Creating a city that works

Opportunities and solutions for a more sustainable Melbourne

A position paper on passenger transport and urbanisation by the Commissioner for Environmental Sustainability

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Executive Summary

Melbourne must be a city where people are the focus, not cars.

The Commissioner believes everyone has a right to sustainable transport. That is, our transport system should serve communities without adverse social, economic or environmental consequences. The Commissioner considers it a matter of urgency that future community and transport planning focuses on achieving environmental sustainability. This means that in the design and planning of urban areas we must ensure that everyone has access to a range of mobility options, including convenient and reliable public transport services, walking and cycling, and that car dependency is reduced.

Post war, in common with most major western countries, Victoria’s response to the demand for mobility has resulted in cities that have become dominated by cars rather than people. Urban design has reflected the need for arterial roads for major trips, and minor roads to get around where we live. On top of this, we have added freeways in a bid to speed up longer trips or move high volumes of vehicles in critical areas, car parks to accommodate vehicles at their destinations, and in some urban areas, reflecting our more affluent lifestyles, we have made the double and even triple garage a ubiquitous feature of new homes. While the benefits of widespread car ownership are acknowledged, the challenge now is to create a transport system that provides similar benefits but with lower environmental and social costs.

The environmental, social and economic impacts of car-focused urban design are now increasingly well understood by the community, business and governments. They include emission of greenhouse gases and other air pollutants, the environmental impacts of land for roads, the social costs of noise and reduced amenity, the economic costs of traffic congestion as well as the health costs of poor air quality, insufficient exercise and road accidents.

Responding to these impacts requires a new approach to urban planning. In particular, there are three key challenges that stand out as critical in shaping the future of our urban development and transport systems. These are:

- climate change and the urgent need to significantly reduce the high levels of greenhouse gas emissions by our car-dependent transport system;
- ‘peak oil’ and the imperative to adapt our transport system so that in the future it is not reliant on oil as its primary energy source; and
- the social implications of car dependence including the increasing pressure on household budgets, particularly in outer areas, as the cost of fuel increases as well as the health costs associated with reduced exercise, road accidents and air pollution.

Change is needed if we are going to successfully respond to these three major challenges for future urbanisation and transport, and achieve a more sustainable city.
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More sustainable solutions to these passenger transport and urbanisation challenges are available. Victoria has access to less energy intensive forms of transport, for both public transport and for private vehicles. We understand the patterns of urban development that allow people to walk and cycle to local services and community facilities. In addition, we are getting better at integrating transport technologies and urban design, for example through transit oriented development.

The challenge is to develop and maintain the will to institute the fundamental changes that we know are necessary over the longer term.

There are three key areas that require further attention if we are to ensure change occurs in the right direction and in a timely manner.

- The first is better use of rational pricing. Pricing mechanisms are already widely used in transport and urbanisation, and include parking charges and levies, vehicle stamp duty and registration, developer fees and charges, and local government rates. But in few instances are these pricing mechanisms being used strategically to shift transport and urbanisation behaviour towards achieving more sustainable outcomes. Rational pricing attempts to do just this, and its use should be expanded. Revenues raised should be invested in providing more sustainable transport and urbanisation services and infrastructure.

- The second is improved integration and coordination of land use planning and transport planning. In the past government departments tended to work in silos, with a roads department that wanted little to do with a planning department or a public transport agency. If we are going to create a city that works, better integration and coordination of effort is vital. Planners and developers, together with governments at all levels, must work closely together.

- The third is leadership from government. The State Government’s Meeting our Transport Challenges, Melbourne 2030 and Linking Melbourne strategies all represent significant moves in the right direction. However, there is still a very long way to go, particularly regarding greenhouse gas reduction. The challenge is to ensure the objectives of these strategies and their targets are met through adequate resourcing and through a long-term commitment to deliver on these plans.

Creating a city that works is certainly possible. The drivers for change are understood, and more sustainable options for urbanisation and transport are known and available.

This position paper on passenger transport and urbanisation, the first from Victoria’s Commissioner for Environmental Sustainability, aims to stimulate discussion, raise key issues, analyse some of the current responses to those issues, explore institutional barriers to change, and recommend some actions to help improve the sustainability of Melbourne’s urban environment and transport system.
“Melbourne must be a city where people are the focus, not cars.”
1. INTRODUCTION

The Commissioner believes that everyone has a right to sustainable transport. That is, our transport system should serve communities without adverse social, economic or environmental consequences with people, rather than cars, as the focus of our cities. The Commissioner considers it a matter of urgency that future community and transport planning focuses on achieving environmental sustainability. This means that in the design and planning of urban areas we must ensure that everyone has access to a range of mobility options, including convenient and reliable public transport services, walking and cycling, and that car dependency is reduced.

The dominance of the car in serving our mobility needs presents a range of environmental, social and economic impacts that challenge the sustainability of our cities and towns. The following highlights some of the concerns that underpin this paper:

- In 2004, the transport sector accounted for almost 80 million tonnes of greenhouse gas emissions in Australia (16 per cent of which was attributable to Victoria), an increase of 23 per cent since 1990.
- In Victoria, it is estimated that cars will be producing 13 million tonnes of greenhouse gas by 2008, of a total for all transport (including commercial vehicles, rail, shipping and aircraft) of 24 million tonnes.
- Melbourne is an energy intensive city in world terms, and in common with other Australian cities, has a low density urban form with high levels of car use.
- There is worldwide concern about the long-term future for oil and petrol-based transport systems, with growing evidence that world oil production may be close to peaking.
- There are increasing negative social effects of car dependence including: economic vulnerability, physical inactivity, noise and decreased general amenity.

Addressing these concerns will require innovative solutions. Implementing solutions will require commitment and coordinated input from all levels of government, business and the community.

This paper is organised around the following sections: section two, the key issues identified as being critical to the debate about urbanisation, transport and sustainability; section three, an analysis of some of the current policy responses to those issues; section four, an exploration of current institutional barriers to change; and section five, recommendations aimed at improving the sustainability of Melbourne’s urban and transport systems.
2. URBANISATION, TRANSPORT AND SUSTAINABILITY

The history of Melbourne’s transport system and urbanisation patterns are closely linked and they have given rise to a level of car dependency that means we are not well placed to address three major challenges: climate change, peak oil and the social cost of unhealthy lifestyles. Changing transport and urbanisation patterns is made more difficult because we do not pay the full cost for our mobility and urbanisation choices and market preferences for lower density, detached housing remain. Some of the solutions to these issues are well known and include increasing motor vehicle fuel efficiency, fuel substitution and better urban planning. This section describes this context and leads us to the question of whether our responses to the environmental, social and economic challenges are adequate.

2.1 MELBOURNE SHAPED BY TRANSPORTATION AND MOBILITY DEMAND

Urbanisation and transport patterns in Melbourne over the last century and a half can be broken into several phases:

The public transport city

The first phase of urbanisation was from the mid-nineteenth century to the early twentieth century. During this period, Melbourne grew rapidly to dominate Victoria and to become Australia’s leading metropolis. A world class rail-based public transport system was built, with inner and an outer circle lines, since dismantled, and heavy and light rail lines radiating from the city centre. These helped create a spacious, well laid-out city with extensive parklands, with most of the population living in terraces or detached houses within walking distance of rail lines. Employment was highly centralised in the central business district, supplemented by industrial areas mainly to the west of the city, but with relatively few jobs in the suburbs.

The rise in popularity of the car

The second phase began in the early twentieth century, and lasted until about 1980. This period was dominated by the spread of the suburbs, although employment patterns remained highly centralised and, from the middle of the century, by the rapid rise in popularity of the car which was seen as a superior form of transport (Davison, 2004). In smaller Victorian cities, the car quickly became the dominant means of travel, but in Melbourne the public transport system continued to provide for much of the radial travel to the city centre, while due to rising incomes and falling household size, car ownership rose. Increasingly, cross-suburban trips became possible and then necessary as the population spread and employment and service activities decentralised. As a result, car ownership rates further increased. Public transport patronage fell in absolute terms, with the number of trips per head of population falling from around 370 in 1950 to less than 100 by 1980 (Figure 1). The mode share for public transport fell even faster, and the car reached a position of dominance.


Figure 1: Public transport trips per capita in Melbourne, 1950 – 2006.
A transition phase

The oil shocks of 1974 and 1979 saw a rapid rise in oil prices and a rekindling of interest in public transport. At the same time, major social and industrial changes began to alter urbanisation and transport patterns:

- The manufacturing component of the value chain began to move elsewhere, and employment roles began to shift to white collar jobs, particularly finance and business services, community services and retail.
- A range of social and other factors, such as a trend towards delayed marriage as well as marriage break-up, helped drive a major shift in housing preferences towards apartment living.
- In the 1980s and 90s, the central business district and other inner areas began to recover their importance with major redevelopment projects at Southbank, Docklands and Jolimont.

From 1980 until 2005 public transport usage, particularly radially, increased slightly to just over 100 trips per person per year, with absolute public transport patronage rising again due primarily to population increase.

During this period however, the price of both new cars and petrol fell significantly in real terms, and car ownership and use continued to rise. Furthermore, the expansion of Melbourne’s freeway network, including Australia’s first electronic tollway, is likely, due to induced demand, to have increased total vehicle-kilometres travelled (VCEC, 2006), while temporarily reducing some local road congestion. The net effect has been to contribute to increased travel. As a result, the proportional mode share for walking, cycling and public transport continued to fall as vehicle-kilometres rose more rapidly (Figure 2).

There is some evidence to suggest that the proportion of trips and therefore total person-kilometres travelled by cars has decreased slightly from 2004-06 levels, while those of public transport have increased significantly, with train patronage increasing almost 20 per cent (DOI, 2007). Data from the 2006 census, available from June of this year, will help to determine the extent of such trends. Despite these recent phenomena, the large majority of person-kilometres in Melbourne continue to be carried by private vehicles.

Although not the focus of this paper, another concern is the forecasted significant increase in road freight transport from 40 billion tonne-kilometres in 2007 to 60 billion tonne-kilometres by 2020 (BTRE, 2006). The increased volumes and interactions between freight and passenger road transport are likely to have significant effects on the efficiency and environmental impact of each.

Looking ahead

The evolution of Melbourne’s transport system has been the result of historic changes in land use and access to mobility. While car ownership has provided significant benefits in terms of convenience, especially for more complex journeys, the prevalence of car-based transport has become self-perpetuating. Despite significant recent increases in public transport patronage, especially trains, comparatively, Melbourne remains primarily a car-based system which has amenity, social and health implications, and is relatively energy intensive and task-inefficient in world terms (UITP, 2006). While governments need to provide improved infrastructure and planning mechanisms so that transport choice is available they also need to provide educational initiatives that enable individuals to understand the environmental effect of their living and travel patterns. Finally, it is also recognised that as individuals we all have a responsibility to, within the best of our ability, make considered decisions that minimise the environmental pressure incurred by our own need for mobility.

Given our current reliance on car-based transport there are three important issues that must be addressed if Melbourne is to remain viable in the future. These are climate change, peak oil and the social impacts of car dependence. These issues are explored in the next section.


*Figure 2: Estimated Victorian urban passenger motorised transport task; million person-km travelled by mode 1985–2004 (does not include walking and cycling, watercraft or light commercial vehicles).*
2.2 CAR DEPENDENCE: CLIMATE CHANGE, PEAK OIL AND SOCIAL IMPACTS

Climate change

Over the last 10–20 years there has been much debate about climate change; whether it was happening, what was causing it and what were likely to be its effects. By 2004, there was a strong consensus that it was real (Oreskes, 2004), accelerating and could have potentially catastrophic effects. The Stern Review (UK HM Treasury, 2006) notes that the latest research indicates that atmospheric greenhouse gas (GHG) levels are highly anomalous within an historical perspective and that “the rate of increase in CO₂ concentrations is accelerating, being twice that of thirty years ago” (UK HM Treasury, 2006, p.3).

Further, the Stern Review states that “The evidence shows that ignoring climate change will eventually damage economic growth. Our actions over the coming few decades could create risks of major disruption to economic and social activity, later in this century and in the next, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century” (UK HM Treasury, 2006, p. ii).

There is now little argument that we need to respond to climate change. The recent Intergovernmental Panel on Climate Change publication, Climate change 2007: The physical science basis (Summary for Policymakers) (IPCC, 2007) makes it clear that global debate is now focusing on responses: what must be done to slow the process of climate change, to ameliorate its impacts and to adapt to it. An increasing number of countries are now proposing deep cuts in greenhouse gas emissions over coming decades. Over the last 12 months the debate has shifted very quickly, and now the community, business and governments are largely convinced that climate change presents a real risk and may already be upon us.

The Victorian Government has responded with a range of initiatives, including the establishment of the Office of Climate Change and the setting of an ambitious GHG emissions reduction target of 60 per cent by 2050. However, it is not yet clear how this target will be achieved.

In Australia, transport accounted for almost 80 million tonnes of GHG in 2004, an increase of over 23 per cent since 1990 (Table 1). Were it not for sharp declines in emissions from land clearing, that cannot be repeated, Australia would have recorded a significant increase in gross CO₂ emissions since 1990, the point at which Kyoto targets are based.

<table>
<thead>
<tr>
<th>Source</th>
<th>Emissions (million tonnes CO₂-equivalent)</th>
<th>1990</th>
<th>2004</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Energy</td>
<td></td>
<td>287.5</td>
<td>387.2</td>
<td>34.7%</td>
</tr>
<tr>
<td>Stationary</td>
<td></td>
<td>195.7</td>
<td>279.9</td>
<td>43.0%</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td>61.7</td>
<td>76.2</td>
<td>23.4%</td>
</tr>
<tr>
<td>Fugitive Emissions</td>
<td></td>
<td>30.0</td>
<td>31.0</td>
<td>3.4%</td>
</tr>
<tr>
<td>Industrial Processes</td>
<td></td>
<td>25.3</td>
<td>29.8</td>
<td>18.0%</td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td>91.1</td>
<td>93.1</td>
<td>2.2%</td>
</tr>
<tr>
<td>Land use</td>
<td></td>
<td>128.9</td>
<td>35.5</td>
<td>-72.5%</td>
</tr>
<tr>
<td>Waste</td>
<td></td>
<td>19.2</td>
<td>19.1</td>
<td>-0.7%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>551.9</td>
<td>564.7</td>
<td>2.3%</td>
</tr>
</tbody>
</table>


Victoria’s economy has been built on the availability of cheap fossil-fuel energy – the combustion of coal for power industries and oil for transport, fuels which are greenhouse intensive in combustion (OCES 2006). As a result of Victoria’s pattern of urbanisation, and the sources of energy that are used, the energy consumed by transport results in high emissions of GHG.

In 2008 it is estimated that transport in Victoria across all modes will generate 21 million tonnes of GHG (approximately 17 per cent of the total GHG attributable to Victoria (AGO, 2006b)), 56 per cent of which will come from cars and 25 per cent from trucks and other commercial vehicles (Figure 3). By comparison, buses and trains are minor sources of GHG, and even shipping and aircraft are relatively minor sources (BTRE, 2002).
Trends in passenger transport task share\(^1\) (see Figure 2) mean that the amount of energy used in the transport sector continues to increase and that private motor vehicles continue to constitute the greatest percentage of this, around 52 per cent (206 petajoules) in 2004 (ACG, 2006). Melbourne's transport system is also particularly energy (and therefore GHG) intensive compared to those of The Economist magazine's other Most Liveable Cities nationally and internationally (Figure 4).

It is argued that this level of energy intensity (at this per capita, per year level) is the result of Melbourne's low urban density and diversity, which generates trip distances that are long in relation to comparable international cities (UITP, 2006).

Studies of over 100 cities internationally have shown that private transport energy use per capita is inversely proportional to density, with Australian cities generally performing poorly (ISTP, 2006). Within Melbourne, the amount of energy used in transport varies by municipality (Figure 5). This variation is dependent on density as quantified by 'activities per hectare' – a measure combining built form density and 'people per hectare' (Newman, 2005).

Addressing transport energy use, which has been growing rapidly in Australia and around the world, is of particular concern as an aspect of managing climate change because transport systems are heavily based on oil, a carbon intensive energy source.

The current greenhouse intensity of car use in Melbourne (approximately 200g CO\(_2\) on a person-kilometre basis) means that attention must focus on ensuring that inefficient car use is minimised through better urban planning and design. Given the lag times necessary to effect change in planning and density, improvements in engine design (for example via the Australian Design Rules) that continue to reduce greenhouse intensity is also of high priority.

While GHG emissions from motor vehicles constitute the greatest proportion of transport related emissions, currently Victorian modes that rely on electricity (trams and trains) have GHG full fuel cycle intensity levels on an average per person-kilometre basis that are comparable to motor vehicles (GWA, 2002; ACG, 2006). This is due to Victoria's electricity supply being dependent on brown coal (OCES, 2006). The operating greenhouse intensity of trams and trains is likely to be lower than that of motor vehicles during peak times due to the high occupancy rates and traffic congestion, but higher in non peak times.

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\(^1\) 'Transport task share' refers to the proportion of total transport, measured in person-kilometres travelled, carried by each mode.
The greenhouse intensity of public transport will be further improved through better networking and peak spreading that increases occupancy rates and, as with all industries that utilise electricity, as forms of renewable electricity generation become more accessible. Since these calculations were made, public transport patronage rates have increased and this is likely to have shifted the balance towards public transport being the lower greenhouse emitting mode, with ongoing increases in patronage rates only strengthening the case for public transport. Due to the complexity of these calculations, further work is needed to better understand greenhouse intensity and comparisons of intensity between modes.

**Peak oil**

Because of its dependency on the car, Melbourne’s transport system is relatively vulnerable to future energy supply shocks. It is clear that world oil production will one day reach a peak while demand will continue to rise. The concept is labelled ‘peak oil’ (Simmons, 2005).

Figure 6 shows that global production of oil has consistently exceeded the discovery of new reserves since 1980, and that no new major discoveries of oil have been made since the late 1970s. As a result of this, the Association for the Study of Peak Oil (ASPO) estimates that world oil production from conventional sources is close to peaking and that total oil and gas production including deepwater oil, polar oil, tar sands and other heavy oils may peak as soon as 2010. Other groups, such as the USA Geological Survey and Cambridge Energy Research Associates, have forecast longer timeframes. At the same time as world oil production is reaching a plateau, global demand continues to increase. For example, in 1996 China had only 5 million motor vehicles (4 per thousand head of population) (Pucher, Peng, Mittal, Zhu, & Korattyswaroopam, 2007). In the first eleven months of 2006 alone, some 6.5 million vehicles were sold in China, with forecast total sales of 9.6 million vehicles per year by 2010 (AFP, 2007).

As ever increasing global demand means the balance between supply and demand becomes much tighter, supply disruptions, such as the effect of Hurricane Katrina on oil supply from the Gulf of Mexico, which would previously have been absorbed within the global economic system, have an increasing influence on prices (Skrebowski, 2006).

Since 2005, there has been a rise in world oil prices, which had fallen in real terms back to levels below those in the 1960s before the first oil shock of 1974. The price of oil rose from US$30 a barrel in 2005 to its current level in the vicinity of US$70 a barrel, pushing up retail petrol prices by more than 30 cents a litre.

The sudden emergence of a gap between rising demand and supply that was seen during 2006 drove oil prices, and therefore petrol prices, up rapidly. Without proactive adaptation, an ongoing rise could lead to significant economic and social consequences. In the short term, increasing prices would hit hard those countries and cities which are most dependent on cars for transport, including Melbourne.

One of the impacts of peak oil is likely to be a strong increase in demand for public transport as petrol becomes less affordable. Melbourne must be ready to meet this future challenge, and the move to a low energy transport system must also be low in greenhouse intensity, and needs to start now. Most importantly, across the whole transport system, any responses to possible future oil supply constraints must not be at the cost of the environment.

![Graph showing past and forecast discovery compared to production of regular conventional oil.](source: The Association for the Study of Peak Oil and Gas (ASPO) (2006).)

*Figure 6: Past and forecast discovery compared to production of regular conventional oil.*
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Social impacts of our transport system and urbanisation patterns

It is generally understood that the distribution of mobility choices is not evenly spread across the metropolitan area, and this influences social and economic patterns. Several mode choices exist for those living in the inner areas of Melbourne, but with distance from the centre there is a general pattern of reduced choices and higher car dependency. The work of Dodson and Sipe (2006) demonstrates the social and economic impact of greater car dependency away from the centre (Figure 7).

They found that the extra burden of higher petrol prices in outer areas leads to social and economic vulnerability. Car dependency in the outer suburbs of Melbourne means that an increasing proportion of the household budget needs to be devoted to transport, especially when petrol prices rise, pushing up the total cost of living, and increasing the vulnerability of households which are already highly geared. This is a result of transport and urban planning that has for many years favoured the car above other modes.

Source: Dodson and Sipe (2006), p. 34. Figure 7: Vulnerability assessment for mortgage, petrol and inflation risks and expenditure (“Vampire”) assessment for Melbourne. High values indicate higher levels of vulnerability.
This research shows how Melbourne’s current car dependence can affect the social and economic wellbeing of families and individuals. Even with a relatively small petrol price increase, large parts of Melbourne’s fringe could shift to high levels of vulnerability. This vulnerability is likely to persist until alternative mobility options are provided evenly across the metropolitan area. The work of Dodson and Sipe therefore also shows why it is important to plan for early adaptation to future energy supply constraints.

Recent government initiatives, such as the orbital bus routes planned as part of Meeting our Transport Challenges (DOI, 2006) the removal of Zone 3 from the public transport fare system, and the progressive approach led by the Growth Areas Authority to structure planning that raises the viability of non-car modes will go some way towards addressing these issues. Such changes will assist those who live in outer areas but do not own cars, and are most in need of efficient public transport.

As well as social vulnerability, living in a car-dependent city also affects individuals’ physical health. While the costs to the community and the medical system of road accidents and air pollution are well understood, the link between the design of cities and human health has become clearer in recent years.

In September 2006, at the 10th International Congress on Obesity in Sydney, the Chair, Professor Paul Zimmet, stated that “the spread of McMansion developments without attention to footpaths, bike paths, public transport corridors, playing fields and friendly exercise areas, attractive and accessible to people” was perhaps as significant to the cause of obesity as were the influences of ‘too much food’ and ‘too little exercise’ (The Age, September 5, 2006).

Pucher and Dijkstra (2003) examined the relationship between the share of trips by walking, cycling and public transport across a range of affluent countries and the extent of obesity (Figure 8). While the degree and direction of causality has been disputed, and other factors may play a role, they found that an inverse correlation existed.

In addition, the authors found that American cyclists and pedestrians were two to six times more likely to be killed on the road than their German or Dutch counterparts. Germany and the Netherlands are two of the countries with the best provision for cycling, and the highest use of bicycles. As understanding of the effects of car-dependent mobility on human health increases, governments are beginning to understand the important role that urbanisation patterns and transport planning play in creating safe and healthy communities.


Figure 8: Obesity and travel behaviour.

2. McMansion: The term refers to modern outer suburban developments that feature large houses often of pastiche design, on blocks that are relatively small compared to more traditional dimensions. The term has been used to describe a collection of aspects of housing and development, not all of which are necessarily socially or environmentally unsustainable.
2.3 THE TRUE COSTS OF URBAN TRANSPORT

Climate change, peak oil and health impacts represent significant challenges that Melbourne, as a car-based city, needs to address. Each of these issues lends weight to the argument that car-dependent cities are unsustainable – socially, environmentally and economically.

Leading researchers Peter Newman and Jeff Kenworthy found that cities with high car dependence tend to spend more of their gross regional product on urban transport than those cities which rely more on public transport, and which have urban densities and structures which enable and support mass transit (Newman & Kenworthy, 1999).

A range of external costs are associated with high car dependence, such as congestion, transport accidents, air pollution, noise, and use of space for roads and parking. A major study in the USA (Shoup, 2005) found that parking is heavily subsidised in USA cities and represents a major distortion in transport pricing. Research in Sydney indicates that the total social cost (including externalities) of running a car is 80 cents per person-kilometre, compared with 40 cents per person-kilometre for rail and 43 cents per person-kilometre for buses (Glazebrook, unpublished). Preliminary research (DOI, 2006b) indicates that these costs are similar for Melbourne, with congestion comprising around 22 per cent and accidents about 7 per cent of the total cost to society of car-based mobility.

The Victorian Competition and Efficiency Council’s 2006 report, Making the Right Choices: Options for Managing Transport Congestion, includes an estimated annual cost for congestion alone of $1.3 to $2.6 billion in 2006 (VCEC, 2006). Others forecast that the figure will reach $8 billion by 2015 (BCA, 2005).

It is important to recognise that congestion, although significant, is only one of the range of social externalised costs of high car dependency and that the impact of increased GHG emissions on climate change is also of high importance. Any strategy aimed at reducing congestion must do so in a way that reinforces rather than undermines the equally important objective of reducing long-term GHG emissions.

The diseconomies that result from the inefficiencies in the current system, as well as the large amount of infrastructure required, mean that society must subsidise car-based transport via taxes. Society as a whole pays a high cost for our transport systems, which are largely car dependent. Users also perceive the car as more convenient, but cities with land uses adapted to the car tend to spread out at low density, increasing travel distance and trip times, which to a large extent counters the time advantage made possible by the speed of cars.

Recognition of this situation in Perth helped drive that city’s major effort to upgrade its public transport systems and change the nature of its development. As discussed later, Perth is now the leading city in Australia for transit oriented development and is rapidly expanding its rail and bus systems.

While its transport system is very different to Melbourne’s, Perth demonstrates that changing car dependency is possible, although it can be a slow process. At the same time it is important to focus on reducing the impacts of car use and shifting patterns of urbanisation to better suit a range of mobility options. These points are discussed in the following sections.
2.4 INCREASING MOTOR VEHICLE EFFICIENCY AND FUEL SUBSTITUTION

A recent rise in petrol prices has led to some behavioural changes, such as a shift in new car purchases towards more fuel efficient vehicles and increased demand for public transport. Given the current energy and greenhouse intensity of passenger vehicles, there is significant scope for improving efficiency. But the question remains: how quickly could entire cities like Melbourne reduce GHG emissions from transport and adapt to declining fuel availability?

In 2005, there were some 790,000 new cars registered in Australia, of which 22 per cent were large (for example Holden Commodore) and a further 23 per cent were four-wheel drive vehicles (Federal Chamber of Automotive Industries (2006)). These vehicles have fuel consumption rates in the range of 14-22 litres/100 kilometres (urban) and 8-17 litres/100 kilometres (non-urban). At the other extreme, the petrol/electric hybrid Toyota Prius has a stated fuel consumption of 5.6 litres/100 kilometres in CBD driving, 5.0 litres/100 kilometres in suburban driving, and 4.5 litres/100 kilometres in highway driving. This is approximately 36 per cent lower than a sample of similarly sized conventionally powered vehicles. If all new cars were to be sold with new hybrid-powered engine technology from tomorrow, fuel cycle consumption could be reduced by over one third within about 20 years (the time it would take to replace the whole fleet). However, it should also be noted that some have raised doubts about the capacity of current hybrid vehicles to reduce overall GHG emissions over their entire life cycle, due primarily to the large quantities of energy used in their manufacture (CNW 2006).

A more realistic estimate would be a 25 per cent saving achieved per vehicle over perhaps 30 years compared with current fuel consumption, allowing time for manufacturers to develop new models. This does not allow for growth in overall vehicle numbers, or the more difficult task of reducing fuel consumption by trucks and heavy commercial vehicles, many of which are already powered by relatively efficient diesel engines.

Another option is to retain internal combustion powered vehicles, but to gradually replace existing petroleum based fuels by ethanol, methanol, biodiesel or other biofuels. There are already moves in this direction. For example, the USA plans to increase production of ethanol from corn, while the European Union has issued a directive to promote biofuels or other renewable fuels (UK Department for Transport, 2006). However, there are concerns about the amount of land currently used for food production and ecosystem services that would be required for ethanol production at a scale that is sufficient to meet the demands of what is currently an inefficient transport system (Skrebowski, 2006; UK Department for Transport, 2006). Further, there is uncertainty over the net energy benefits of biofuels under a ‘full fuel cycle analysis’; when the energy required for growing the crops and processing them is taken into account. Some studies show net energy gains are possible, while others point out that net energy losses are also possible (Farrell et. al., 2006; Pimental & Patzek, 2005; Shapouri, Duffield & Grabowski, 1995). Establishing a minimum energy performance standard for biofuels would be one way to ensure their use reduces energy and GHG emissions as compared to petroleum.

A popular but longer term alternative is the replacement of internal combustion engines with fuel cells, such as those powering three buses as part of a recent trial of the technology in Perth. Fuel cells require hydrogen, which can only be created using energy. In Australia, that energy would be predominantly provided by fossil fuels, limiting any improvements to the overall greenhouse gas emission picture. Furthermore, the time required to replace conventionally powered vehicles with fuel cell equipped vehicles would be greater than that for hybrid engine vehicles. There are other potential technologies involving biofuels as the raw energy source for fuel cells, but those issues noted above regarding net energy benefits and impact on agriculture would still apply.
2.5 URBAN PLANNING AND MELBOURNE’S TRANSPORT

As with most modern international cities, Melbourne’s transport system has evolved in an era of high energy availability that is unlikely to continue. While providing a high level of mobility, the transport system has also created environmental and social issues that must now be addressed. Whether it is for reasons of regulatory environmental management, limited access to or availability of oil or a combination of these factors, Melbourne’s transport system now needs to evolve to a lower energy future. Switching to alternative fuel sources is a worthy exercise, but because our existing infrastructure and mobility patterns have evolved in response to cheap energy, this response is unlikely to be sufficient to future proof Melbourne.

Significant moves to walking, cycling and low greenhouse intensive, mass public transport will necessarily play a major role in ‘energy proofing’ our cities and lifestyles. Increasing the role of strategic land use planning and urban design programs that actively facilitate these modes is essential if they are to effectively carry a greater proportion of Melbourne’s total transport task into the future. These approaches can also assist in addressing the social impacts of our current transport system and urbanisation patterns.

Both nationally (South East Queensland, Sydney, Perth (Spiller, 2006; Newman, 1999)) and internationally (Portland, Vancouver and others (Gibson, 2006)), strategies that integrate land use and transport planning for sustainability are being or have been developed as they are recognised as vital to the future of cities. In Melbourne too, Melbourne 2030 and subsequent strategic documents developed by the Victorian Government contain strong policies and directions that have the intention of reducing energy use and therefore the environmental impact of transport.
“Importantly, the Government has not shied away from the need to set the direction through a long-term plan.”
3. CURRENT RESPONSES TO MELBOURNE’S TRANSPORT CHALLENGES

There has been a range of responses in Victoria and Melbourne to the challenge of providing sustainable mobility, including better land use planning and reducing the energy intensity of the transport system. Importantly, the Government has not shied away from the need to set the direction through a long-term plan. This section outlines some of the most significant policy and regulatory responses that have emerged in recent years, and assesses how well they are meeting their stated aims.

3.1 MELBOURNE 2030 AND LINKING MELBOURNE

In 2002 the Victorian Government released Melbourne 2030 (DOI, 2002), a metropolitan strategy that has as its goals improving Melbourne’s environmental and social sustainability. The strategy has been hailed as a new approach that focuses on containing Melbourne’s growth within an urban growth boundary (UGB) and consolidating development around activity centres across the metropolitan area.

Melbourne 2030 and the subsequent transport strategy for the implementation of several Melbourne 2030 policies, Linking Melbourne (DOI, 2004) aim at reducing the growth of travel demand, and in particular the growth in car based travel, through a number of strategies which are stated as including:

- Concentrating future population growth into established areas (69 per cent) with the remaining 31 per cent occurring in five corridors (Casey-Cardinia Park, Hume, Melton-Caroline Springs, Whittlesea and Wyndham) that have existing access to heavy passenger rail, and therefore offer potential for supporting principle public transport network (PPTN) bus routes.
- Encouraging job and activity concentrations into key ‘Transit Cities’, mostly on the rail network, with 41 per cent of new dwellings to be absorbed in 120 higher order activity centres and other strategic development sites.
- Encouraging mixed use development, with high job, service and dwelling densities providing greater opportunities for walking.
- Encouraging increased job growth in the new growth corridors, to reduce the requirement for long distance commuting.
- Enhancing the public transport system through a series of measures.
- Setting a target of 20 per cent of motorised trips by public transport by 2020 (compared with 9 per cent in 1999) - the 20/2020 target.

Based on previous trends in overall travel, the strategy would require increasing the number of public transport trips per capita per year to over 200 by 2020, similar to the 1966 level and similar to the levels achieved in cities like Montreal, Copenhagen or Oslo. In other words it would require a dramatic increase in the total number of public transport trips, from 390 million in 2005/6 (DOI, 2006a) to over 1 billion by 2020.

The strategy’s objectives are broadly supported. While it is recognised that we are only five years into a 30 year implementation programme, there is some concern that Linking Melbourne’s focus on arterial roads has already begun to move away from the aims set by Melbourne 2030. In regard to both documents, there are also concerns regarding the means by which targets will be achieved. In particular whether:

- the proposed enhanced public transport system would have the capacity to handle the anticipated patronage
- the negative effects of urban spread can be contained, given the UGB has been shifted to increase land supply from 18 to 25 years at a relatively low density rate
- Integrated Transport Strategies (ITSs), for large retail centres that are not on rail routes and are therefore based on buses, will be sufficient to fully integrate the centres within the MPIN, such that these centres can also contribute to the necessary reduction in car use
- there are incentives in place to check the growth in travel demand and encourage a significant shift to non-car modes.

There are concerns over the resources available over the long term to assess whether progress is being made towards these sustainability goals and whether the Melbourne passenger transport task indicator (such as VATS) (RMIT University, 1999) can provide sufficiently meaningful historic information on progress towards the goals. It is also essential that the planned new data collection method, VISTA (DOI, 2007) remains sufficiently funded over the long term such that trends can be re-established and accurate evaluations made of progress towards goals.
3.2 MEETING OUR TRANSPORT CHALLENGES

The government statement Meeting our Transport Challenges (MoTC) (DOI, 2006) is clearly a significant step in the right direction compared with past funding levels and the priority previously given to public transport. However, it is less clear whether even programs of this size will lead to the fundamental changes in behaviour that are urgently required to address the challenge of climate change.

Overall, the program gives significant priority to public transport compared with roads, with approximately $6.2 billion allocated for improvements to metropolitan and regional public transport (excluding freight rail, level crossings, transit cities, cycling and other initiatives) compared with $2.8 billion for major road upgrades and extensions. The program includes a 'reserve' fund that is aimed at ensuring future governments can continue to meet the objectives.

Despite the overall allocation, the 2006/7 budget allocation gave greater relative priority to road projects, with allocations amounting to 38 per cent of the 10 year figure for roads, compared with 13 per cent of the 10 year budget for key public transport projects (Table 2).

This initial budget allocation shows the large commitment to improvements on the Monash and Westgate freeways. In addition, while there are major initiatives for extending the Smart Bus system and expanded bus routes in outer (much needed) areas, the initial allocations in 2006/7 for rail were focused mainly on train control and safety, and improving access at stations.

However, to address strong growth in demand for train services, the recent 2007/8 State Budget brought forward significant MoTC funding. A $362 million package was announced that will deliver 10 new trains by late 2009 and fund the recruitment and training of 22 extra drivers.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>MoTC</th>
<th>10 year Total</th>
<th>2006/7 allocation (over 4 yrs)</th>
<th>2006/7 as % of total</th>
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<tr>
<td>Action item</td>
<td>$m</td>
<td>$m</td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>ROAD – TOTAL</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monash - Westgate Freeways</td>
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<td>$865</td>
<td>$742</td>
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<td>$230</td>
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<tr>
<td>Regional Victoria</td>
<td>6</td>
<td>$690</td>
<td>$115</td>
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<td>PUBLIC TRANSPORT – TOTAL</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>Local Area and Flexible Solutions</td>
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</tr>
<tr>
<td>Other – TOTAL</td>
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<tr>
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<td>Cycleways</td>
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<td>$7</td>
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<td>$200</td>
<td>$24</td>
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<td>Road Safety</td>
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<td>$600</td>
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<tr>
<td>Ports</td>
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<tr>
<td>Regional Freight Rail</td>
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<tr>
<td>TOTAL</td>
<td>$10,140</td>
<td>$2,025*</td>
<td></td>
<td>20%*</td>
</tr>
</tbody>
</table>

Sources: Meeting our Transport Challenges (MoTC); (DOI, 2006a), Victorian Government (2006a, 2006b & 2007)

Table 2: MoTC financial allocations.

*The 2007/8 Victorian Budget brought forward funding for 10 new trains and 22 extra drivers.
It is acknowledged that it takes time to redirect infrastructure funding programs that have for so long been focussed on roads. Further, it is acknowledged that recent road infrastructure and planning development has delivered improvements to social sustainability in Melbourne’s west (Spiller, 2006). However, the focus of spending on roads in the initial phase of the MoTC budget could establish a pattern that will compromise the 10 year intention of the MoTC document.

In addition to funding, appropriate coordination will be required if the goals of Melbourne 2030 are to be achieved. For example, individual modes (train, tram, bus, taxi) should be fully integrated with each other and with modes that can enhance access (walking, cycling, park and ride, kiss and ride, etc) to provide a truly seamless system. Some have highlighted that current franchising arrangements reduce the Government’s capacity to ensure ongoing flexibility and a coordinated system (Mees, Moriaty, Stone & Buxton, 2006) and that the Melbourne 2030 target of getting 20 per cent of motorised trips onto public transport by 2020 was not strongly reiterated as a policy that drives MoTC, but was given only an incidental reference. The 20/2020 target needs to be supported with a series of clear intermediate steps that show how it will be achieved.

3.3 TRANSIT ORIENTED DEVELOPMENT

The Government has also announced the Transit City Initiative to develop mixed use higher density ‘Activity Centre’ developments at key nodes on the public transport system. While significant amounts of money have been allocated to such projects, they remain a small proportion of all developments. They do however provide local implementation case studies of transit orientated development (TOD) principles and are being used by government to encourage developers and councils to incorporate principles more widely across activity centres of all sizes.

The TOD approach has proved highly successful overseas in building up transit patronage, particularly in cities like Washington DC and Vancouver which have been based largely around car access. Research in the USA (Renne, 2005) showed that transit mode share for TODs has increased over the last 30 years, whereas it has fallen significantly in other parts of the metropolitan statistical areas (Figure 9). In the City of Vancouver, transit patronage has grown rapidly, walking and cycling has grown even faster and car use is down.

There are some good examples of TOD in Melbourne (for example Docklands, Box Hill and Beacon Cove), as well as in Sydney and Perth. More locally, local authorities with support from state government agencies are also now incorporating TOD principles into new urban design frameworks and structure plans.

TOD principles have been increasingly incorporated into planning practice in all states though no clear mechanism for delivery has been established and no funding is being considered by the Australian Government (such as Better Cities in the early 1990s). Nevertheless, there is evidence of a powerful market force for TODs internationally. In the USA, The Center for Transit Oriented Development estimates that an extra 15 million Americans would prefer to live within half a mile of a train station as they would save around 20 per cent of their household income due to the reduced need for a car (CTOD, 2004).

Historically much of Melbourne’s current TOD was achieved by the early tram and train operators developing land along their routes. Management of the services then passed to government once development opportunities were realised. More recent examples of coordinated land use and transport planning, nationally and internationally include:

- Hong Kong, where the major rail companies are also major land developers of real estate around rail stations.
• The United States, where transit is partly funded from additional land-based tax revenues in designated ‘improvement districts’ around the transit stops.

• Perth, where East Perth and Subiaco were comprehensively redeveloped as Transit Oriented Developments by the East Perth Redevelopment Authority, and where major new TOD developments are occurring around the new stations on the Northern Suburbs and South-Western Suburbs rail extensions.

• Sydney, where there is major development occurring around the three new stations on the Epping - Chatswood rail line before the line is opened.

These examples provided ‘win-win’ situations where the profits from land development and increased land prices are used to offset the cost of public transport infrastructure, and where the increased population, retail and commercial activity around the public transport nodes feed traffic onto the public transport system, helping to generate the higher patronage levels.

Given the long lead times to re-orient land uses (10 to 20 years for major redevelopment is realistic) it is important for these TOD initiatives be accelerated so that substantial progress can be achieved by 2020. It is acknowledged that plans for TOD can meet with local resistance, particularly if the community is not involved in the process. Community consultation that enables the development of locally supported and robust urban design frameworks is therefore essential if TOD is to be successful. With community input, TOD developments at high value sites such as train stations can attract best practice architecture that nonetheless preserves local amenity and heritage values.

3.4 AURORA

Project Aurora is a 630 hectare demonstration project by VicUrban, the Government’s land development agency, located in Whittlesea in the Northern Corridor, approximately 20-25 kilometres north of the Melbourne CBD. 29 sustainability ‘priorities’ were developed by VicUrban to guide this project, covering the environmental, social and economic dimensions of sustainability (VicUrban, 2006a).

The Aurora Context Study (Hornery Institute 2005) reviewed the plans and processes needed to capitalise on the development opportunity. It found two particular challenges for the achievement of sustainable transport on this site – ensuring higher densities and providing necessary rail infrastructure.

High density and activity diversity is needed to support transport services

The assessment found that services should be spaced within acceptable walking distances, including a bus stop within a 5 minute (400 metre) walk, a corner shop within a 10 minute (800 metre) walk and a railway station within a 15 minute (1200 metre) walk. Given these distances and the proposed density of the Aurora design, at least 18 corner shops, four doctors’ surgeries and schools, and two railway stations, hospitals and major shopping centres are needed, preferably situated throughout the development.

One objective in planning Aurora was an average density of 50 persons per hectare, which is significantly higher than other developments in outer Melbourne though still below some overseas examples. It will be important to monitor progress towards this goal and to see whether transit services are provided in response.

The plan outlined by the Hornery Institute identified two potential rail stations and town centres, both of which are located near the eastern boundary of the site, within park and ride distance, but with their 15 minute walking catchments beyond a significant proportion of the future population of Aurora, although extending beyond Aurora itself, particularly to developments in the east.

There is no certainty that a railway service is forthcoming

Recent experience in Perth suggests that people in outer suburban developments will accept smaller lots provided that they are situated close to high quality transport. For example in both the northern and southern suburbs of Perth, small lots (down to 250 square metres) have sold well in transit oriented designed subdivisions near proposed rail stations even in areas beyond 25 kilometres from the Perth CBD. In the case of Perth, three key factors are involved:

• There is confidence from both developers and the public that the State Government will build the rail lines soon after development has commenced (Northern line extended and the South Western line currently under construction).

• The rail service provided is high speed, frequent and comfortable.

• The subdivision design reinforces transit stops with other activities and provides safe and convenient walking paths to the centres.

The subdivision design reinforces transit stops with other activities and provides safe and convenient walking paths to the centres.
The draft Aurora Land Release Staging Plan (The Hornery Institute, p. 12) and Meeting our Transport Challenges suggest there is no existing timeline for extending the rail system from the Epping line into the Aurora site. It is acknowledged that the establishment of public transport use patterns is the priority, rather than the mode by which the pattern is provided (such as buses versus a train). Nevertheless, in other places (such as Perth), the presence of rail has been shown to create a greater level of confidence in new developments. Given that Aurora is expected to be delivered over the next 20 years, it is important that the public transport services, whether they be comprehensive bus services, or rail infrastructure and services, are in place early so that transport choice is available and car dependence does not become entrenched.

The Epping rail service is currently much slower than best practice outer urban services (although MoTC programs, The Epping rail service is currently much slower than best practice outer urban services (although MoTC programs, are in place early so that transport choice is comprehensive bus services, or rail infrastructure and services, are in place early so that transport choice is available and car dependence does not become entrenched. Nevertheless, in other places (such as Perth), the presence of rail has been shown to create a greater level of confidence in new developments. Given that Aurora is expected to be delivered over the next 20 years, it is important that the public transport services, whether they be comprehensive bus services, or rail infrastructure and services, are in place early so that transport choice is available and car dependence does not become entrenched.)

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In addition to these factors, the lack of a train service at Aurora has been shown to create a greater level of confidence in new developments. Given that Aurora is expected to be delivered over the next 20 years, it is important that the public transport services, whether they be comprehensive bus services, or rail infrastructure and services, are in place early so that transport choice is available and car dependence does not become entrenched. Nevertheless, in other places (such as Perth), the presence of rail has been shown to create a greater level of confidence in new developments. Given that Aurora is expected to be delivered over the next 20 years, it is important that the public transport services, whether they be comprehensive bus services, or rail infrastructure and services, are in place early so that transport choice is available and car dependence does not become entrenched.)

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While the requirements cover the broad objectives well, it will be important to monitor the degree to which their implementation achieves the intent. For example:

- For 16 lot or larger developments, Clause 56 is linked to other policies such that applications must be accompanied by a written statement that discloses how the subdivision implements related strategic planning and transport policies (56.02). It will be important to monitor the success of such clauses in areas of faster growth. If a development’s context within a wider framework is not recognised (due for example to an absence of up-to-date strategic policies), opportunities to integrate sustainable transport with neighbouring areas may not be realised.

- Each clause sets out a number of standards which should be achieved. While flexibility enables design responses to different situations it may also mean sustainability opportunities are lost depending upon the rigour and experience applied at the approval stage. The process and outcomes could be improved if future Planning Practice Notes provided further, more detailed guidance in the form of best practice case studies.

- Standards for lot design (C7) provide performance based opportunities to increase density. However while the draft provisions proposed default densities of 10 lots per hectare, and while it is acknowledged that diversity in density is important, no clear targets have been set in the final document, and the target implied in Melbourne 2030 (DOI, 2002, p.63) (15 lots per hectare, which is low by international standards) is not mentioned.

If the objectives and standards are applied systematically and to the more environmentally rigorous end of the parameters which their flexibility allows, Clause 56 will perform a vital and integral role in meeting the objectives of more sustainable urban form implied by Melbourne 2030. As an example, in the long term, application of Clause 56 could also help to establish a ‘virtuous circle’ where higher public transport patronage can justify more frequent services and longer hours of operation, which in turn will attract more patronage. It will be important to closely monitor the level of success that Clause 56 achieves towards meeting its transport sustainability goals as implied in Melbourne 2030.

### 3.5 VPP CLAUSE 56 – SUSTAINABLE NEIGHBOURHOOD PACKAGE

In October 2006, the Victorian Department of Sustainability and Environment released a package of measures that promote sustainable neighbourhoods with the explicit aim of achieving some of the policy goals of Melbourne 2030. The package includes new residential subdivision provisions in Clause 56 of the Victorian Planning Provisions (VPPs) covering issues relevant to transport including Subdivision site and context description (56.01), Liveable and sustainable communities (56.03), Lot design (56.04) and Access and mobility management (56.06) (DSE, 2006).

Clause 56 contains comprehensive requirements that aim to encourage sustainable transport planning within the framework of statutory land use planning. It is a progressive amendment and attempts to implement many of the sustainable transport and planning elements of Melbourne 2030, in particular the Neighbourhood Principles (DOI, 2002, p.102), into subdivision design and the master planning of developments in a systematic way.

<table>
<thead>
<tr>
<th>Stations</th>
<th>AURORA &gt; MELBOURNE</th>
<th>CLARKSON &gt; PERTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance as crow-flies (km)</td>
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<td>30</td>
</tr>
<tr>
<td>Travel Time</td>
<td>45 - 53 minutes*</td>
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</tr>
<tr>
<td>Effective Speeds</td>
<td>Av Speed (Min)</td>
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</tr>
<tr>
<td></td>
<td>25 - 30 kph</td>
<td>56 - 60 kph</td>
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<tr>
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<tr>
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<td>15 minutes</td>
</tr>
<tr>
<td>Evening (after 9pm)</td>
<td>30 minutes</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

Table 3: Comparison between rail links to Aurora (Melbourne) and Clarkson (Perth).

* Based on current times to Epping (40-48 mins) plus an extension to Harvest Home Road. The plans for Aurora contain good provisions for walking and cycling, and provide good potential for new local area buses. Similarly, good use has been made of existing bus networks to link residents to Epping and Thomastown stations. Another encouraging feature is the close proximity of Aurora to the Cooper Street Employment Precinct immediately to the south, which is envisaged to provide up to 23,000 jobs. However, in the short term at least, the absence of a train service means that car use may well be as high as in other suburban areas.
“Recent policy initiatives in Victoria have improved urban sustainability through transport and land use change, but potential gaps and shortfalls in the policy approaches remain.”
4. ADDRESSING BARRIERS TO CHANGE

Recent policy initiatives in Victoria have improved urban sustainability through transport and land use change, but potential gaps and shortfalls in the policy approaches remain. These include a lack of focus in using pricing signals, insufficient coordination of demand management and incentive programs, institutional barriers to implementation, including vested interests, and lack of resources to meet the targets that have been set. There are a number of ways these can be addressed, as set out in this section.

4.1 RATIONAL PRICING

Some of Australia’s most egregious policy mistakes have arisen due to failure of governments, stretching back to colonial times, to insist on the appropriate pricing of access to natural resources like water, timber and fish stocks, and by widespread environmental degradation, including a history of habitat destruction and species extermination.

Dr. Ken Henry, Secretary to the Australian Government Treasury, 2006.

A major gap in policy responses to date is the absence of ‘rational pricing’ as a means to restrain car use. Car use is currently highly subsidised by all taxpayers, whether they benefit or not, while the disbenefits incurred by car use, in terms of social and environmental damage, are far reaching and affect the whole of society. Rational pricing is a mechanism whereby the party responsible for the social and environmental pressure associated with car use bears a more rational proportion of the total cost and therefore has similarities to the ‘polluter pays’ principle. Rational pricing is also necessary to complement measures which aim to improve or promote alternatives to the car (for example TravelSmart). Incentive programs such as these that are not supported by disincentives for car use are unlikely to be as effective as those that are.

Estimates of the future costs of climate change are beginning to shift attitudes and behaviour towards rational pricing at a broad scale. For example, the state governments in Australia are now advocating carbon trading to reduce emissions in the power generation sector, with the impacts on electricity prices being seen as more acceptable than the long-term costs of a ‘business as usual’ approach (NETS, 2007). Similarly, pricing is becoming more widely accepted as a viable demand management technique in the face of diminishing water availability across much of Australia.

Implementing rational pricing can be difficult. One of the major problems is that political time frames are generally too short for the benefits of pricing to be revealed fully. Similarly, the public may find it difficult to accept such programs if the benefits are not immediately apparent or will only become apparent after 25 years.

Nevertheless, there is growing evidence from cities such as Singapore, London and Stockholm that congestion pricing, for example, is a promising way to manage travel demand by private motorists, provided that alternatives (walking, cycling, public transport, etc) are enhanced. Despite the known challenges, the government has shown leadership in implementing one type of rational pricing within A Plan for Melbourne’s Growth Areas (DSE, 2005). This publication announced a development contributions plan (DCP) to, among other reasons, raise funds to assist in the provision of public transport infrastructure and services. Once established, ongoing evaluation of the effectiveness of the DCP in shifting transport to more sustainable patterns in outer urban areas will be important.

The Melbourne CBD core parking levy is another example of rational pricing being used to influence mode choice (SRO, 2006). In this example the parking levy increased to $800 per space per year from January 1, 2007, providing the impetus for similar pricing systems to be used in other parts of the transport system. However, the use of this off street parking levy is designed to address peak period congestion and, unlike the London congestion tax, it will not reduce overall traffic movement through the CBD at all times of the day. In parts of suburban Sydney, parking levies introduced recently penalise drivers of large vehicles and reward drivers of smaller vehicles. It is too soon to assess whether they are significant enough to have made any impact on vehicle choice.

At the national level, ‘perverse’ subsidies and taxes, such as fringe benefits tax and an emphasis on road funding, should be reformed as a priority. At the Victorian level, there is still a lot more that can be done to address a phasing in of rational pricing and other restrictions on car use. Any such moves should be introduced gradually so that society can adapt with minimal unintended social consequences, and alternatives to car-based transport should be provided to maintain transport equity.
The price of travel demand management mechanisms, such as peak-hour tollway pricing, levies on other motorways and full electronic pricing, should be set to reflect the full (environmental and social) cost of the mode. They should also be set with reference to the funds required to continue the mode shift that has recently occurred towards meeting the 20/2020 target. While road pricing is contrary to current government policy, it should be noted that a feasibility study into such measures was recommended by VCEC in last year’s report into traffic congestion (VCEC 2006).

A rational pricing strategy should include a series of measures introduced over the next 20 years. A staged strategy makes it easier to accelerate (or decelerate) the rate of adjustment in response to changing circumstances, once the initial steps are taken and their need is understood by the community. To put it simply, people are more likely to react favourably when they have time to make adjustment. Above all, funds raised via rational pricing should be used to improve the viability of more sustainable modes of transport, so that those being affected will benefit from it and will appreciate the connection.

4.2 GOVERNANCE STRUCTURES AND SUSTAINABLE URBAN DEVELOPMENT

While many Australian Government policies impact directly on Australian cities, it is the role of state and local governments to manage transport and land use development and coordination. Further, there is currently a distortion in the investment pattern from the Commonwealth that favours roads over public transport. Commentators such as Spiller (House of Representatives Standing Committee on Environment and Heritage, 2005) Gleeson (2006) and the Planning Institute of Australia (2004) advocate for the Commonwealth to play a greater role by providing incentives for leadership initiatives and funding for sustainable metropolitan and transport planning, a view, that given the capacity of the states, is strongly supported.

Current institutional arrangements in Victoria divide transport and land use responsibilities functionally (for example separate authorities for roads and public transport, and separate bodies for transport and land use planning) and by level of government (state and local). There are also a number of private transport operators providing public services across the state. Some commentators have suggested that the lack of integration between all agencies involved is a barrier to real progress (Low, Gleeson, & Rush, 2003). Better coordination between VicRoads and the public transport providers has occurred recently (for example, ThinkTram® & SmartBus®) acknowledging the important role that roads play in public transport provision, while the forthcoming public transport guidelines for land use development (DOI, 2007) will also facilitate better integration of sustainable transport at an operational level. Other encouraging initiatives include the establishment of the Growth Areas Authority, and local initiatives such as the Dandenong Development Board. However, strategic metropolitan-wide level coordination between transport modes (DOI, 2006c) and between transport and land use agencies is critical to ensuring sustainable transport planning and urban development.

The recently established Office of the Coordinator General of Infrastructure to improve whole of government coordination of transport and land use policy and planning is an encouraging move. However, it remains to be seen whether a non-statutory office that sits within a single government department has the ability to effectively drive strategic whole-of-government planning. In comparison, the statutory Coordinator-General’s Office in Queensland, which focuses on development, has proven highly effective in ensuring government objectives are met.

A more streamlined approach to land use and transport integration in Victoria would be possible if a single strategic authority with a comprehensive charter soundly based on environmental and social sustainability principles were established. In exploring alternative transport governance scenarios, Mees (2005) has suggested a need to restructure public transport administration through the establishment of a small but efficient multimodal public sector agency which handles public transport planning, marketing and ticketing, along the lines of those that exist in Zurich, Vancouver or Toronto. Others (c.f. Spiller, 2006) have proposed a strategic metropolitan planning authority, with a democratic mandate operating at arms’ length from the state government, that could coordinate and work with all levels of government and private transport operators to integrate urban and transport planning.

4.3 THE NEED FOR LONG-TERM INVESTMENT AND POLITICAL COMMITMENT

Policies and strategies, such as Melbourne 2030, are vital to enable sustainable development, but will not deliver change without ongoing political support and the necessary investment that enables their implementation. Transport infrastructure investment needs a long-term focus and ongoing attention to the long-term is needed so that governments do not address short-term bottlenecks in a manner that is inconsistent with agreed strategic directions.

Success also depends upon community support. If the benefits are made clear to the community, and if plans are amended as necessary to reflect changes in population growth and new transport technologies, then community support should be ongoing. This means the public transport programs and projects outlined in MoTC must proceed as a matter of priority if it is to achieve its targets, and to ensure the community is able to access the benefits of ongoing investment.

Shared investment, between local and state governments and between states and the Australian Government, reflects a shared political commitment and an alignment of strategic planning goals. For example, municipalities are required to implement strategic planning through structure plans in response to state government plans. Genuine collaborative planning between these two levels of government is required to ensure that local strategies align with metropolitan planning and transport strategies. There have also been several calls for increased Commonwealth funding for sustainable land use and transport planning, particularly public transport, in Australia’s metropolitan centres (Gleeson, 2006; Spiller, 2004), a call that deserves support.
“There is still a long way to go, however, to shift transport behaviour and systems away from the car and towards less energy intensive forms of transport and to shift urbanisation patterns away from car-dependant models.”
5. NEXT STEPS

A number of positive initiatives are underway in Victoria that will improve land use and transport sustainability. There is still a long way to go, however, to shift transport behaviour and systems away from the car and towards less energy intensive forms of transport and to shift urbanisation patterns away from car-dependent models.

Five recommendations to accelerate these shifts and enable more sustainable transport and urban development are:

1. Introduce rational transport pricing arrangements.
2. Shift transport investment priorities towards less energy intensive modes, such as public transport, walking and cycling.
3. Accelerate development of integrated transport systems to support Transit Oriented Design (TOD).
4. Improve institutional coordination to achieve better integration between land use and transport planning.
5. Audit the progress towards achievement of the government’s transport and urban sustainability policies.

5.1 INTRODUCE RATIONAL PRICING

A key factor behind the over dependence on private cars in Australia is the fact that the marginal price for using a car is in fact a fraction of the full social and environmental cost. Accordingly, there is a need to gradually reduce this gap to encourage people to make more rational travel choices.

The first step is for a study to be undertaken to gather reliable data for Melbourne on the transport costs and benefits of all major modes. It should include all significant externalities such as those that affect climate change, air pollution, health, safety, morbidity, noise, congestion and land use. This study should then inform development of a comprehensive rational pricing and funding strategy for urban transport. The strategy could include measures such as:

- Gradually increasing parking charges as part of an overall parking strategy. Some of the revenue raised could be used to expand park and ride facilities, while some should be used to facilitate business transition for private car park operators. Differential rates should be maintained between the CBD, other major centres and attractions, and minor centres so that the policy does not cause an incentive for businesses to relocate out of the CBD or major centres.

- Moving towards comprehensive road pricing. This could commence with the introduction of peak period surcharges on existing toll road facilities. Later, electronic road pricing could be added to other key roads. It may follow that all vehicles are eventually fitted with black box-type devices with GPS receivers which measure where, when and how far each vehicle travels.

To minimise impacts on equity, the measures in a rational pricing strategy should be introduced gradually. This would allow people time to adjust their travel behaviour, housing choices and job location choices and would allow investment in alternative transport options. A suitable time-frame to phase in all measures might be as long as 20 years.

Strategic implementation of rational pricing would ensure that individual sectors, centres or urban areas are not disadvantaged and could generate significant funds based on relatively modest and staged increases in charges. For example Sydney already has a parking levy of $840 per space in the CBD and $420 per space in other key centres including North Sydney, Bondi Junction and Parramatta. Extending the Melbourne CBD parking levy to other areas, within a framework of wider rational pricing, has the potential to generate around $1 billion dollars annually that could be used to support sustainable transport initiatives.
5.2 INVEST IN LESS ENERGY INTENSIVE TRANSPORT MODES

Funds raised via rational pricing can be used to shift transport investment to less energy intensive modes, such as public transport, cycling and walking. Recent initiatives such as Melbourne 2030 and Meeting our Transport Challenges demonstrate a significant shift in this direction, but much more remains to be done. The immediate needs include:

- For medium to long distance (5 kilometres or longer) radial trips to the CBD and other centres, particularly for work but also for shopping, entertainment and other purposes, investment is needed in the radial rail and tram networks and services, as well as improved express bus services in some corridors. This should include extensions to existing lines, duplication or tripling of some lines to improve speed and capacity and possible further enhancements to the inner city network, such as the cross-city route proposed by Melbourne City Council. Some investment has already been identified and some improvements in span of service and frequencies have been announced. These should be built on as the core of the Principal Public Transport Network.

- For medium to longer distance cross-suburb trips, faster, more convenient public transport options are required, which avoid the need to travel into the city. This is likely to take the form of express buses linking key park and ride facilities, rail interchanges and centres, coupled with new forms of local access systems (see below). Such buses will need priority in congested areas, including dedicated lanes, to give them travel time advantages compared with cars. A number of key cross-suburban links have been identified as part of the Government’s response, but more will be needed.

- For short trips (under 5 kilometres) the aim should be to replace car trips by walking, cycling, local public transport and, potentially, future options such as small electrically powered vehicles.

5.3 DEVELOP INTEGRATED TRANSPORT SYSTEMS

While transit oriented design (TOD) is a priority urbanisation pattern, there will always be a proportion of the population and activities located outside comfortable walking catchments of transit oriented activity centres. Extending the range and effectiveness of the public transport system will therefore also require improved feeder options that make better use of existing road networks. Feeder modes that complement TOD include walking, cycling, park & ride, demand responsive services and car sharing. Integrated combinations of modes that effectively provide feeder services already exist in some, particularly inner, areas. These need enhancement and extension into outer areas so that TOD and the principal public transport network can work effectively across the city. Initiatives to support the expansion of feeder modes are consistent with the principles and directions of Melbourne 2030 and include:

Increase the capacity of cycling and walking to carry a greater proportion of trips

Cycling and walking are the least greenhouse intensive modes of urban transport available. Although increasingly used, there is still great potential to further improve Melbourne’s transport landscape through cycling and walking. Compared with many European countries, very few people cycle to rail or tram stations in Melbourne. This situation could be greatly increased by providing safer road conditions, secure bike parking at stations and by providing transport for bikes on trams and on buses, as exists in Canberra. For distances less than two kilometres, walking is an ideal mode of transport for accessing public transport and should be actively encouraged through pedestrian prioritisation over other traffic (for example via Homezones® and via the creation of paths that are pleasant, protected from exposure and safe for users of all ages and abilities.

Increase ‘park and ride’ capacity and extend to other transport hubs

There are currently 30,000 park and ride commuter parking spaces in Melbourne, most but not all located at railway stations. MoTC includes a commitment to deliver a further 5,000 spaces (DOI, 2006a). Park and ride facilities should be created at middle and outer suburban stations, where the need is greatest. To minimise the potential for new park and ride facilities to maintain or even increase car use by encouraging people to drive to stations, they should be targeted at those stations that cannot be efficiently serviced by local feeder options such as buses. Integrated parking / travel ticketing incentives that provide incentive to use these facilities should also be considered.

Extend local demand-responsive public transport services

Invicta Buslines in outer Melbourne was one of the pioneers in developing flexible–route feeder services from low density areas to rail stations and town centres. These services can pick people up or drop them off at their front door by varying the route in response to demand. While these types of service almost always require subsidies, they can greatly improve access to shops, hospitals and other facilities as well as to the principal public transport network. They can also help to increase patronage at non-peak hours when public transport services usually have spare capacity, thus improving the economic viability and reducing the greenhouse intensity (on a person-kilometre basis) of the service.

Encourage local governments to extend their support for car sharing

Popular in countries such as Switzerland and Germany, commercially run car sharing has now expanded to Melbourne, where it is supported by councils such as the Cities of Melbourne, Yarra, Moreland and Port Phillip. Private car sharing arrangements are also starting to occur amongst groups of individuals, which should be encouraged.
Car sharing, whether commercial or privately run, provides options for people to reduce car ownership costs, whilst retaining access to a private vehicle when needed for specific trips. This provides a good complement to public transport and other modes described above. Economies of scale mean that car share groups can also stay abreast of new technology, thus keeping the emission intensity of their travel lower than the average across the vehicle fleet.

5.4 IMPROVE INSTITUTIONAL COORDINATION

Improving institutional coordination can help achieve better integration between land use and transport planning. A range of agencies and programs currently address the issues around transport and urbanisation, and greater coordination of their efforts is required to deliver more sustainable outcomes. The work that has occurred recently between VicRoads and the Public Transport Division of DOI to improve coordination is a pleasing sign and should be encouraged to continue.

Networked public transport planning is vital to environmentally sustainable land use planning. The transport and urbanisation challenges in Melbourne cut across government agency responsibilities and will require departments that may traditionally have worked independently to develop new ways of working together. There are good examples of planning and coordination initiatives both internationally (for example Greater London Authority), and locally (for example Inner Melbourne Action Plan and The Melbourne Transport Forum), that are raising issues and proposing solutions at a scale wider than that which local governments alone can tackle. These local strategic initiatives are to be commended and should be supported.

As mentioned previously, Queensland’s Statutory Coordinator General’s Office also provides a successful example of a state agency creating better coordination across government. The Victorian Government recently established the Office of the Coordinator General of Infrastructure within DOI that includes the aim of achieving whole-of-government coordination of transport and land use policy. However, it is too early to tell how effective it will be in achieving this goal.

There is potential to build on the example set by the recently established Growth Areas Authority (GAA) by adopting a similar approach for the greater metropolitan area. By working with councils, local communities, developers and State Government departments, an expanded GAA or similar Metropolitan Authority could provide strategic direction to metro-wide development to ensure better integration between land use and transport. The authority could also manage and utilise a developer contribution system and provide targeted assistance to local governments in strategic and structure planning, as the GAA does now.

5.5 ENSURE PROGRESS THROUGH INDEPENDENT AUDITING

In addition to the strategic pricing and governance arrangements proposed above, an independent assessment of the progress made towards sustainable urban and transport solutions is required. As a starting point, the Commissioner looks forward to the results of the current review of Melbourne 2030.

The Commissioner will continue to assess both the relative contribution and the implementation effectiveness of strategies that are designed to address urban efficiency and environmental sustainability in Victoria. In line with statutory objectives, the Commissioner will evaluate and report on developments overseas and elsewhere in Australia within a Victorian context providing best practice case studies and assessing their applicability to Victoria. The role will also review the standards and targets of broader urban policy as it affects the environmental sustainability of planning and urban mobility.

As a component of State of the Environment Reporting, the Commissioner will continue to monitor and report on the progress of key Victorian transport and urban indicators so that progress towards meeting sustainability goals in these fields can be tracked.

Within this current statutory role in encouraging government to adopt sound environmental procedures, the Commissioner for Environmental Sustainability is well suited to these tasks. The Commissioner has an appropriate charter operating with a level of independence from the Victorian Government, yet with close links to government organisations and policy formation.

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“In order to slow and ultimately reverse the trend towards an increasingly unsustainable city, action must be taken now.”
6. CONCLUSION

Melbourne’s transport system and urban environment evolved in response to a period of high energy availability. Due to our increased understanding of its environmental impacts, likely future energy supply constraints and health and social issues, the current system is no longer viewed as environmentally sustainable. In order to slow and ultimately reverse the trend towards an increasingly unsustainable city, further action must be taken now.

While many positive initiatives have been put in place, and ought to be encouraged, more must be done to achieve an urban form that is environmentally and socially sustainable - for the long term. Our increasing understanding of climate change provides a new frame of reference against which to assess both the appropriateness of our targets and the likelihood that they will be met.

Implementation of mechanisms that work towards sustainability requires our community to make adjustments. While there is strong support for the need for sustainability across the community, and while the options needed to achieve the goal are generally well understood, not all are well accepted. For this reason, education, leadership, proactive visioning and political will are needed to achieve the goals to which society as a whole aspires.

The transition to a sustainable urban form and transport system can be achieved by way of what are arguably relatively minor adjustments, which will nevertheless be challenging. However, if current patterns of urban development were to continue as they have for the past 50 years, the necessary adjustments which will be required to adapt to changing circumstances will be much more reactive and much more difficult.
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