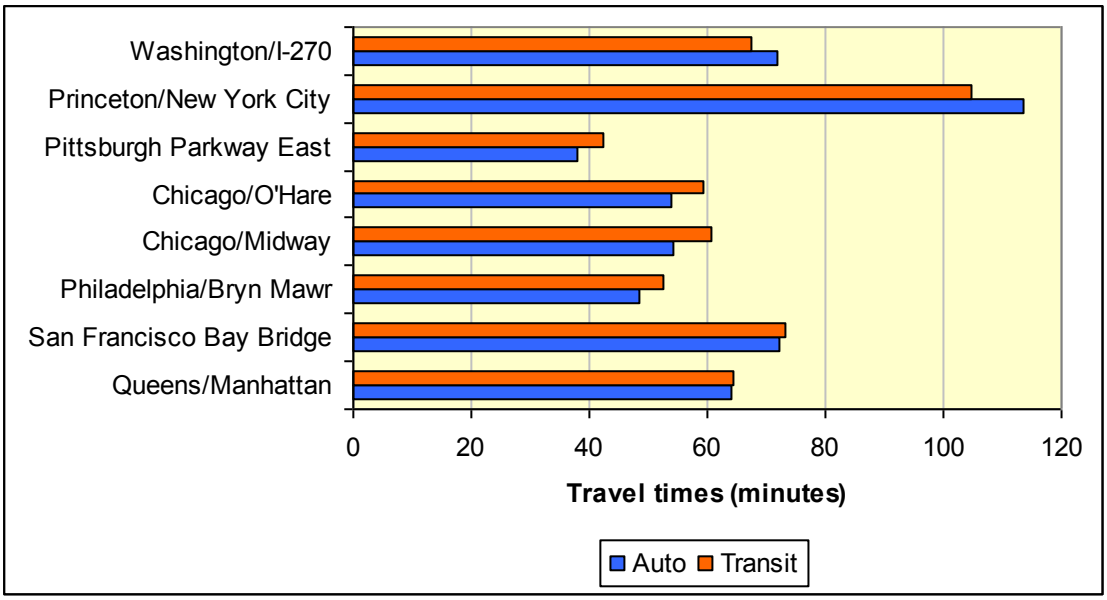
1. walking;
2. cycling;
3. public transit;
4. goods movement; and
5. automobiles.

This differs from the approach of defining a route hierarchy that can potentially prioritise low value road users above high value users on parts of the network and encourage inefficient transport patterns.

The effects of supply-side responses to congestion are explained by the *Downs-Thomson paradox* or the *Lewis-Mogridge Position* (Mogridge 1990). Enhancing the speed and/or capacity of a road system induces additional traffic, some of which is journeys diverted from public transport alternatives (Litman 2007b). This decline in public transport patronage leads to reduced service levels (e.g. frequencies) or increased fares which in turn drives more patrons away from public transport and to the road alternative. With public transport then becoming a less competitive alternative through the combination of larger investment in road infrastructure and disinvestment in public transport service quality, the additional road capacity fills and road system performance can actually end up worse than prior to the 'enhancement' (Figure 3.11).

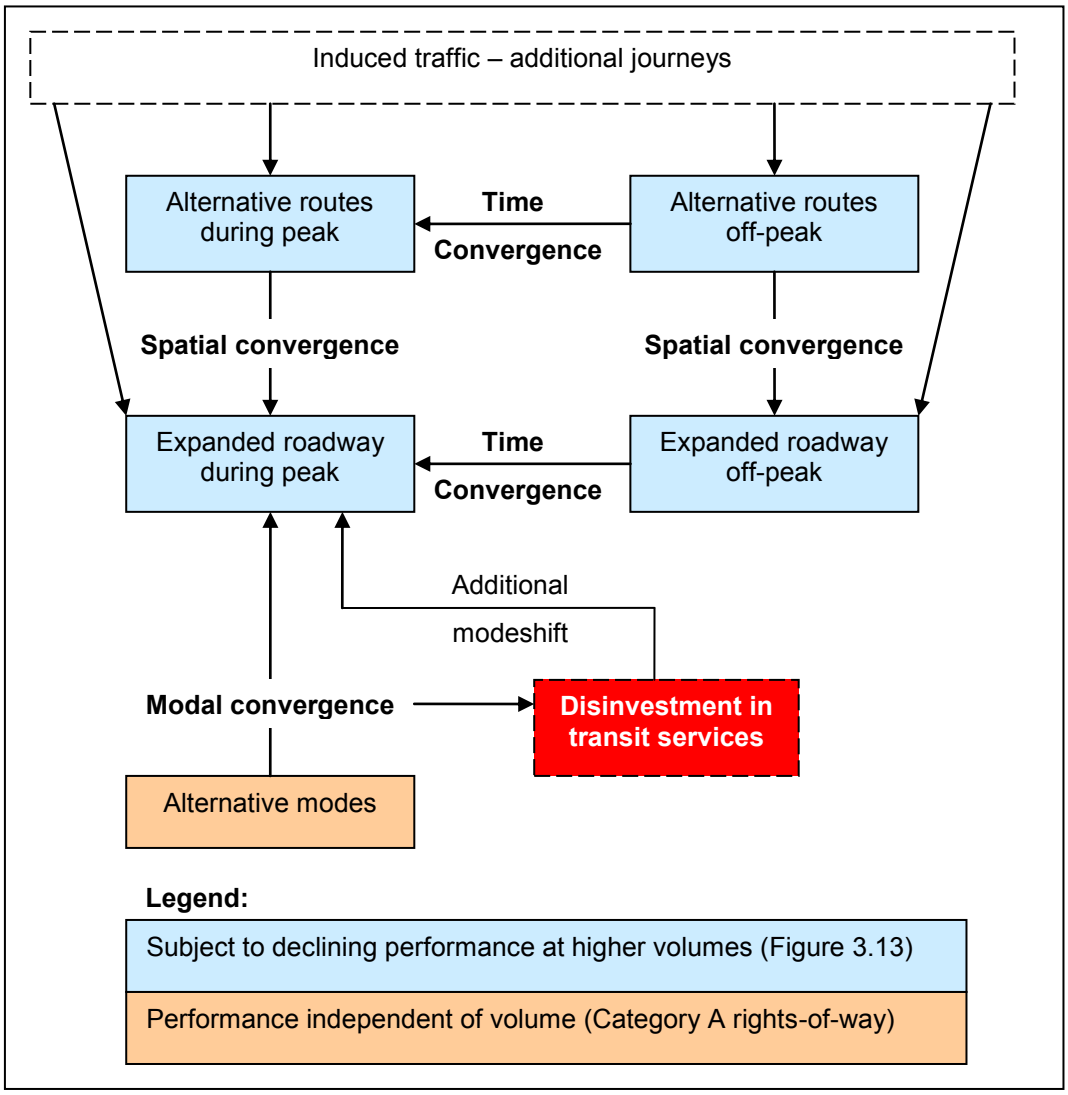
The extent of the deterioration in road system performance depends largely on the quality of transport alternatives. Consistent with the premise of the Downs-Thomson paradox, Lewis and Williams (1999) have demonstrated that the speed of road corridors tends to converge with the speed of transport alternatives (Figure 3.10). The best performing corridors are those with 'competing' high-speed fixed guideway mass transit systems that are able to attract road users away from the road when typical traffic conditions deteriorate. On the other hand, conditions on road corridors without such 'mass transit pressure valves' continue to deteriorate.

Figure 3.10: Door-to-door travel times for peak journeys



Source: Lewis & Williams 1999, p.112

Figure 3.11: Triple convergence following roadway expansion

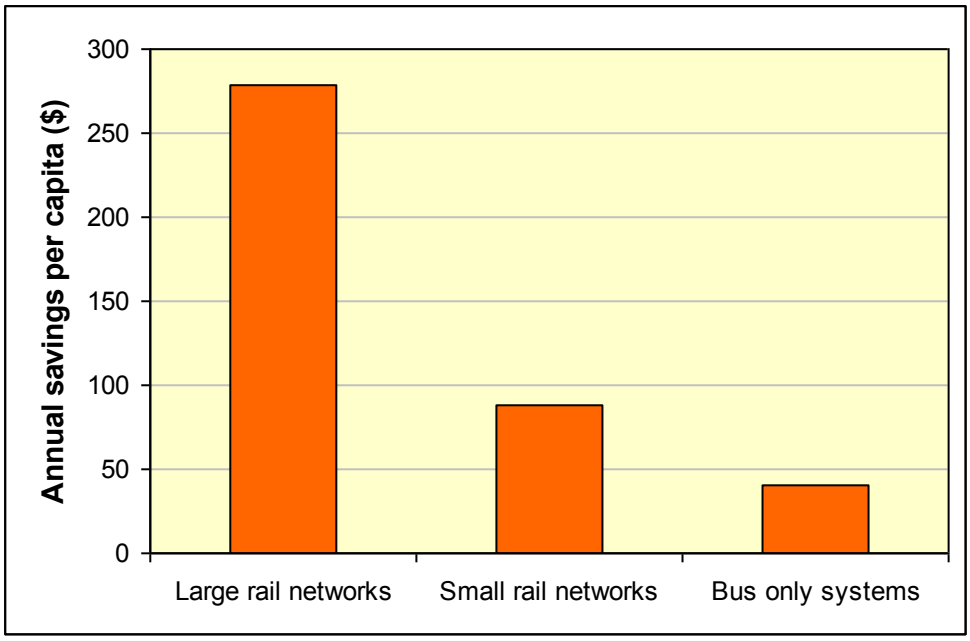


***Spatial convergence**: road users shift to the expanded roadway from alternative routes.*
***Time convergence**: road users shift time to use the expanded capacity during the high-value peak period.*
***Modal convergence**: transit passengers change mode to use expanded road capacity, adding to total number of vehicles and reducing the financial viability of transit which in turn leads to disinvestment in transit quality which leads to additional mode shift from transit to car.*
***Induced traffic**: additional journeys are encouraged by the new capacity and by existing capacity released through spatial convergence (Litman 2007b). The effect is particularly strong where congestion levels have been high.*
***Equilibrium**: convergence ceases when journey times are approximately equalised. The critical speed – the lowest acceptable road speed – is dependent upon the speed and efficiency of public transport (Suchorzewski 1973).*
Source: Based on Lewis & Williams 1999.

Not only does grade-separated mass transit move people more efficiently, good quality public transport also enables a net reduction in vehicle travel through impacts such as a reduced need for chauffeured journeys (which can require two return journeys for one outing) and by encouraging land use patterns that are less car-dependent. International research demonstrates that at least four kilometres of car travel can be replaced with just one kilometre of public transport use - an effect known as 'transit leverage' which effectively multiplies by four (or more) the benefits of public transport use based on per kilometre comparisons with car use (Newman & Kenworthy 1999, pp.87-88; Litman 2006, pp.7-14).

In some parts of Melbourne public transport is making a major contribution to congestion management by absorbing a large share of peak journeys. A high proportion of journeys to work in inner Melbourne are made by public transport, albeit less so from corridors that lack convenient access to heavy rail services (PTUA 2007a, pp.12-14). The ability of public transport to contribute to congestion management is currently constrained by the failure to provide fast, high capacity rail services to areas such as Doncaster and Rowville and into growth areas like Mernda.

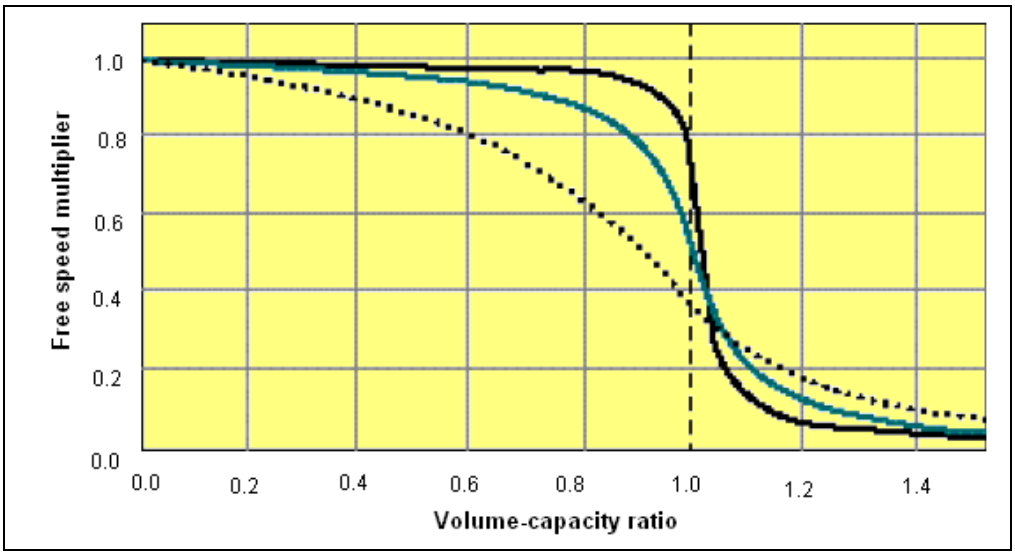
Figure 3.12: Annual congestion cost savings from transit



Source: Litman 2006, p18

Notwithstanding a minority share of total journeys, public transport can make a disproportionate contribution to relieving congested roads. When nearing capacity (i.e. a volume-capacity ratio around 1.0), even a relatively small shift of journeys from car to public transport (i.e. relatively small reduction in the volume-capacity ratio) can make a disproportionately large contribution to traffic flow (i.e. increase in the free speed multiplier), as shown in Figure 3.13. This is demonstrated by the significant improvements in traffic flow that accompany relatively small seasonal reductions in traffic volumes during, for example, school holidays.

Figure 3.13: Speed-flow relationship for selected road types



Source: Bureau of Transport & Regional Economics

Some groups assert that major road projects have in the past relieved congestion in Melbourne and that current levels of congestion are the result of the absence of various missing links. Such assertions overlook the importance of the economic slowdown that suppressed traffic through much of the 1990s[6] as well as the lag between the addition of new capacity in the latter part of that decade and the eventual build up of induced traffic into this century[7]. Subsequent declines in road network performance therefore have more to do with traffic induced by earlier motorway expansion and the failure to ensure the availability of fast, frequent, reliable and integrated public transport across the city, including in growth areas.

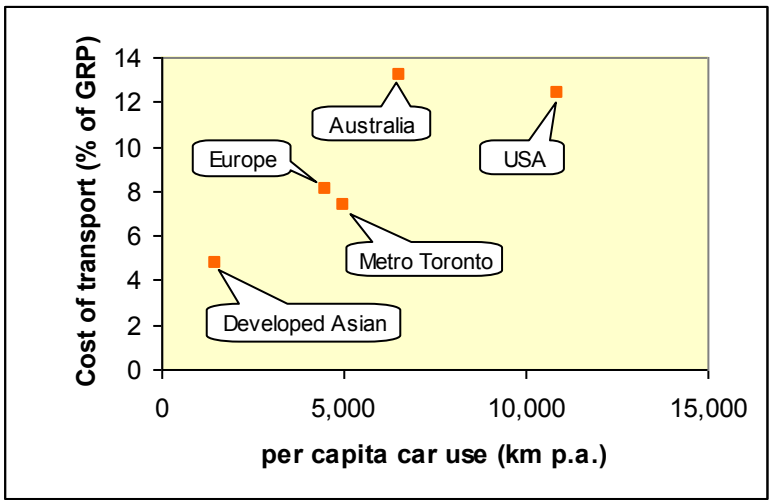
3.1.4 Transport costs

> "The cost of transport for the community varies from 5% in dense cities with high public transport use to over 12% in sprawling cities where the car is virtually the only mode of transport." (Vivier *et al* 2005, p.9)

As discussed above, cars consume a large amount of space (and energy) per passenger and their numbers expand to fill the road space available. Attempting to cater for their demands, rather than properly managing demand, inevitably consumes significant financial resources, for both individuals and governments. Cities or regions that focus on car use for their transport needs must divert significantly more of their regional wealth to transport than cities that adopt more efficient approaches (Figure 3.14).

[6] Gross State Product (GSP) was lower through most of the first half of the 1990s than it was in 1990.
[7] Litman (2007a, pp.9-10) identifies a range of studies pointing to lags of up to a decade or more, with most of the increase taking place within about five years.

Figure 3.14: Proportion of city wealth spent on transport



Source: Newman 2000

This transport spending comprises capital costs for both the public sector (e.g. infrastructure) and the private sector (e.g. vehicle purchases) as well as operating costs for each (e.g. public transport subsidies and household car operating expenses respectively). It is also important to note that in line with the Downs-Thomson paradox, public transport operating subsidies for given service levels are likely to be higher in cities that direct large amounts of resources to expanding road systems.

3.1.4.1 Opportunity cost

With transport being a derived demand, it is also important to recognise this transport spending as a transaction cost to be minimised through demand management and better transport and land use planning rather than as a desirable economic activity. Litman and Laube (2002) outline the broader economic impacts of various classes of consumer expenditure (Table 3.4). Consumption of motor vehicles and petroleum clearly contributes very little to local economies and retail vitality compared to other forms of expenditure. Growing trade deficits in these categories also suggest they are a drag on the national economy. This low multiplier would harm the vibrancy of a location and the diversity of shops, cafes and other commercial activities of interest to the 'creative class'.

Table 3.4: 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

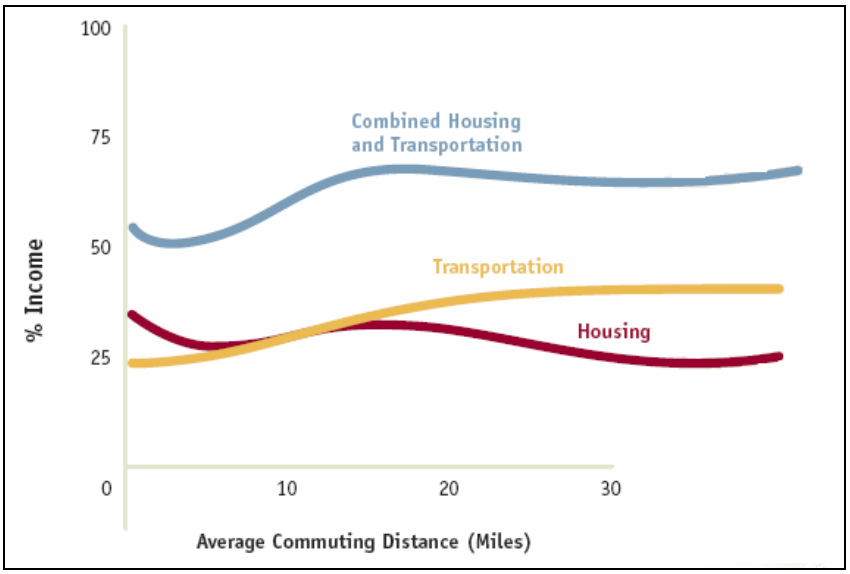
** Analysis performed in Texas, USA (Miller et al 1999)*
 # Analysis performed in British Columbia, Canada (BC Treasury Board 1996 in Litman & Laube 2002)

3.1.4.2 Affordability

> "Journeys made in urban areas are half as expensive in Hong Kong, Singapore and Helsinki as they are in Chicago, Melbourne and Newcastle. This gulf represents a saving of around EUR 2,000 per year per inhabitant in cities where the use of public transport and of "green" modes is most strongly developed" (Vivier *et al* 2005, p.9)

Since household transport costs are a function of where people live, housing and transport costs are inextricably linked and no discussion of housing affordability can be divorced from transport costs. Research in Australia and overseas has shown that the combined burden of housing and transport costs is higher in car-dependent communities. For example, sprawling cities such as Atlanta are among the least affordable (Lipman 2006) and fringe suburbs lacking good public transport are among the most vulnerable to rising interest rates and petrol prices (Dodson & Sipe 2006).

Figure 3.15: Housing and transport costs by commuting distance

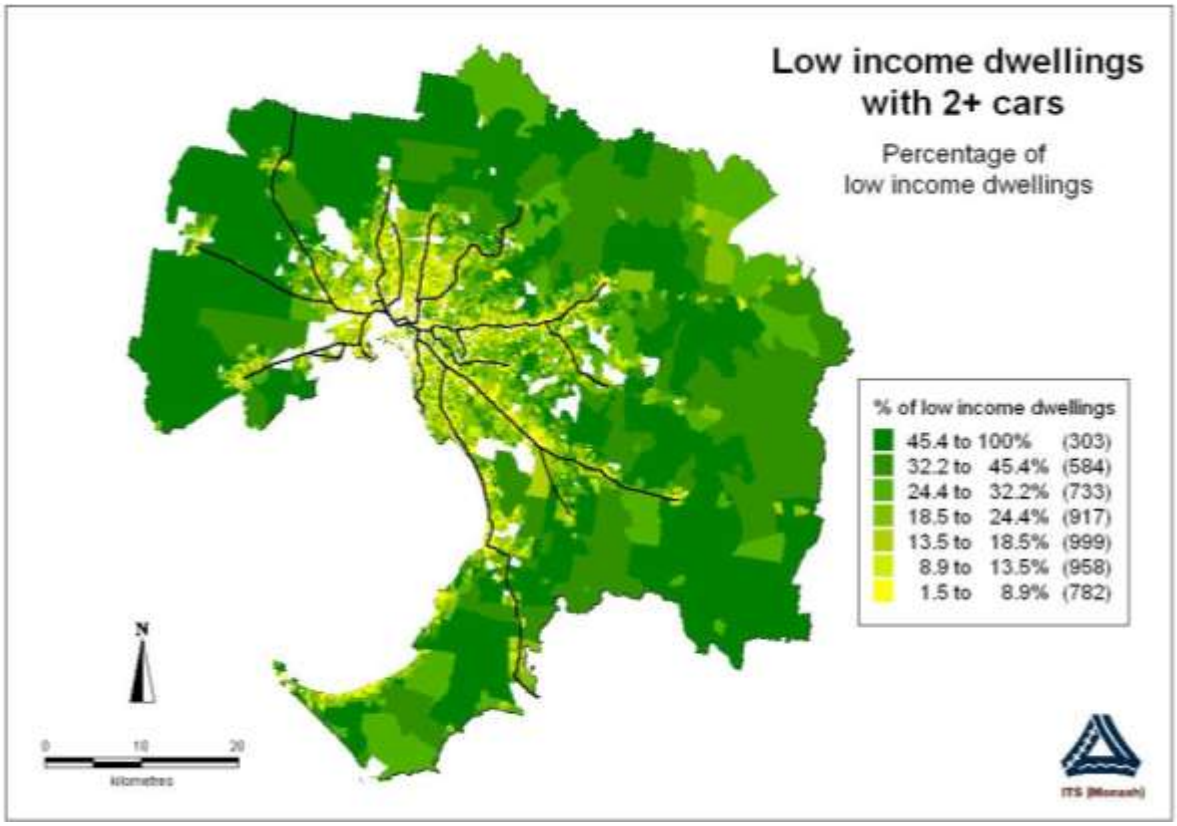


Source: Lipman 2006, p.5

Residents on the urban fringe of large cities, such as Melbourne, are more greatly affected by the rising associated costs of car travel. If households maintain more than one vehicle and are travelling longer distances, they thereby incur a greater proportion of rising petrol costs. This in turn has decreased affordability of inner-city housing as more people turn to inner city areas where transport is more accessible. With global oil production at or near peak (Hirsch 2007), car dependence is likely to become an even greater financial burden for households.

The number of cars per household in Australia continues to grow, pointing to a higher proportion of household income being spent on transport-related costs. Australia-wide, the number of registered passenger vehicles per 1,000 estimated resident population increased markedly between 1986 (437) and 2006 (544) (ABS 2007). This growth was concentrated in outer suburban areas where transport options are poor and car dependence is consequently high (Lucas 2008). The effect of public transport provision, or lack thereof, on 'forced car ownership' is shown in Figure 3.16.

Figure 3.16: Forced car ownership and rail supply



Note: Low income households without good access to high performance mass transit are forced to bear the costs of owning and operating multiple vehicles.
Source: Senbergs and Currie 2007

> "The gaps between 'energy efficient' and 'energy intensive' cities are considerable: from 10,000 to 18,000 megajoules per year per inhabitant in most European cities and over 30,000 in the cities of North America and Australia. To give a clear picture, this gap represents 400 to 500kg of crude oil per year and per inhabitant." (Vivier *et al* 2005, p.12)

3.1.5 Transport disadvantage

Poor urban planning is especially burdensome for transport disadvantaged households. Around one third of people in Melbourne cannot drive (CfPT 2006, p.14). Lack of transport limits access to education and employment with the result that young people in transport-poor areas of Melbourne experience significantly higher levels of unemployment and are much less likely to complete high school or attend tertiary education (CfPT 2006, pp.20-23). On top of the resulting personal disadvantage, this breeds broader social problems and reliance on government support.

Poor access to education and employment also harms workforce participation and productivity, and constrains the development of a skilled workforce that is attractive to high-value industry.

3.2 Degree of planning

Many journeys made within a city either begin, end or travel through an area with poor alternatives to private motor vehicle use, even though the other end of the journey and much of the route may have a range of good quality transport choices available. This leads to excessive car dependence and traffic across the city, including in areas with apparently good alternatives. This is one example of how planning decisions regarding one part of a city impact the city as a whole. It should be clear therefore that close integration of transport and land use planning should be applied consistently across cities, with a close eye to how local transport networks integrate with the broader metropolitan network.

3.3 Allocation of roles and responsibilities

Regardless of the actual division of roles and responsibilities, there will always be interdependence between functions carried out by different tiers of government. It is therefore important to ensure permanent institutional arrangements (with adequate resourcing) to allow these relationships to be managed constructively and efficiently. For example, local government decisions on planning and permit applications will influence the effectiveness of state government transport planning decisions, and vice versa. The institutional framework must accommodate these interdependencies and remove barriers to successful coordination of decisions, regardless of how roles are allocated between tiers.

4 Provincial Victoria

A comparison of the desires expressed in Section 6.1 indicates that common threads run through large urban, provincial and rural communities alike. Issues of amenity and access (e.g. to education, employment and affordable housing) are fairly universal regardless of the size of the community and the exact form those concerns take in any given setting.

Concerns about congestion and the availability of parking have become a common theme in larger provincial centres around Victoria. These problems are unsurprising since alternative transport, particularly public transport, has been relegated to a marginal role serving mainly people who are too young, too old or otherwise unable to drive. This decline in the status and role of public transport is particularly acute in those provincial centres that used to have high-frequency tram services providing a genuine alternative to car use. This neglect of public transport in provincial centres contrasts sharply with the level of service provided in countries like Switzerland which is heavily represented in the top echelons of global liveability rankings and where even the smallest communes (local government areas) are provided with some form of public transport at least several times a day. Ultimately the success factors for public transport in regional centres will be much like those in large cities – including convenience and competitive journey times (PTUA 2002, pp.30-33) – however the capacity requirements and capital costs are likely to be somewhat lower.

Rural towns and to a lesser extent provincial centres are also limited in the diversity and specialisation of services that can be offered to residents. For example, specialist medical services may require a journey to a larger provincial centre or to Melbourne. In an era of rising energy prices, such journeys can be costly even for people who have the option of driving, whereas people without that option will be dependent upon public transport or similar services. The gradual return and upgrading of regional rail services is making an important contribution to providing people in regional Victoria with access to employment, education and services in larger centres. The initial momentum on revitalising Victoria's rail network is however in danger of dissipating, with commitments to the return of passenger services to Mildura and Leongatha still yet to be fulfilled, and numerous other communities suffering from the disappearance of rail services. This constraint on access to regional centres is also a barrier to increased tourism through Victoria, especially with the rising cost of petrol on one hand and the declining cost of interstate and international travel resulting from increased competition in the aviation sector.

Due to the distances between centres and the current absence of transport alternatives, regional Victoria could be hard hit by the carbon constraints of peak oil and climate change. The Transport Connections program provides a useful demonstration of the benefits that can be derived from leveraging the resources of different transport providers to provide greater transport choice. A range of government-supported transport services are currently provided in rural areas including V/Line passenger services, town bus services, school buses, community transport and patient transport.

The resources currently available to each of these services individually are generally insufficient to offer a viable transport alternative to people with the option of driving. This effectively leaves many regional Victorians dependent upon their car and vulnerable to rising energy prices. When pooled however, the combined resources of various government-supported transport providers can begin to offer a more viable transport alternative to regional Victorians.

To some extent an enhanced inter-regional bus network for Victoria could utilise the existing resources of many of the above transport providers (PTUA 2002, p.33) and begin to reduce car dependency in regional areas. It is unlikely however that incidental resource sharing alone will be sufficient to provide viable transport alternatives, hence greater resourcing of regional transport providers is likely to be required along with close integration of services and coordination with regional rail services.

Fausch (1981) found that integration of school transport and public transport is physically possible and can offer significant savings in operational costs while improving the coverage of the network. Conceptually this is little different to the use of metropolitan public transport by both school students and the general public. However Fausch also highlighted the need for strong cooperation and planning at a tactical level to bring route and schedule planning together, and the importance of an effective coordinating institution.

5 Sustainable Urban Concepts

Sustainability, or lack thereof, has major spillover effects as exemplified by Sir Nicholas Stern's observation that climate change is the greatest market failure the world has ever seen. It is no more possible to be partially or "a little bit" sustainable than it is to be "a little bit pregnant". Sustainability, to be genuine, is an all or nothing approach that considers brownfield and existing developments just as actively as it does new model greenfields developments.

The level of required urgency around climate change and peak oil (Spratt & Sutton 2008) is totally incompatible with ignoring existing housing stock and established urban forms. Efforts to reduce car dependence in existing car dependent communities should be no less intense than those to avoid car dependence in new transit oriented developments, otherwise efforts to reduce congestion, pollution and social exclusion on a city-wide scale will be doomed to failure.

5.1 Is liveable sustainable?

In the long term we cannot trade-off sustainability for more liveability. An area that is not socially and environmentally sustainable will face a relentless slide down the liveability rankings as crime and other anti-social activities combine with pollution and deteriorating food, water and energy availability and quality to create a real-world dystopia.

Some commentators regard liveability as a more local or short-term manifestation of sustainability while others see it as a necessary but insufficient pre-requisite of sustainability (Brook Lyndhurst 2004, pp.8-10). In practice however, this has not prevented unsustainable actions in the name of liveability. Brook Lyndhurst (2004, p.14) note that transport is "one of the key areas in which individual choice and the pursuit of personal 'liveability' can conflict with the liveability of whole neighbourhoods and the community, and more widely with that of sustainable development".

Risser *et al* (2003, p.37) also note that "under democratic conditions, citizens will refuse to support projects that improve sustainability, if their own quality of life will deteriorate as a consequence of the support they give" and further that "as you cannot fulfil the needs of all people, you have to be aware of conflicts", as was noted by Brook Lyndhurst. The management of these conflicts is a communications issue that needs to be honest and up-front about the restrictions being proposed, but also sensitive to the needs that people feel are being met by the unsustainable behaviour. The involvement of the public in shaping transportation plans is an important part of this process (Risser *et al* 2003, pp.37-39).

Brook Lyndhurst (2004, pp.24-32) note that pursuing community-based initiatives can be an effective means of linking local environmental quality with community cohesion and broader sustainability issues. They also note that some of the local quality of life issues raised have strong linkages to sustainability, such as housing (especially energy efficiency), preventative health and sustainable mobility (walking, cycling, public transport and reduced car dependence).

6 Enhancing Liveability

6.1 What aspects of liveability are important?

Even before the more recent upsurge of awareness about climate change and peak oil, the consultation process for Melbourne 2030 provided a unique insight into the issues of concern for people across Melbourne:

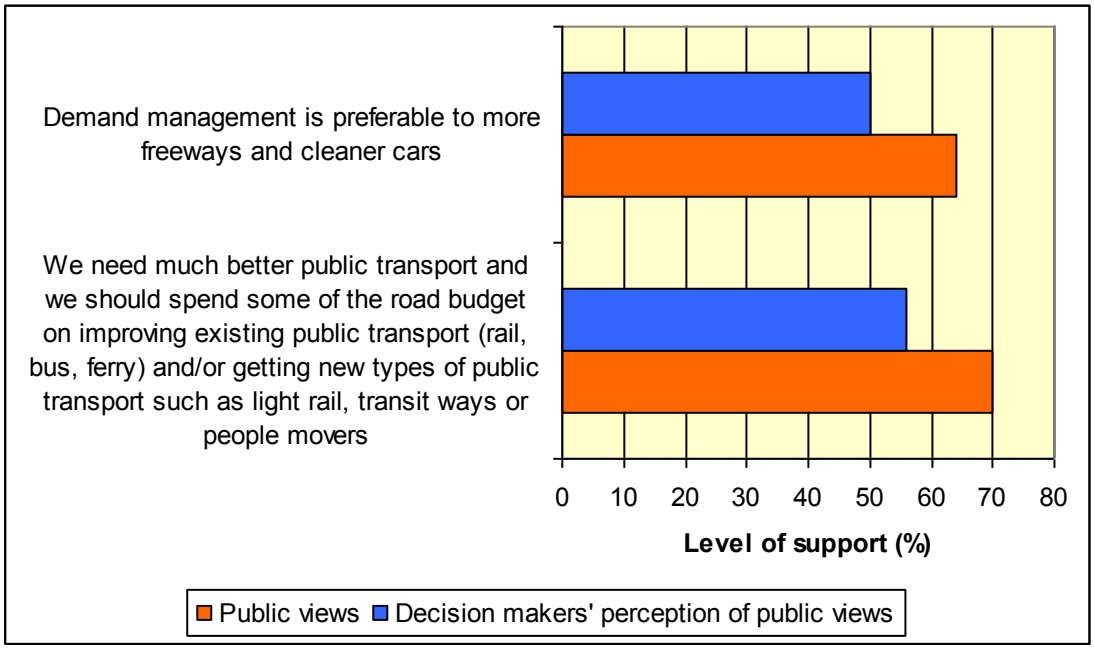
> "Reducing car dependence, controlling the urban sprawl and taking better care of our environment are the keys to the future of Melbourne, according to its residents....
> The report is the culmination of 17 public forums held last year across Victoria, to canvass community opinion on the Metropolitan Strategy - a 30-year action plan that will guide the development of Melbourne and its relationship with regional Victoria.
> "The responses show Victorians are well-aware of the challenges facing Melbourne if it is to stay one of the world's most liveable cities. They agree on the need for a coordinated plan to tackle these challenges," Ms Delahunty said.
> Among the issues raised was the need for:
> - Management of urban growth to protect the natural environment and neighbourhood character;
> - Increased emphasis on public transport and cycling facilities, instead of roads;
> - Greater access to education as a means of reducing social disadvantage; and
> - Use of alternative energy.
>
> "If we are serious about reducing car dependence, we need to make public transport an attractive and viable alternative for Melburnians," Mr Batchelor said..."
> (Delahunty & Batchelor 2002).

These priorities mirror those identified during consultation for Sydney's metropolitan strategy where issues such as protection for the natural environment, and expansion and improvements to the public transport system featured heavily (Searle 2006, p.564). Similarly, consultation for Perth's planning strategy found that "over 75% wanted government to reduce car dependency, spending more on passenger rail lines and improving safety" (Government of Western Australia 2003). Perhaps the one key difference between these three consultation processes is that Western Australia appears to be implementing the findings.

These findings have been replicated in other fora. For example, in January 2005 the *Herald-Sun* reported that an overwhelming 87 per cent of readers surveyed wanted the Bracks Government to do more to improve train, tram and bus services. Surveys of business also provide similar results. A survey of business leaders reported in the *Herald-Sun* on 21 January 2005 found that most considered public transport to be the single most important issue facing the city. More recently, a survey of Australian consumers and small and medium business owners has found that consumers believe cycling and using public transport to be one of the top things Australians should be doing to help the environment, and that climate change and peak oil are among the environmental issues likely to have most impact on business (Sensis 2007).

Consistent with international experience (Vuchic 1999, pp.172-173), Australian decision makers seem to consistently underestimate the public's appetite for traffic demand management and investing in public transport at the expense of roads (Figure 6.1).

Figure 6.1: Public support for traffic restraint and decision maker's perceptions



Source: Warren Centre 2002

Based on their interviews with technology-based companies in the UK and USA, Baxter *et al* (2005, p.51) identified the features of an environment that attracts skilled people as "short travel times, low congestion levels, affordable housing prices, the quality of local schools and social facilities, the quality of the cultural facilities, including nightlife, shopping, the design and appearance of a place, and the presence of peers and colleagues." They then go on to highlight the importance of ensuring that liveability for people outside the prestigious creative sector is also protected:

> "...people in support sectors ..., which contribute significantly to the quality of life of technology-based employees, could not afford to pay the high house prices and rental often associated with technology-based centres. This undermined the quality of services that could be provided in these areas and consequently threatened the quality of the environment necessary to attract the high-tech skills and people to drive the growth of these high-tech centres." (Baxter *et al* 2005, p.51)

Surveys of people who have made a sea or tree change also provide an insight into the lifestyle people are seeking. Apart from the pull of a new job or business opportunity, environmental factors play an important role in the decision to leave metropolitan centres, with the desire to live in a quieter place, closer to nature or in a more 'family-friendly' location featuring strongly (Burnley & Murphy 2004, p.137).

Table 6.1: Main reasons for moving to turnaround regions

Main reason	*Number*	*Percentage*
New job/transfer	48	9
Closer to work	4	1
Business opportunity	18	4
Became unemployed/looking for work	7	1
Total work	*77*	*15*
Retirement	58	11
Change in marital status	28	5
Better place to raise family	76	15
Better house	9	1
Cheaper house/land	8	1
Own instead of renting	14	3
Owned/rented holiday home in area	13	3
Total housing	*44*	*8*
Live closer to natural environment	47	9
Live in rural area	39	7
Live in quieter place	57	11
Less crime here	13	3
Total environment	*156*	*30*
Other and not stated	82	16
Totals	*521*	*100*

Source: Burnley & Murphy 2004

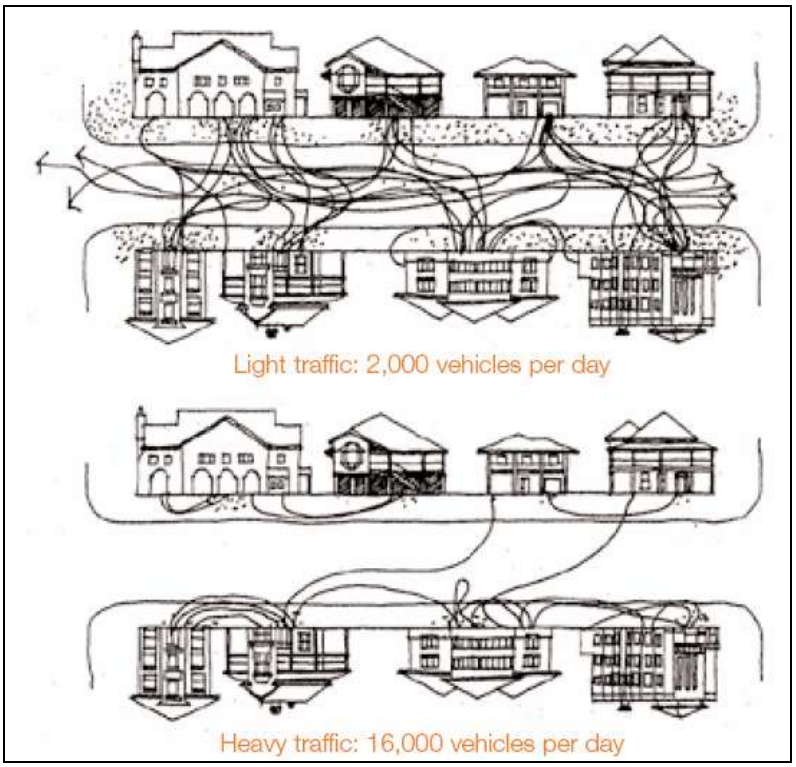
Reflecting comments above that quality of life is ultimately a personal or subjective matter, less tangible items often dominate issues of importance in people's lives (Bowling 1995, p.1451 in Rogerson 1999, p.981). Many of these less tangible items are closely related to social capital and are well-served by people-friendly urban environments (Figure 6.2).

Table 6.2: Items considered most important in people's current lives

*Priority**	*Item*
1	Relationship with family/relatives
2	Own health
3	Health of someone close
4	Finances/housing/standard of living
5	Relationships with other people
6	Availability of work/able to work
7	Other (including crime, politics, happiness/well-being)
8	Social life/leisure activities
9	Conditions at work/job satisfaction
10	Education
11	Religion/spiritual life
12	Environment (pollution, rubbish, noise, safety, cleanliness)

** Defined in terms of proportion indicating first most important item*
Source: Bowling 1995

Figure 6.2: 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

6.2 Influencing liveability

One of the most significant actions the government could take to improve liveability would be to eliminate car dependence. We stress however that eliminating car dependence should not be confused with eliminating cars. Eliminating car dependence retains the benefits of cars while reducing their negative impacts such as congestion, pollution, oil vulnerability, degradation of open spaces and local amenity, road trauma and other health impacts, and social isolation among households without cars. Since car dependence is "a series of convergent land use and transportation conditions in a city that leave people with few non-car options", eliminating car dependence will require each of these conditions to be addressed.

As demonstrated under Section 3.1.3 above, public transport that is good enough to attract discretionary or 'choice' passengers out of their cars (rather than just providing an hourly 'charity' service for captive users) provides win-win outcomes. Existing captive users benefit from the higher service levels, and remaining road users benefit from the road space vacated by discretionary users who shift from car to public transport. Public transport authorities and taxpayers also benefit with a greater proportion of full-fare discretionary passengers contributing to the financial viability of the system, and the environment is a clear winner if there is a reduction in private motor vehicle journeys.

6.2.1 Expanding availability of time-competitive transport alternatives

If we are to significantly increase the share of journeys undertaken by public transport, it will need to become more competitive with car travel to attract drivers. As noted by Vuchic (1999, p.294), "[t]his can be achieved only by giving transit vehicles priority in traffic or by providing separate rights-of-way (category B or A)"[8]. Expanding rail networks and priority for road-based public transport to ensure the fastest possible travel time is one key element. So too is ensuring better integration so that passengers switching between services are not saddled with long waiting times at interchanges. Land use design for integrated public transport is also important to ensure there are fast, easy and safe transitions for passengers who are switching between different transport modes. Locating bus stops and tram stops outside train stations is one important example, as is extending routes that currently fall short of stations.

Vuchic (1999) has outlined a series of short, medium and long-term measures to improve public transport and strengthen its role in increasing the liveability of cities (Table 6.3). These measures are also intended to be placed within a context of rational, comprehensive transportation policy that considers how the city and transport provision *should* be shaped to support liveability before rushing off to predict demand and provide infrastructure based upon historical trends or planners' convictions (Mees 2005).

[8] **Categories of rights-of-way:**
Category A: fully separated with guided technology (usually rail), offering much higher capacity, reliability and safety than street-based systems.
Category B: partially separated, such as median strip, crossing intersections at grade.
Category C: share roads with mixed traffic, and generally not competitive with car travel (Vuchic 1999, pp.42-43)

Table 6.3: Measures to enhance the contribution of public transport to liveability

Short-term Transit Incentives:

- *Introduction of priorities to transit vehicles in traffic*
  Including enforced fairways, traffic light priority and headstart lanes to speed up road-based public transport vehicles relative to cars. Such measures can also be part of image-building programs to boost perceptions of the status of public transport among car users.
- *Introduction or strengthening of intermodal integration of transit modes, as well as between transit and other modes*
  "Intermodal integration is paramount in increasing the quality of transit services and attracting ridership." This incorporates:
  - Organisational integration: a single agency or umbrella organisations unifying all functions affecting passengers (not just marketing), based on the transit federation model in Europe.
  - Operational integration: coordinated network layout and schedules, along with multimodal fares and integrated service information.
  - Physical integration: locating and designing stations and interchanges to ensure safe, fast and convenient transfers between services.

  Public transport facilities should also integrate with walking and cycling networks.
- *Contributions to, or full payment of, transit fares by employers, businesses, and retail stores, usually related to greater use of transit passes*
  Since motor vehicle taxation in Australia generally, and Victoria in particular, is low by world standards, public transport fares should also be kept low to compete with the marginal costs of driving. Similarly, the marginal cost of public transport use should be kept low by means of attractively-priced periodical tickets.

Medium-term Transit Measures:

- *Introduction of advanced methods of fare collection, such as self-service and smart cards for all transportation payments – tolls, transit fares, parking, and so on*
  Given the existence of multimodal, self-service ticketing and boothless tollroads in Melbourne, this measure is not a priority for Melbourne at present.
- *Use of ITS techniques to implement transit priorities, integrate modes, increase reliability of services, and improve transit information*
  While ITS has been overwhelmingly oriented towards highway traffic, it could be used for the benefit of public transport to implement systematic priority for public transport vehicles and to provide customer information.

Long-term Transit Measures:

- *Provide adequate, stable, and predictable financing for transit; this may be from an integrated transportation fund, a special dedicated tax, or some other revenue source*
  On top of adequate state funding, federal government investment on a scale comparable to its road funding should also be sought, as well as non-traditional sources such as value capture.
- *Plan and build a transit network as a high-performance system competitive with the car*
  This requires convenient access to high-speed mass transit with separate rights-of-way throughout the metropolitan area.
- *Incorporate transit in the planning of all major developments, to create intermodal services that enhance livability*
  Coordinated land use and transport policy is essential to avoid aggravation of transport problems and to create a liveable city. There are two broad categories of measures:
  1. Macro-scale planning: convenient access to high-performance transit should be a requirement for new developments and activity centres in the same way as access to water and electricity. Transit networks should be designed to ensure coverage and integration, and land use policies geared towards transit access.
  2. Micro-scale planning: local-level design should make walking, cycling and public transport use safe, convenient and attractive. Transport interchanges should be the "centre of gravity" with buildings clustered around and connected by attractive walkways.

Based on Vuchic 1999, pp.294-305

6.2.1.1 - Importance of rail

The findings of Vuchic (1999), Lewis & Williams (1999) and Litman (2006) highlight the importance of rail services in delivering more liveable cities and managing congestion. As part of an integrated, multimodal public transport network, rail services have a number of advantages that arguably make them a prerequisite for any medium-sized or large city:

Grid-connected rail systems have higher flexibility in primary energy source

Electrified rail networks are able to use energy from any primary energy source, such as wind, solar, wave, biomass, geothermal, etc, without the weight, expense and conversion losses of energy storage systems such as batteries or fuel cells. Motor vehicles, including buses, are generally restricted to one fuel type and any new fuel types would require extensive new infrastructure for production and distribution. This is likely to become a very important factor as the world runs out of cheap oil.

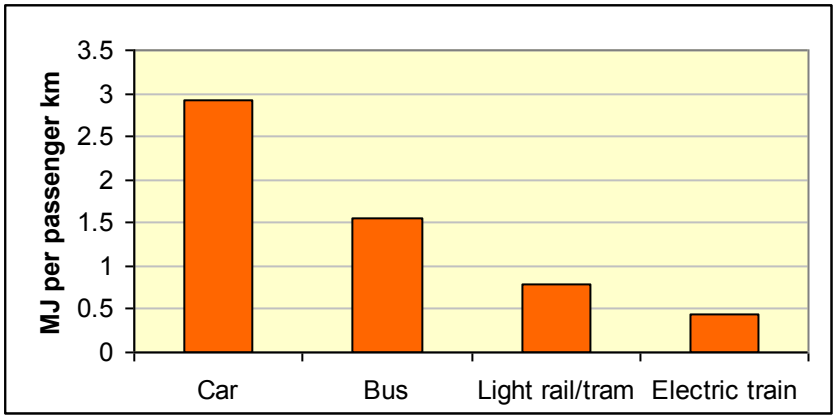
No local emissions

Electrified trains and trams do not produce local exhaust emissions, whereas motor vehicles, including cars, trucks and buses, are the largest single contributor to urban air pollution. This is particularly relevant given growing concern over the level of particulate matter in the air (Richards 2007), a rapidly growing population and plans to increase urban density under Melbourne 2030.

Energy efficiency

Rail is more energy efficient than motor vehicles, which contributes to lower operating costs, reduced pollution and more efficient use of natural resources. Energy efficiency is likely to become even more important given rising oil prices and the imminent introduction of carbon pricing.

Figure 6.3: Land transport energy consumption



Source: Newman 2000

Capacity

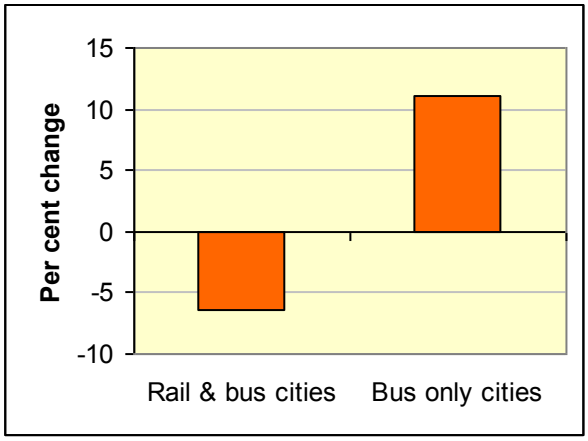
Trains are able to carry significantly higher passenger loads in relative comfort. A two track rail line could comfortably carry 40,000 passengers per hour in both directions, while some of the world's busiest rail lines boast loadings significantly above this level. This capacity would enable the transport network to more comfortably accommodate the tripling in patronage that the government's 20 per cent by 2020 mode share target implies in the context of population growth and also absorb a larger share of journeys

that are currently undertaken by car in congested corridors. References to comparable capacities among bus systems generally relate to highway sections without stops and large terminals with around 200 bus bays (Vuchic 1999, pp.210-211).

Operating costs

The superior energy efficiency and economies of scale (e.g. fewer drivers per passenger) flowing from higher capacities provide operating cost advantages for rail systems. Rail systems are also more appealing to discretionary, full-fare passengers, while the marginal cost per passenger is close to zero.

Figure 6.4: Change in operating costs per passenger mile – 1996 to 2003



Source: Henry & Litman 2006, p.10

Speed

Trains offer the fastest speed of all public transport modes (see Table 6.4). For longer trips they are the only mode that can provide car-competitive travel times and thus have potential to attract people out of cars. Speed can be further increased though the intelligent use of express services. This advantage can also apply outside cities, with some regional Victorian services now capable of travelling up to 160km/h and many European intercity services reaching speeds significantly higher than this.

Table 6.4: Comparative speed of road traffic and public transport

	Melbourne	***Sydney***	***Brisbane***	***Perth***
Average road network speed in 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. Note the apparent convergence between road and rail speeds (Section 3.1.3)

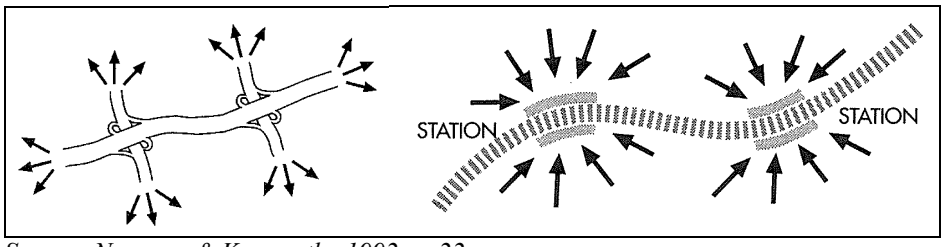
Legibility

Almost all residents (public transport user or not) know the locations and destinations of their local train and tram services. This is not true of bus routes, which can be confusing even to regular passengers. This legibility is also of great benefit to regional, interstate and international visitors who lack familiarity with the network.

Landuse impact

Melbourne's heavy and light rail networks have successfully attracted higher density mixed use development over the last century in the absence of central edicts such as Melbourne 2030. This can be contrasted with the more dispersed development that accompanies road-based development (see Figure 6.5). The sense of permanence of rail infrastructure increases investment certainty and attracts local development. By contrast, roads can have a seriously negative impact on values and the amenity of the local area (Tucker 2003; Mitchell 2006; Houlihan 2006). The "spontaneous" concentration of activities encouraged by rail reduces the amount of travel needed to access services and employment, increases the proportion of travel undertaken by public transport, and enhances the sense of vibrancy of commercial centres.

Figure 6.5: How freeways and railways affect development



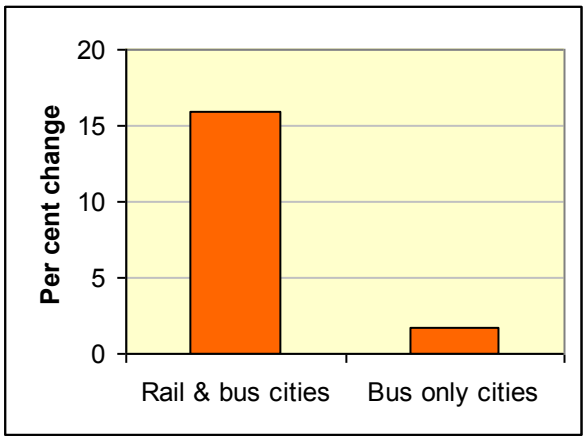
Source: Newman & Kenworthy 1992, p. 22

Modeshift

For reasons such as speed, legibility, comfort and the smoother ride, rail systems in Australia and internationally have proven substantially more successful in attracting and retaining passengers than bus systems, especially new discretionary passengers that underwrite the financial viability of the system (see Figure 6.6).

> "…rail supply has the largest effect on driving of all our sprawl and transit variables."
> (Bento 2005)

Figure 6.6: Growth in public transport boardings - 1996 to 2003



Source: Henry & Litman 2006, p. 9

This attractiveness, combined with higher capacity, enables rail systems to make a greater contribution to congestion minimisation, as outlined in Section 3.1.3. Not only has public transport patronage growth been stronger where rail services are available,

congestion cost savings are shown to be higher in cities with large rail networks (see Figure 3.12).

In order to take advantage of these benefits, Melbourne needs to expand the coverage of the electrified rail network by making investments such as:

- extending heavy railway lines to Mernda, Cranbourne East and Baxter;
- electrifying existing heavy railway lines to Melton and Sunbury;
- building new heavy railway lines to Doncaster and Rowville; and
- extending various tram lines to nearby railway stations to ensure better service integration;

6.2.1.2 - Buses as equal partners – shared objectives, different roles

Notwithstanding the benefits of rail, it is important to note that "there is no single 'best' mode" (Vuchic 1999, p.46). Rather than buses or trains being inherently "better" or "worse" than the other, each is able to serve distinct roles based upon their particular characteristics. Buses are an indispensable component of an integrated public transport system, however their potential is unlikely to be realised unless they are granted priority over private vehicles.

Buses are far superior to "park and ride" for feeding mass transit. Not only does park and ride fail the needs of the one third of Melbournians who cannot drive (and visitors without a car), it is an inefficient use of high-value land around stations that could be developed in accordance with transit-oriented development principles. High capacity parking facilities are also very expensive to construct and divert resources away from public transport service quality. It has been estimated that around 100,000 additional parking spaces would be required to meet the Government's 20/2020 target using park and ride. In contrast, feeder buses support the land use objectives of Melbourne 2030 and enable station access by passengers who are unable to drive.

Buses also form the majority of non-radial links in the broader public transport system, which are absolutely essential to create a 'network effect' that serves diverse origins and destinations. The ability of the current rail network to serve anything other than purely radial journeys is severely compromised unless it is well-integrated with coordinated bus and tram services that provide connections to destinations away from the hub-and-spoke train network. These co-dependencies emphasise the fundamental importance of ensuring organisational, operational and physical integration across public transport modes to deliver a seamless service for passengers.

Many bus routes date back to the era when the train, tram and bus systems were run as separate fiefdoms. As a result, the present route structure lacks logic and efficiency. Bus routes should be fundamentally reformed, both to deliver a comprehensive network in partnership with train and tram services, and to straighten out meandering routes that add to journey times and vehicle kilometres. In addition, investment in fleet expansion and traffic priority measures would enable much more attractive service levels that can be more effectively coordinated with train and tram services.

6.2.2 Reducing barriers to active transport

On their own or in tandem with public transport, walking and cycling offer a multitude of benefits including elimination of carbon emissions and other pollution, healthier and more active lifestyles, affordable mobility, reduced traffic noise, and fostering social capital and neighbourhood interaction. More than half of car trips in Melbourne are under 5 kilometres in length, and 38% are less than 3 kilometres. A sizable proportion of these journeys could be undertaken by walking or cycling if it was considered appealing to do so. Tolley (2003, p.13) identified the dominant barriers to increased walking as:

- physical barriers such as roads and car parks;
- heavy traffic;
- excessive vehicle speeds and lack of crossing opportunities;
- blockage of pavements by signs, clutter and parked cars;
- poor walking surfaces; and
- personal security concerns.

Barriers to increased cycling identified by Queensland Transport (2003) could be summarised as:

- a lack of time or destinations being too far;
- weather or terrain;
- lack of fitness, confidence or a bike to ride (!);
- safety concerns related to high speed and/or high volume traffic and road user behaviour;
- poor quality or fragmented cycle routes (e.g. interrupted by roads); and
- the convenience of driving (which further serves to emphasise that you do not reduce traffic by making it easier to drive).

In each of these cases, walking and cycling, the ongoing practice of facilitating motor vehicle traffic is a fundamental impediment to healthier, more sustainable transport patterns.

Hakamies-Blomqvist *et al* (1996) have explicitly related mode choice decisions to subjective aspects of quality of life. Subjective well-being in this case is arguably more important than objective measures since is it is the personal, subjective experience that ultimately determines mode choice. The key quality of life components that need to be addressed to encourage more sustainable transport decisions include:

Social climate/equity

Pedestrians and cyclists have traditionally been afforded low status by planners and Treasuries, and are often literally marginalised on the road and subject to abuse and intimidation from motorists. In contrast cars are rewarded with large infrastructure programs by all three tiers of government and marketed as symbols of power, prestige, independence and wealth. Becoming a ‘second class road user’ (i.e. walking or cycling) contradicts the need for esteem under Maslow's Hierarchy of Needs.

Objective safety

A fundamental element of Maslow’s Hierarchy, safety will be a crucial factor in mode choice. It is also important to acknowledge that pedestrians and cyclists do make mistakes, especially given many of them are children or adolescents, and that the traffic system needs to be tolerant of such human error. Reduced traffic speeds can slash the

number of crashes and turn what would be a fatal impact into minor brush (SWOV 2004; Moynihan 2008), as well as improving local amenity and retail vitality.

Research in Australia and overseas has also shown that there is 'safety in numbers' for pedestrians and cyclists (Robinson 2005). That is, as the number of people walking and cycling increases and drivers adapt their behaviour in response to the consistent presence of unprotected road users, the fatality and injury rates decrease. In this regard, measures that inconvenience or deter pedestrians and cyclists (such as barriers to prevent crossing the road) can be counterproductive by limiting the growth in walking and cycling and by removing the impetus for drivers to behave in a manner suited to the presence of unprotected road users. Such counterproductive measures also reinforce the perception that pedestrians and cyclists are 'second class road users'.

Security

In addition to objective statistics on crash rates, Maslow's Hierarchy shows that people need to *feel* safe from the dangers of road trauma and physical assault in order to venture out on foot or bicycle, or to allow their children to do so. Human-friendly traffic speeds will again be important to ensure people, including parents, do not fear sharing public spaces with motor vehicles.

Measures to enhance personal security will also be important, such as adopting 'design out crime' principles in urban design (Office of Crime Prevention 2007), ensuring streets are pleasant places for people to be and providing a constant human presence across the public transport network.

Mobility

The lack of continuous, integrated walking and cycling routes hampers mobility for pedestrians and cyclists and exemplifies the low status afforded to active transport in transport planning. This is also manifested in traffic lights that are unable to sense the presence of cyclists in order to trigger a change to green.

Comfort

Walking and cycling will be less pleasant and less likely to be undertaken if pedestrians and cyclists face obstructions such as cars parked across footpaths or there is a lack of weather protection such as trees, shop awnings or bus shelters.

Aesthetic and environmental quality

Pleasant surroundings on a human scale are likely to attract the more sedate forms of transport such as walking and cycling, whereas traffic noise, fumes and 'spaghetti junctions' will deter pedestrians and cyclists.

Cost

Although walking and cycling should offer financial advantages, in reality motorists externalise large costs upon society (see Table 3.1) and company cars benefit from a range of tax advantages and concessions that are not available to active transport and public transport.

Since many of these barriers apply also to public transport use and most public transport journeys begin or end with walking or cycling, attention to these needs will also benefit public transport users.

6.2.3 Encouraging complements to sustainable transport choices

As mentioned above, eliminating car dependence does not mean the elimination of cars. People that walk, cycle or use public transport for much of their travel may still have occasion to use a car when transporting heavy or bulky belongings or when venturing further afield. For many such people car ownership may not make financial sense for such infrequent or irregular use. Similarly the space requirements of high levels of car ownership can add to the cost of housing and work against the urban density objectives of Melbourne 2030.

Car sharing schemes can serve as a convenient complement to walking, cycling and public transport use without imposing the costs of car ownership on households or adding to the already large proportion of our city devoted to roads and off-street parking. Planning schemes and other local government measures such as precinct parking plans should support car sharing schemes, particularly where there is a demonstrable reduction in private car ownership in the local area.

Information & Communications Technology (ICT) also offers potential for reducing demand for travel by allowing telecommuting, teleconferencing, Distributed Collaborative Applications and Intelligent Transport Systems (ITS) to facilitate backloading and road space prioritisation. For example, it has been estimated that a larger role for telecommunications networks could deliver annual travel cost savings of $6.6 billion per annum and reduce carbon emissions by nearly 5% (Mallon *et al* 2007).

6.3 Responsibility for public transport lies with State Government

The State Government has a large role in transport planning and pricing, including for roads and public transport. While communities have been calling for increased investment in public transport and more sustainable transport planning, improvements to the public transport network have been limited in past decades.

Clearly, individuals cannot create their own public transport network and so rely on effective network planning by governments. Ensuring multi-modal transport provisions are part of the urban planning process for local communities is essential to reducing the car-related costs to communities discussed above and thereby increasing liveability.

6.4 Commonwealth role

Despite token efforts to gain federal funding for public transport, state relations with the Commonwealth Government have been characterised by constant efforts to extract more funding for major road projects that will not only induce more traffic (Section 3.1.3), but will also require matching funding from the state government and thereby constrain budget flexibility. This approach reinforces car dependence and makes Melbourne less sustainable, less equitable and less liveable.

The election of a new federal government provides an opportunity to redefine federal transport funding so that it makes a positive contribution to reducing car dependence and hence improving liveability. State requests for funding should be based upon what contributes most effectively to improved liveability, not based upon what the federal government has tended to fund over the last decade. Commonwealth funding should not be sought nor accepted for road projects where these projects may crowd-out demand management or public transport alternatives that are more effective at addressing congestion, sustainability, and liveability over the longer term.

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