



Moving On

The RTBU's Public Transport Blueprint for Sydney



P O L I C Y P A P E R



Moving On: The RTBU's Public Transport Blueprint for Sydney

Policy Paper

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Foreword

This Blueprint comes at a time of heightened public interest in debates about the ways and means to secure prosperity and sustainable ways of living.

If there is one thing we have all learned over the last few months, it is that the long cherished assumptions of policy makers and public authorities can be overturned by a reality check, almost overnight.

Until now, transport policies for cities such as Sydney have been dominated by a number of assumptions, all of which have now been brought into question. These assumptions include the idea that we can continue to rely on an unending stream of cheap and easily accessed oil to fuel our transport needs, that our quality of life can be measured by a simple reading of raw Gross Domestic Product numbers and that the consequences for both the natural and human environment of public and private consumption choices may be safely ignored.

Each of these assumptions has been called into question. The UK Government's *Stern Review on the Economics of Climate Change* has enabled broad public debate on carbon emissions to occur, where before, the matters dealt with in the Report were easily sidelined by conventional thinking and assumptions. The recent spike in oil prices has reminded everybody that it would be foolish to take the past abundance and relatively low price of oil as a 'given' for the future. People are increasingly calling into question the notion that increased consumption is an adequate proxy for the measurement of overall social health and well being. All of these things should be understood as a 'reality check' on the underlying assumptions and priorities of transport planners to date.

However public debate requires something more substantial than simply disquiet about newspaper reports, if it is to change policy decisions. Democratic public debate requires substantial information, new ways of thinking about old issues, and the ability to participate in campaigns to bring about the changes people want and need.

The RTBU is proud of the collaboration between the workers who deliver public transport services for the people of Sydney, and the University of Technology, Sydney's Institute for Sustainable Futures, which has produced an alternative framework for thinking and acting on a sustainable approach to Sydney's transport needs. I look forward to the work we have done here stimulating vigorous debate and public campaigning for securing Sydney's future, on an environmentally and socially sustainable basis.

Nick Lewocki

Branch Secretary,

Rail Tram and Bus Industry Union, NSW Branch

Summary: 10-point plan for a sustainable transport future

While urban transport planning was once viewed as a solely technical activity to be executed by 'value-free' experts, it is now acknowledged that it is an inherently political activity because it influences the distribution of costs and benefits within societies.

~ Kenworthy et al, 2005.

This document details the Rail Tram and Bus Union's (RTBU) Transport *Blueprint*. The *Blueprint* recommends ten key policy changes that would help to deliver a sustainable transport future for Sydney.

Most of the recommendations outline fundamental structural changes needed to develop a sustainable public transport system, rather than identifying specific transport initiatives. Current State and Federal Government planning and decision-making frameworks for transport in NSW hinder the transition to a sustainable public transport system. Frameworks focus on short-term planning governed by election cycles, without guiding principles or sufficient investment to permit long-term commitments. The recommendations in the *Blueprint* provide a framework to identify sustainable public transport policy initiatives consistent with the expectations of New South Wales' taxpayers and transport users for public transport that is safe, accessible, efficient and effective.

The RTBU urges all political parties to consider and to adopt these policy recommendations in advance of the NSW election in 2007. Without significant change, New South Wales' and Sydney's continued economic growth will be threatened and the negative impact on our community and the environment will be exacerbated by the growth of transport modes that are neither fuel-efficient nor socially equitable. Only long-term thinking supported by immediate action can deliver a public transport system that reflects Sydney's status as a world city.

Summary of recommendations

1. Commit to a long-term legislated plan for a world-class public transport system in Sydney that provides a real alternative to car use.

The history of transport planning in Sydney indicates a lack of long-term political commitment to the development of a public transport system, which is capable of challenging increased car use as the only solution to transport challenges. To be attractive, public transport must be appropriately priced, fast, efficient, close, reliable, frequent and safe.

THE RTBU CALLS FOR:

- A legislated plan for the development of a world-class public transport system for Sydney incorporating clear and enshrined targets to reduce private vehicle kilometres travelled (VKT) and increase public transport usage.
- A clear VKT reduction plan to accompany the VKT target.
- Firm targets for increased public transport accessibility, frequency and quality.

2. Commit continuous, annual and substantial State and Commonwealth funding to the development of a world-class transport system in Sydney.

The development of a world-class public transport system requires changes to both funding sources and funding priorities. Efficiency of funding allocation should be improved but additional resources also need to be found and applied to the reduction of reliance on private motor vehicles and increased support for public transport.

THE RTBU CALLS FOR:

- Commonwealth Government to allocate a proportion of fuel excise to support the development of public transport in major cities.
- NSW Government to adopt an integrated resource planning approach to identify the most efficient allocation of resources.
- NSW Government to identify and commit to additional funding mechanisms and to enshrine the chosen mechanisms in legislation.

3. Establish an independent NSW Transport Coordination Authority to oversee the development of a sustainable, world-class transport system for Sydney.

Responsibility for transport planning is spread across numerous government departments and authorities and too much power rests with the Roads and Traffic Authority (RTA). Greater coordination is needed.

THE RTBU CALLS FOR:

- An independent NSW Transport Coordination Authority which is:
 - Modelled on the successful example of the Olympic Roads and Traffic Authority
 - A statutory body, reporting to Parliament, with responsibility for transport planning and allocation of funds across all modes of transport
 - Charged with the task of developing and implementing the plan to achieve a world-class sustainable public transport system.

4. Adopt principles of sustainable transport to provide a framework for the development of Sydney's transport system.

Sydney's existing transport system is not sustainable. It is characterised by poor access and poor service quality, health impacts, lack of integrated planning, inefficient land use, greenhouse gas emissions, reliance on fossil fuels and low economic efficiency. These characteristics arise from the ad hoc and haphazard approach adopted by governments of all persuasions in dealing with the challenge of high quality public transport provision across Sydney.

THE RTBU CALLS FOR:

- A transport system that complies with principles for sustainable transport.

See *Box 1 p.xiv* for sustainable transport principles.

5. Give high priority to initiatives that will improve transport equity in Sydney.

Sydney's public transport system is marked by geographical and social inequity. People living in older and wealthier parts of the city have a range of public transport options that include various combinations of heavy rail, light rail, ferries and buses.

People living in the outer urban rings of Sydney and new developments in the south western and north western corridors have few options other than to use private vehicles.

THE RTBU CALLS FOR:

- The extension of public transport options, particularly to western and south western Sydney
- Improved planning for the provision of public bus and light rail services as 'feeds' to the heavy rail network
- A review of the provision of public and community-based transport services with a view to improved integration of services to the transport disadvantaged with a specific focus on people with disabilities and people with mobility issues as a result of ageing
- Acceleration of the Metropolitan Rail Expansion Project (MREP)
- A more equitable distribution of road tolls accompanied by incentives for public transport usage especially targeted at areas where toll roads dominate transport options.

6. Establish citizen-driven transport planning processes at multiple levels to identify preferred targets and initiatives.

There have been few effective opportunities for citizens to participate in Sydney transport planning in a way that has a real influence on how public transport is provided.

THE RTBU CALLS FOR:

- The Transport Coordination Authority to establish authentic, participatory processes to guide transport planning at the metropolitan, regional and local levels.

7. Develop 'fit for purpose' public transport infrastructure with a heavy rail base at the metropolitan level, buses and light rail operating on a regional scale and more active use of Government provided transport assets at the local level.

Transport requirements change with spatial scale and transport responds to and influences land uses. This needs to be recognised in transport planning and mode selection. Further, the Government needs to make better use of community transport

assets that it funds to ensure these resources are not sitting idle and are providing the most effective services for the capital outlaid. Local government is an active provider of local transport for special needs groups. These transport assets may be able to be managed to provide additional transport options for local areas.

THE RTBU CALLS FOR:

- Investment in heavy rail as the skeleton of the network (accelerate MREP, identify missing links in the network and put in place heavy rail to complete the metropolitan coverage)
- Investment in bus services and light rail to provide a finer network
- Investment in active transport options and the improved use of community transport assets at the local level.

8. Pursue and fund specific high-priority initiatives in the short-term while establishing the long-term plan.

There is a risk that the development of a long-term plan for the transport system will be used as an excuse to delay initiatives that are needed in the short-term.

THE RTBU CALLS FOR:

- Resumed planning of the Epping-Parramatta heavy rail link
- Electrification of the Southern Highlands rail line and the Kiama-Bomaderry rail line
- Overhaul of fare structures to take into account multi-modal trips and ensure that multi-modal tickets can be purchased across all existing and new public transport modes. There is no reason why existing computerised ticket sales systems should not be used as a point of sale for multi modal trips across NSW
- A comprehensive examination of new and existing light rail and bus proposals with a view to rapidly implementing several of the proposals with the highest merit
- A local trial of demand-responsive bus services integrated with community transport resources in an appropriate location.

9. Use appropriate planning and accountability measures to support the development and integration of new transport infrastructure.

In addition to infrastructure development, there is a need to develop planning and accountability measures to support the transition to a sustainable transport system.

THE RTBU CALLS FOR:

- Investigation of the application of emissions trading to transport in NSW

- Better public transport information services, for example the integration of public and private timetabling into the 131 500 service.

10. Use targeted programs to support the move from 'car preference travelling' to supporting a 'public transport culture'.

Initiatives to move people to public transport must be supported by innovative programs and incentives to move people towards using public transport.

THE RTBU CALLS FOR:

- Social marketing and education programs to promote public transport
- A public transport service that is fast, reliable, safe, comfortable and frequent; something that is both possible and desirable, as the 2000 Sydney Olympics demonstrated.
- Programs with major trip generators – such as universities, hospitals and businesses – that can support sustainable transport options by combining cultural and infrastructure changes
- Development of incentives to encourage people to use public transport, for example, offering tax deductions or higher rebates for those who purchase six or twelve-monthly travel passes.

Box 1 Ten Principles for Sustainable Transport**Ten Principles for Sustainable Transport**

Principle 1: People have a right of access to other people, places, goods, services and opportunities.

Principle 2: Transport services that enable access should meet the community's expectation of a high standard of reliability and quality.

Principle 3: Governments and transport planners and developers should be bound by a framework that ensures the equitable distribution of basic transportation resources to meet the needs of all people including men and women, young and old, the poor, the disabled and those living in outer suburban or rural areas.

Principle 4: Transportation systems should be designed and operated in a way that protects and promotes the health (physical, mental and social well-being) and safety of all people, and enhances the quality of life in communities.

Principle 5: Transport decision-makers have a responsibility to ensure that the transportation systems allow the opportunity for individuals to act to reduce their impacts on the natural environment.

Principle 6: Transportation decision-makers have a responsibility to pursue more integrated approaches to planning, delivery and use of public transport.

Principle 7: Transport decision-making processes should support, encourage and provide resources for public participation.

Principle 8: Transportation needs must be met within a framework which minimises the use of natural resources and land and reduces emissions that threaten public health and essential ecological processes.

Principle 9: Transportation systems must maximise the use of, and return on, transport assets and resources through better planning and accountability measures, while maintaining their long-term sustainability.

Principle 10: Transportation systems should be cost effective, now and in the future, and transportation decision-makers must move as expeditiously as possible towards fuller cost accounting, reflecting the true social, economic and environmental costs, in order to ensure that users pay an equitable share of costs.

Abbreviations

BRT	Bus rapid transit
BTE	Bureau of Transport and Regional Economics
CBD	Central Business District
CEDA	Committee for Economic Development of Australia
CIE	Centre for International Economics
CITIA	The Chartered Institute of Transport in Australia
CNG	Compressed natural gas
DIPNR	Department of Infrastructure, Planning and Natural Resources
DUAP	Department of Urban Affairs and Planning
FBT	Fringe Benefits Tax
IPART	Independent Pricing and Regulatory Tribunal
IRP	Integrated Resource Planning
ISF	Institute for Sustainable Futures
ISTEA	Intermodal Surface Transportation Efficiency Act
GDP	Gross Domestic Product
MREP	Metropolitan Rail Expansion Project
NCOSS	Council of Social Service of New South Wales
NSW	New South Wales
NWRL	North West Rail Link

OECD	Organisation for Economic Cooperation and Development
ORTA	Olympic Roads and Traffic Authority
PFI	Private Finance Initiative
PIA	Planning Institute of Australia
PPP	Public Private Partnership
RailCorp	The Rail Corporation of NSW
RIC	Railway Infrastructure Corporation
RICS	Royal Institute of Chartered Surveyors
RTA	Roads and Traffic Authority
RTBU	Rail, Tram and Bus Union
SIS	State Infrastructure Strategy
SLA	Statistical Local Area
SRA	State Rail Authority
STA	State Transit Authority
SUV	Sports utility vehicle
SWRL	South West Rail Link
TAG	Transport Access Guide
TCA	Transport Coordination Authority
TIDC	Transport Infrastructure Development Corporation
TIF	Tax Increment Financing

TPDC	Transport and Population Data Centre
UITP	The International Association of Public Transport
UITPANZ	The International Association of Public Transport (Australia/New Zealand)
UTS	University of Technology, Sydney
VKT	Vehicle kilometres travelled
4WD	Four wheel drive

1 The story so far

Sydney is in desperate shape...public transport is chaotic, unreliable and sometimes unsafe; roads are congested; impossible demands cause energy, land, housing and water shortages; and five decades of official complacency on planning has left the [NSW] Government struggling to meet community expectations. Clearly, Sydney cannot continue living, consuming and travelling in the same greedy, unsustainable way.

~ Darren Goodsir and Tim Dick, *The Sydney Morning Herald*, 30 May 2005

1.1 Introduction

Sydney's transport system is in crisis. Unlike other sustainability challenges, there is no dam at 40% capacity and dropping, there is no electricity grid with only 1% spare generation capacity in the peak. The transport crisis is like an iceberg: what we see is only the tip of the problem. In the past year, we have seen:

- Cuts in the frequency of rail and some bus services
- Major budget variations on the Epping to Chatswood rail link
- Continued delays in the provision of the integrated Tcard ticketing system
- A parliamentary inquiry into the Cross City Tunnel and Lane Cove Tunnel motorway projects, which continue to incite community anger (*see Box 3 p.16*)
- The release of survey results indicating that Sydney residents give the NSW Government's management of transport an average rating of less than 4 out of 10, which was the lowest out of the six essential services considered (10,000 Friends of Greater Sydney, 2006).

These recent problems sit within a broader context of continued increases in traffic congestion despite massive increases in road capacity. The congestion threatens Sydney's economic prosperity and the health of its residents. At the same time, greenhouse gas emissions from transport are growing rapidly, increasing the threat of dangerous climate change. Soaring petrol prices are a reminder that our current transport system relies heavily on the availability of cheap oil – something that we can no longer rely on in the current global climate. Access to transport in Sydney is inequitable and poorer suburbs tend to have the poorest transport options. In short, Sydney's transport system is not sustainable.

An unreliable and run-down transport system threatens Sydney's position as financial capital of Australia and gateway to Asia, and yet successive governments (State and Commonwealth) have failed to deliver solutions. Investment has been incremental. Whilst the Government plays 'investment catch-up' for decades of under-investment, passengers are forced to endure cuts in service frequency as transport operators attempt to maintain running times. At the core of the system, historical under-investment in public transport means that major stations like Town Hall now operate at absolute capacity and surface streets are full of buses crawling through the CBD. Whilst trying to rectify this historical lack of investment, the government has capitalised on some relatively 'easy wins' to 'greenfield' development sites. The massive task of untangling a railway system that has not been progressively, strategically enhanced has captured attention. However, this form of 'infrastructure catch-up' is not an excuse to fail the many residents of Sydney's outer western suburbs who have never had a decent rail system. The addition of a couple of new

lines to growth areas (the new land releases of the north and south-west) is like playing 'leap-frog' while many existing suburbs are being left behind.

What is the alternative? In this Policy Paper, the RTBU presents a Blueprint for a sustainable transport system in Sydney. The paper opens with a brief description of the current system and Sydney's transport planning background (Section 1). The paper develops a series of sustainable transport principles (Section 2) and reviews existing transport initiatives against these principles (Section 3). Decision-making on the future of Sydney's transport system is described (Section 4) and pricing and funding of the system is considered (Section 5). Based on this work, Section 6 presents a 10-point plan for addressing structural and institutional issues that prevent the development of Sydney's sustainable transport system. Finally, Section 7 describes the benefits that would be realised through implementation of the plan.

There have been many plans for Sydney's transport future and many people have ideas for improving the transport system. What is missing is political will and leadership. Ideas and plans need to become partnerships with the community, investments, programs and projects. What we need is a commitment to develop Sydney's world-class, sustainable transport system.

1.2 Sydney's transport system

Sydney's transport system consists of extensive arterial and local roads, a heavy rail network, bus and ferry services and a small light rail line and monorail system in the inner city. The NSW Government is primarily responsible for provision of transport services, through the Ministry of Transport and the NSW Roads and Traffic Authority (RTA). Local governments have delegated responsibility for maintaining local and regional roads and many also promote active transport through provision of pedestrian and cycling facilities.

The RTA is responsible for managing the arterial road network, comprising more than 17,000 kilometres of State Roads and more than 3,000 kilometres of National Highways. This includes the development of major road projects like the Lane Cove Tunnel and M7. Roads in both the east and west of Sydney suffer from congestion. However, there is an optimum investment level required in the road system. Investment beyond this level supports economically inefficient traffic growth. Commentators note that 'in the east the issue tends to be too much traffic for the established roads while in the west it is not enough new roads for the increasing traffic demand' (Kilsby, 2000).

The Rail Corporation of NSW (RailCorp) delivers passenger rail services in NSW through the CityRail (greater Sydney region) and CountryLink networks (regional NSW). CityRail operates more than 2,000 kilometres of track stretching from the Hunter Valley in the north to the Southern Highlands and Illawarra region in the south to the Blue Mountains in the west. CityRail operates over 300 stations and 1,500 carriages, carrying approximately 275 million passengers per annum (Glazebrook, 2006). The 11 suburban lines, four intercity lines and one regional line comprise a highly centralised network focussed on moving commuters between their homes and the CBD (McKerral, 2002). CountryLink operates rail and coach services from Sydney to Brisbane, Melbourne, Canberra and regional centres.

The State Transit Authority (STA) of NSW is the state-owned bus service operator in Sydney, with the subsidiaries Sydney Buses and Sydney Buses. Sydney Buses operates a network of bus services comprising more than 300 routes and carrying more than 600,000 people on an average day. The network reaches to Palm Beach in the north, Miranda in the south and Parramatta in the west, but is mainly concentrated on the old tram routes in eastern Sydney (Glazebrook, 2002a). Western Sydney Buses operates the Liverpool-Parramatta T-Way, a 31 kilometre bus rapid transit system. Private bus operators contracted

by the NSW Government provide most of the bus services in the outer western, outer northern and outer southern suburbs of Sydney. The combined private bus fleet is comparable in size to the public bus fleet (Kilsby, 2002).

Private taxi operators provide a flexible, 24-hour transport service at a higher cost than other public transport options. According to the Taxi Council, NSW taxis provide 175 million passengers journeys a year (Ministry of Transport, 2004). Taxi operators use on-road motor vehicles on flexible routes between origins and destinations determined by the passenger. Vehicles include sedans, station wagons and minivans. The Ministry of Transport sets maximum fares based on recommendations from the Independent Pricing and Regulatory Tribunal (IPART).

The Sydney Ferries Corporation operates ferry services from Circular Quay to 41 wharves around Sydney Harbour, including Manly, Parramatta, Darling Harbour and Watsons Bay.

Finally, Metro Transport Sydney owns and operates the Metro Light Rail, running from Central Station to Lilyfield in the inner west of Sydney. Sydney's only light rail system carries more than 3.5 million passengers each year. Metro Transport Sydney also operates the tourist-oriented Sydney Monorail that operates in a loop through the CBD and Darling Harbour. Ferries, Light Rail and the Monorail account for approximately 20 million trips per year in total, or less than 4% of the total number of trips on mass transit (Glazebrook, 2006).

1.3 Transport planning in Sydney

One of the earliest Sydney transport visionaries was Dr J.J.C Bradfield, who among other great achievements, recommended construction of the Sydney Harbour Bridge. Bradfield's report, which provided for electrification of existing suburban railways, and construction of an underground city loop as well as two new railways, an Eastern Suburbs Railway and a Western Suburbs Railway, became law in a new City Railway Act in 1915. Although not all of Bradfield's plans were implemented, the package of the Harbour Bridge, electrified suburban railways and the city underground as planned and executed by him, have been a great success. (Australian Heritage Council, 2003).

In 1948 the County of Cumberland Plan was developed. As Westacott (2004) points out:

At that time Sydney's population was 1.7 million people and it occupied a relatively small area, located close to rail and bus networks. Car ownership was very low and most people used public transport, or walked to get to work. Only 8 % of peak-hour work trips were made by car. This was linked to the high concentrations of jobs in the CBD. Three-quarters of the workforce lived within 10 kilometres of the GPO.

At that time, parts of Sydney were still served by a tram network that, at its peak in the 1930s, included 290 kilometres of track. The tram network was progressively removed between 1939 and 1961 and replaced with buses.

Much has changed since 1948. Sydney's population has grown to 4.2 million and car ownership has increased dramatically. It is estimated that Economic Activity (GDP) generated in the City of Sydney Local Government Area in 2003-2004 was approximately \$63 billion. This represents over 8% (nearly one-twelfth) of the total national Australian economy, over 30% of the GDP of the Sydney metropolitan area and almost one-quarter of the GDP of the entire state of NSW (City of Sydney, 2006). The vital economic importance of the city means that investment from the State should be accompanied by Commonwealth investment to ensure Sydney continues to play its part in helping build Australia's wealth.

Instead of protecting this economic heartland from unsustainable car dependence, the total vehicle kilometres travelled (VKT)¹ has grown faster than the population, putting enormous pressure on Sydney's road network. At the same time, underinvestment in public transport means that many people have no viable alternative to private motor vehicle transport. As a result, only 22% of people use public transport to travel to work and 70% of all trips are by car.² (NSW Department of Planning, 2005). More worryingly, the proportion of public transport trips in Sydney fell slightly over 1999 to 2004 despite an increase in the total number of trips over the same period (TPDC, 2006).

Since the County of Cumberland Plan, many plans and inquiries have grappled with Sydney's transport challenges but none has achieved the sweeping changes and injection of investment required to put the transport system on the path to sustainability. In 1995, the Department of Transport released an *Integrated Transport Strategy for the Greater Metropolitan Region* that sought to integrate transport and land use planning. The strategy defined multiple transport corridors where strategic transport opportunities existed and proposed initiatives for each. While some of these initiatives, such as the Airport Rail Link, have been realised, many failed to make it off the drawing board. (NSW Department of Transport, 1995).

In 1998, the NSW Government released *Action for Transport 2010* (NSW Department of Transport, 1998), which proposed various actions to achieve VKT stabilisation. It sought a NSW-wide increase in public transport journeys to work from 20% to 30% and proposed numerous specific initiatives, from the provision of real time information at bus stops to an extension of the heavy rail line to Bondi Beach. A 2005 audit of progress by the Audit Office of NSW found that the NSW Government:

is not succeeding in encouraging people to reduce their reliance on cars and promoting greater use of public transport. Private car use in NSW is now growing faster than population.

We are...building more roads but many of the major rail projects in Action for Transport have not proceeded (Auditor General's Report, 2006b).

In 2003, a Ministerial Inquiry into Sustainable Transport in NSW (*the Parry Inquiry*) examined the funding and cost effectiveness of public transport in NSW. One of the conclusions was that:

current arrangements are not delivering the most appropriate transport solutions to best meet the needs of the broad community. Taxpayers are not getting the best possible value from the large amounts of money being spent each year on public transport. This has been a problem for many years, facing governments from all sides of politics (NSW Government, 2003).

The Inquiry recommended overhauling the management and workplace practices of public transport operators, asking passengers to pay a greater share of the costs of the system and examining the role of road use pricing in encouraging more people to use public transport.

¹ Vehicle kilometres travelled, or VKT, is a measure of the total distance travelled by all motor vehicles in a given area. In this case, it is the total distance travelled by all motor vehicles in NSW. Air emissions are closely linked to the total VKT.

² The mode share of public transport into the CBD is significantly higher than for Sydney as a whole with 72% of those commuting to the CBD using public transport (NSW Government, 2006a).

In response to the Interim Report of the *Parry Inquiry*, the Institute for Sustainable Futures prepared *Our Public Transport: A Community View* (Campbell & White, 2003) for the Labor Council of NSW, the RTBU, the Australian Services Union and the NSW Transport Unions. *Our Public Transport* established that far from being inefficient and too expensive, NSW's public transport is essential but has had short-sighted planning and long been under-funded. The report called for the continued development of a vision for our transport future in NSW, by and for its citizens; a vision that satisfies the needs of the community and can "meet the challenges ahead and grasp the opportunities" as promised in *Action for Transport 2010*. The report presented the views of community stakeholders and provided recommendations on how to move towards a sustainable transport future. Many of the recommendations in *Our Public Transport* remain relevant and form the foundation for this Policy Paper.

Despite the *Parry Inquiry* findings pointing out many of the challenges facing people wanting to use the system, the Inquiry failed to comprehensively set out a funded overhaul. Government interpretation of the Inquiry included axing services (both at night and in regional areas) or replacing rail services with cheaper, lower capacity services. In summary, rather than improving the service, they reduced it, often in areas where equitable access was long forgotten.

In 2004, the NSW Government released the *Final Report of the Review of Bus Services in NSW* (the *Unsworth Inquiry*). The report recommended consolidation of the many private bus services in Sydney into ten competitive franchise regions linked to a network of strategic bus corridors:

These corridors reflect actual travel patterns, are anchored at regional centres and serve patronage generators such as district centres, campuses and hospitals. They will provide frequent, fast, convenient and direct services, integrate with local services, connect with other modes and provide a blueprint for improving bus priority measures (NSW Government, 2004).

The NSW Government released the *Sydney Metropolitan Strategy* in 2005. Its vision is for a "City of Cities" – a 'metropolis made up of five regional cities (the CBD, North Sydney, Parramatta, Liverpool and Penrith) and 22 other strategic centres' (NSW Department of Planning, 2005). The vision for transport is a positive one, focusing on improved local transport, better links between major centres within Sydney, improved access to economic activities and better investment decisions. The key access undertaking in the Strategy is to increase the percentage of the population living within 30 minutes by public transport of a major city centre, with the benchmark that in 2005, 80% of Sydney residents can access a major centre, regional city or global Sydney within 30 minutes by public transport. Two major growth centres are identified, in the north-west and south-west, with plans for extensions of the existing heavy rail lines to service each.

However, the transport strategy falls short of what is needed to achieve a sustainable transport system, worthy of a "world city". The proposed heavy rail links to the south-west and north-west will not be complete until 2012 and 2014-15 respectively, by which time a generation of residents will have lived in the north-west without access to public transport and established strong habits of car use (Searle, 2006). The Strategy ignores light rail (which has significant potential to complement heavy rail in many urban centres within Sydney) and other innovative proposals, does not plan sufficient public transport capacity to support growth and lacks a target for public transport patronage (Searle, 2006).

The most recent development in transport planning in Sydney is the *NSW State Plan, "A New Direction for NSW"*. Although it includes some welcome commitments for the bus network,

such as implementing bus priority measures on 43 strategic bus corridors across Sydney, the plan is light on new rail initiatives. The plan is also weak on public transport patronage targets. It includes, for example, a target to increase the share of total journeys to work by public transport by only 3–5 % over the next 10 years (NSW Government, 2006a).

1.4 The state of Sydney's public transport

To date, there have been failings across many levels. The trend for reduced levels of Government debt has made it difficult to secure sufficient investment in public transport infrastructure. By 2002–2003, borrowings for the various states had reached very low, even negligible levels (see Section 5.3.12). The transport system has remained CBD focused, despite significant changes in retail and employment trends, with jobs and shopping moving elsewhere. In the face of this, the system has been inflexible and slow to respond. This has been exacerbated by massive land releases happening without simultaneous expansion of heavy rail or mass transit buses.

Meanwhile, many of the transport experts who were consulted during preparation of this paper felt that the Commonwealth Government was denying its responsibility to contribute funding for major transport infrastructure projects in Sydney. The Commonwealth Government collects fuel excise from motorists but this money goes into general revenue and there is no clear mechanism for returning it to the transport system. In 2005, the House of Representatives Standing Committee on Environment and Heritage reported on its Inquiry into *Sustainable Cities* (The Parliament of the Commonwealth of Australia, 2005). It recommended that the Commonwealth Government significantly boost its funding commitment for public transport systems, particularly light and heavy rail, in the major cities, with a particular focus on infrastructure for suburbs and developments on the outer fringes. This funding has not been forthcoming.

The Public Transport system in Sydney is at last undergoing a major upgrade. In the 2006–2007 Budget speech, the NSW Government announced \$3.4 billion funding for railways and public transport, (an increase in funding for rail of over 18% on the 05-06 budget). While these announcements are welcomed, there is much more still to be done and there remains an emphasis on building new roads – see *Box 8 p.52* for an analysis of these announcements. At \$3.3 billion, 2006–2007 marks the biggest ever roads program for NSW, with a total of \$1.59 billion allocated towards road construction (NSW Treasury, 2006). As Sydney residents are all too aware, budget announcements and commitments are one thing, but on-the-ground implementation is what really matters and there have been many broken promises thus far (see *Box 5 p.23*).

Continued neglect of Sydney's transport system by all levels of government will threaten our economic prosperity, environmental sustainability and social equity. If we are to rehabilitate the transport system, we need to move forward with confidence that our actions will improve sustainability. Therefore, the next section defines the principles of a sustainable transport system as a starting point for identifying ways to improve Sydney's transport system.

The evidence is clear. Study after inquiry after report has found that Sydney's transport system is unsustainable. But this is not about making the system financially profitable. The real costs of inaction will be felt in the short-term as the divide between Sydney's transport haves and have-nots is reinforced. In the longer-term, current trends indicate the economic prosperity of the city will stagnate as the city chokes on its own congestion. Constructing roads with private finance will no longer suffice. A shift in principles is required to begin radically reshaping transport in Sydney.

2 Sustainable transport principles

Transport at the turn of the century displays several unsustainable trends. Continued growth in the number of motorised vehicles and their use places major burdens on the availability of natural resources, notably oil. Emissions from the burning of motor vehicle fuel contribute to global and local damage to ecosystems and human health. Other concerns related to the use of motorised transport include traffic accidents, high noise levels that harm human health, and land use patterns that interfere with habitat, migration patterns, and ecosystem integrity.

~ OECD, 2002

The way we currently transport people and goods in Sydney is not sustainable. This paper provides a Blueprint for a world-class transport system for Sydney that is both sustainable and achievable. The Blueprint is underpinned by principles that clarify what sustainability means in practice. The principles also provide a consistent basis for assessing the many possible transport initiatives that have been proposed for Sydney. An assessment of the performance of Sydney's transport system against these principles illustrates the depth, breadth and urgency of the current crisis. For every aspect of the crisis, however, solutions are available. Implementation of these solutions would give Sydneysiders the world-class transport system they deserve.

The principles discussed below are adapted from a set of guiding principles originally developed for the 1996 Organisation for Economic Cooperation and Development (OECD) conference, *Towards Sustainable Transportation*, held in Vancouver, Canada (OECD, 1997).

2.1 Access and quality

2.1.1 Access

Principle 1: People have a right to access other people, places, goods, services and opportunities.

Transport is not something that people demand in its own right. Rather, people demand the access to other people, places, goods, services and opportunities that a transport system provides. In other words, a transport system enables the exchanges that are the basis of an economy and a community.

Sydney's transport system is currently failing to enable such exchanges to the extent that its citizens deserve and that is expected of a world city.

Accessibility requirements vary with the type of trip. For local trips, pedestrian and cycling facilities to encourage walking and cycling should be prioritised. For intra-city trips, the priority is to provide reliable, frequent public transport services. For inter-city trips, fast public transport services are a priority (Wachs, 2002a). The transport system needs to respond to this hierarchy of different access requirements.

Access can be constrained in several ways. First, where public transport options are available, they may be priced in such a way as to be unaffordable to some people. Sydney's Airport rail link, for example, is unattractively expensive - a one-way adult ticket from the Airport to Central or vice-versa currently costs more than \$12, about four times the cost of an equivalent journey on the publicly owned rail network. User charges have been

increasing in real terms. IPART data shows that since 1992/93 rail fares have increased in real terms by 24% and bus and ferry fares by 15% (IPART Annual Report 2004-05 p.49, cited in pers. comm. W. Gardiner, NCOSS, 27 September 2006). This is also an equity issue as many people in Western and South Western Sydney are denied access to integrated ticketing products that generally provide substantial discounts (pers. comm. W. Gardiner, NCOSS, 27 September 2006.)

Second, an area may be poorly served by public transport. Either the public transport network does not reach the area or services are infrequent or unreliable. The residents of Sydney's outer western suburbs, for example, have never had a decent rail system. Commuters from the Central Coast and Campbelltown endure slow, unreliable trips.

Third, the time taken to reach particular destinations may make particular trips unattractive, essentially making them inaccessible. Sydney's rail system has no separated inter-city express rail lines, despite promises such as a designated Sydney to Newcastle line by 2010. This means that the system has little capacity to offer express services to long-distance commuters and is not competitive with car travel for inter-city business trips.

Finally, some people may be physically unable to access the public transport system due to inadequate provision for people with disability. In *Action for Transport 2010*, the NSW Government promised to implement an Easy Access program on CityRail, where by 2010, 100 stations will have been re-designed to include lifts, ramps, wheelchair access toilet and tactile tiling (NSW Department of Transport, 1998). However, many stations in the CityRail network remain inaccessible for people with disabilities. For example, North Wollongong station, the second most used station on the South Coast Line, has no wheelchair access. (Physical Disability Council, 2006a), (Physical Disability Council, 2006b) The NSW Ministry of Transport's assessment in June 2006 states that: "only 28% of stations in the Sydney CityRail network have disabled access, meaning that rail travel is simply not an option for many disabled people" (NSW Government, 2006b).

Although access to public transport in Sydney is constrained in different ways in different locations, solutions are available:

- Accessibility can be improved by extending the reach of the transport system so that access points are in close and convenient locations, at both ends of the trip.
- Accessibility can also be improved through diversification of transport options, providing people with choices that meet their particular access needs. Diversity is important not only to provide people with choices but also to ensure that the transport system has the resilience to keep functioning if a particular mode becomes temporarily unavailable. Of course, the benefits of diversity need to be balanced against the inefficiency of having taxpayer-funded public transport modes competing with each other.
- Physical accessibility can be improved through appropriate design of stations and vehicles. Accessibility improvements have already been made to Sydney's bus fleet, all new buses purchased since 1996 are wheelchair accessible (NSW Government, 2006b). More improvements, particularly on the rail network and initiatives such as wheelchair accessible taxis, are encouraged. All new transport projects should include consideration of physical access needs in the planning stage.
- Economic accessibility can be improved through initiatives such as the NCOSS proposal for an affordable Day Fare ticket for public transport users across the Greater Sydney Metropolitan Region (2006). NCOSS has proposed an all day ticket to enable Sydneysiders to travel on all bus, rail and ferry services for \$10 adult, \$5

concession, with an \$8 integrated ticket for the Blue Mountains, Illawarra, Lower Hunter and Central Coast (NCOSS, 2006a). Community transport provision also plays a vital role in both economic and physical accessibility (see section 3.5). Initiatives such as Manly Council's Hop, Skip and Jump mini "freebie" community bus service promote economic access for a range of user groups.

- Sound urban planning is also important to concentrate trip generators in areas that have good access to multiple modes of transport (see sections 2.2.4 and 3.1). The *City of Cities* concept adopted in the *Metropolitan Strategy* pursues this kind of planning approach.

2.1.2 Quality

Principle 2: Transport services that enable access should meet the community's expectation of a high standard of reliability and quality.

Physical and economic access to transport services is an important component of a sustainable transport system, but access alone is of little value unless transport services are also of a good standard. If transport services are of a poor standard they will either not be used (in the case of public transport) or people forced to use them will have no choice but to endure unacceptable, frustrating and unsafe conditions. The evidence suggests that this is the experience of many Sydney commuters. In 2004, the top 3 reasons for using a car to travel to work included: Shorter travel time (47%); Bus/train unavailable or inaccessible (33%); and Problems with public transport (26%) (TPDC, 2006)³ (See Box 5 p.23).

Poor quality transport contributes to social and health problems and potentially economic problems, through lost time. For the public transport system, a poor quality service may be worse in the long-term than having no service at all. Bad experiences with public transport can turn people away from the system, and into their cars, permanently. A high quality standard needs to be achieved rapidly after a new service is implemented and maintained permanently if people are to be attracted to the service. A world-class public transport system could conceivably provide an enjoyable travel experience. As citizens of a world city, this is the experience Sydneysiders deserve, and it should become a transport planning objective.

If a public transport service is to be attractive, passengers seek a frequent service that arrives on time, is clean and comfortable, provides a fast and convenient trip and is affordable. Sydney's public transport system, particularly the CityRail network, has been criticised for its failure to deliver on-time running of services (See Box 7 p.37). In an effort to improve on-time running, CityRail has introduced a new timetable that reduces the frequency and increases the time taken by some services. These steps may improve the reliability of the system but they will reduce other elements of quality – the frequency and speed of services. High frequency of service is critical for a sustainable public transport system.

Another element of quality is convenience. Transport access points need to be easy to find and use, reliable information needs to be provided at accessible locations and transfers from one mode to another need to be smooth (DUAP, 2001). An integrated Tcard ticketing system is currently being trialled to improve transfers between transport modes in Sydney (see

³ In the Summary Paper, this figure is incorrectly cited as 28%.

Section 3.7). The Tcard system should significantly increase convenience of access to public transport. It is scheduled for full implementation during 2006–2007.

Convenience also requires public transport access points to be located close to trip origins and destinations. Residents in Sydney's North West suburbs, such as Baulkham Hills and Blacktown, live far from public transport access points (TPDC, 2003). An initiative that could substantially improve access for residents in the North West is the North West Rail Link (NWRL), in combination with the North West Transit Way Network (*see Box 6 p.36*). Unless the quality, reliability and convenience of the public transport system rivals that provided by the private motor vehicle, there is little hope of substantially increasing public transport patronage.

Quality of service also needs to be considered in the road network. Here, quality of service can be achieved through regular road maintenance and appropriate design of the road network to reduce congestion. The New South Wales auditor-general recently delivered a critical report on the Roads and Traffic Authority's (RTA) maintenance of the ride quality and structural condition of the state's roads. The auditor-general found that overall the road condition in country areas has improved, but Sydney's ride quality is below most other state capitals.

Initiatives such as electronic tolling, can improve the reliability and quality of road trips. Electronic tolling is already in use in Sydney and could be extended, for example as an enabling measure for congestion charging, which is discussed in section 5. Attention to the hierarchical structure of the road network is also important. For example, quality in a local road network might be measured by the provision of access to all local destinations in a way that minimises traffic noise and maximises pedestrian safety. On arterial roads, designed to move people between major destinations, average speeds may be a more appropriate measure of quality. In other words, different parts of the road system need to address different tasks. As an example, it is economically important that valuable freight movements on the road network (for example delivering containers to and from Port Botany) are not unnecessarily delayed by commuter traffic destined for the CBD. The higher order movements need to be prioritised.

2.2 People and communities

2.2.1 Equity

Principle 3: Governments and transport planners and developers should be bound by a framework that ensures the equitable distribution of basic transportation resources to meet the needs of all people including men and women, young and old, the poor, the disabled and those living in outer suburban or rural areas.

Access to quality transport options is not evenly distributed across Sydney. Transport systems rarely provide equal access for everybody. Inevitably, certain areas are better served by the transport system than others. This raises issues of equity and social justice – is it fair that some people should be denied reasonable access to economic and social opportunities because they are unable to afford a car, or live in an area that is poorly served by public transport?

Principle 3 identifies three aspects of equity that require attention in a sustainable transport system: social, spatial and inter-generational equity.

Social equity requires that all members of the community have fair access to transport and the opportunities that it brings. In other words, no particular social group in our society should be denied access to transport. Transport systems that fail to provide adequate services for elderly people, people with mobility impairment, those on lower incomes or those that do not have access to a car, reduce social equity. A sustainable transport system needs to be physically and economically accessible to all people. There have been significant improvements in physical access to public transport in Sydney through the introduction of wheelchair accessible buses and programs to upgrade rail infrastructure. However, more could be done to improve equity of access. Sydney remains a city where the poor have poorer public transport options and are more exposed to increases in fuel prices.

Spatial equity requires that people across Sydney have access to a reasonably equal standard of transport services, regardless of their geographic location (Stone, 2000). While there will always be appropriate geographical variations in the availability of transport services, Sydney is characterised by some glaring spatial inequalities. In particular, parts of outer western Sydney are very poorly served by public transport. In these areas, not having access to a car constitutes a significant disadvantage. Car dependency also contributes to social inequity. The combination of low average incomes and high car dependency means suburbs like Camden and Wollondilly, the Blue Mountains and Penrith, are particularly at risk as oil and petrol prices fluctuate (*see Box 2 p.12*). People living in these areas that do own a car have few alternative transport options, so they are exposed to rising petrol prices and congestion. In contrast, people in eastern Sydney often have a choice of transport modes and there are parts of Sydney in which not having access to a car is no great disadvantage. Opportunistic private sector financing and the varied application of ad hoc refund systems means even access to the road network is inequitable across Sydney – for example, motorists on the M5 and M4 can claim a taxpayer-funded refund (albeit limited to certain vehicles and trip types) and those on the M2 cannot (Baker & Norrie, 2006). Sydney residents commuting similar distances to the same workplace from areas served by toll roads often have much higher weekly transport costs than others served by public roads.

The current system is characterised by transport haves and have-nots. The *Sustainable Cities* report noted that a lack of public transport often increases social division within Australia: “Higher income groups tend to be located in well-serviced, inner urban areas where they are mobility-rich; while lower-income groups tend to be located in poorly-serviced areas, often at the fringe of cities where they are mobility-poor” (The Parliament of the Commonwealth of Australia, 2005). The report recommends specific funding for sustainable transport infrastructure for suburbs and developments on the outer fringes of cities.

A review of the provision of public and community based transport services is clearly needed. Improved integration of services to the transport disadvantaged will make a major contribution to providing more equitable access in Sydney. Specifically focus is required on people with disabilities and people with mobility issues as a result of ageing. This group is increasing as a proportion of the population and meeting their access needs will accordingly become increasingly important.

Intergenerational equity requires the transport needs of the current generation to be met without compromising the ability of future generations to meet their own needs (Stone, 2000). Major concerns here relate to the environmental impact of the transport system (discussed in Section 2.3) and the depletion of scarce resources such as oil (discussed in Section 2.4.3). Currently, Sydney’s transport system meets the needs of the present generation unequally, at the expense of future generations.

Much more must be done, and done quickly, to address the social, spatial and inter-generational inequities inherent in Sydney’s transport system. Far from optional or guiding,

the responsibility for equity needs to be binding on professionals and governments providing transport because it is inherently an essential service.

Box 2 Equity

Equity: Low income earners, high car-dependence and rising fuel costs

A clear pattern exists of higher Vehicle Kilometres Travelled (VKT) levels per capita the further people are located from the Sydney CBD. Areas with lower concentrations of population relative to geographical area, such as Hawkesbury, Blue Mountains and Wollondilly as well as those located further away from employment centres, such as Gosford, generate higher VKT per capita. These areas also have high concentrations of low-income households.

Therefore, for many low-income households, transport costs are significant and consume a comparatively large proportion of household expenditure. Car related expenses are high, consuming a greater proportion of weekly expenditure for low-income households.

There are predictions that fuel costs could rise to \$3 per litre within the next 3 or 4 years, particularly if no new significant oil discoveries occur or there is no 'technological fix' (Holmes & Jones, 2003). Therefore, some low-income households that rely on private motor vehicles will be devoting an even larger proportion of household expenditure to car related costs. If fuel costs rise significantly, private motor vehicle transport will prove increasingly non-viable for many low-income households. Within Sydney, outer suburban areas with low socio-economic status populations and suburbs that have high levels of car dependence, will be the most affected by increases in fuel costs (Dodson & Snipe, 2005), (NCOSS, 2006b)

2.2.2 Health and safety

Principle 4: Transportation systems should be designed and operated in a way that protects and promotes the health (physical, mental and social well-being) and safety of all people, and enhances the quality of life in communities.

There are many ways in which transport can be bad for human health. Car accidents kill or injure people directly. Air and noise pollution from motor vehicles contribute to health problems. Congestion can increase stress levels and road rage incidents. Reliance on passive transport options contributes to higher rates of obesity and related diseases. Public transport can expose passengers to assault risks. All of these issues need to be addressed in a sustainable transport system.

On average, four to five people are killed every day in accidents on Australian roads and many more are injured (Australian Transport Safety Bureau, 2005). More than 1,600 people died in accidents on Australian roads in 2005 (Australian Transport Safety Bureau, 2005). Every year in NSW, more than 500 people are killed on State roads and more than 25,000 are injured (NSW Government, 2006a). When compared to other OECD countries, Australia's road safety performance is fairly good, although not as good for pedestrian safety (Henderson, 2002). According to the Centre for International Economics (CIE) (2005), the cost of road accidents in Sydney amounts to almost \$3.9 billion per year. A sustainable transport system needs to have a focus on road safety. Transport networks could be

designed to separate cars from cyclists and pedestrians. Alternatively, shared, multi-use road spaces could be provided and the community educated on how to use them. Injury and fatality rates per trip, however, are much lower for public transport than for car transport, so the primary focus should be on improving public transport options.

Despite improvements in emission controls, levels of many air pollutants (with the exception of lead) have remained steady since 1998 due to increases in VKT (Wilson, 2002). Poor air quality impacts on public health through its contribution to respiratory and cardiovascular diseases and some cancers (Frith, 2002). Pollution prevention is discussed in more detail in Section 2.3.1.

There is reasonably consistent evidence that ongoing exposure to traffic noise contributes to loss of social amenity and wellbeing through annoyance, interference with normal social activity (for example, communication) and disturbance of sleep. There is some evidence that traffic noise may aggravate psychological or psychiatric illness or symptoms in susceptible people (Frith, 2002). While less serious than accidents and air pollution, noise pollution can still have a significant impact on public health. In Sydney, noise pollution is on the increase. High noise levels are the result of an increasing population as well as increasing volumes of road traffic (Department of Environment and Conservation, 2006). The NSW Government should take measures to minimise further increases in noise pollution by limiting new road projects and encouraging the uptake of 'noise-free' technologies, such as electric vehicles.

Obesity rates in NSW are soaring. While there are complex factors behind the statistics, it is clear that active forms of transport, such as walking and cycling, have declined in favour of car transport. Our passive transport system contributes to our poor health. Active transport is an important element of a sustainable transport system that can improve health and reduce health costs. Active transport is discussed in Section 3.2.

According to survey results cited by Glazebrook (2002a), some 29% of people raised safety and security issues as a problem for train transport and 14% raised these issues as a problem for bus transport. Instead of responding by improving amenity and safety on trains, however, the government axed night-time rail services reinforcing a dangerously self-fulfilling perception. While much of the problem may be in the perception rather than the reality, it is important to ensure that a sustainable transport system is also a safe and secure one. Rather than simply axing services considered to be unsafe, Government should instead work to resolve safety concerns where they exist.

2.2.3 Individual responsibility

Principle 5: Transport decision-makers have a responsibility to ensure that the transportation systems allow the opportunity for individuals to act to reduce their impacts on the natural environment.

Efficient transport systems extend to car ownership and usage. Vehicle registrations in 2001 and 2005 in Australia by class of vehicle indicate an increase in the purchase of large, fuel-inefficient vehicles in recent years (with anecdotal evidence of a very recent dip in sales due to rising petrol prices). There has been a rapid rise in the sales of vehicles overall in Australia, especially large four wheel drive vehicles (4WDs), which accounted for almost 23% of the new car plus SUV (4WD) market in 2005. 4WDs are more common in the inner suburbs than the outer suburbs, with the highest proportion in any Statistical Local Area (SLA) occurring in Mosman (17.9%), suggesting status considerations are influencing purchase decisions. (Glazebrook, 2006).

People who use large cars with low fuel efficiency, such as 4WDs, have a higher environmental impact than those who choose smaller, more efficient cars. A sustainable transport system will find ways to inform people more effectively about the consequences of their choices and halt the escalating “arms race” of the road (White, 2002) in which people choose large cars to keep themselves safe at the expense of others.

Government has a key role to play in educating people about responsible transport choices, and in encouraging sustainable consumer preferences, through use of regulation such as fuel efficiency standards and tax incentives (see section 5.1.3).

2.2.4 Integrated planning

Principle 6: Transportation decision makers have a responsibility to pursue more integrated approaches to planning, delivery and use of public transport.

It is widely recognised that effective transportation planning needs to be integrated with broader urban planning. Transport networks help to shape patterns of urban development, and changes in urban form affect the viability of different transport options and impact on travel demand. The NSW Government’s *Sydney Metropolitan Strategy* is a step in the right direction, as it defines major centres and developing centres within the city and seeks to develop improved transport links between these centres. It has also sought to define planned land uses to capitalise on the strengths of the existing transport system.

Sydney has the advantage of its development along the rail/tram network resulting in ideal positioning of many major centres (CBD, Strathfield, Chatswood, Parramatta and Bondi Junction). These relatively recent developments have shown that the market will reinforce locations with higher public transport accessibility. There is therefore a long-term feedback from transport on land use. Of course, much also depends on the quality of implementation. But in other parts of the Greater Sydney Region, even this opportunity has been missed as ‘out of centre development’ has proceeded, with unrestricted parking unjustifiably increasing the cost of the transport task in areas such as Castle Hill, Norwest Business Park and Rouse Hill. Controlling parking in centres and ensuring that large-scale business parks do not develop off the transport system with excessive car parking provision is essential.

There is feedback from land use on transport. Low-density development does not support public transport provision. Developers must currently ensure that road services are provided but there is no such requirement for public transport (Glazebrook, 2002a). People moving into new developments where there is no public transport provision have no choice but to use cars and patterns of behaviour become locked in, making the prospect of future public transport provision even less viable.

In judging specific transport initiatives, it is critical to consider their impact on land use and their role within the *Sydney Metropolitan Strategy*. It is also crucial that urban planning is effectively integrated with transport planning to avoid further low density sprawl that cannot be economically serviced by public transport, and to consider options for interim measures, such as sprinter bus feeder services to new developments to avoid locking in patterns of behaviour that favour private car use.

Integrated planning also requires a coordinated approach to planning across different transport modes. Separate planning of active transport, road, rail and bus networks is problematic as there is a risk that the most cost-effective and sustainable solutions to a particular transport need will be missed. For the development of a sustainable transport system, all modes need to be considered in an integrated way within the context of a

broader city plan. Sustainable access requires a hierarchy of modes operating together reliably. The focus should be on using modes that are most 'fit for purpose'.

There is also a need to assess all options for providing transport services, including options that reduce trip generators (and therefore transport demand), on a consistent basis. Major centres and smaller local centres could offer a wider range of services so that the need to travel longer distances is reduced. Reduced demand for transport would have positive impacts on many of the dimensions of sustainability, from reductions in greenhouse gas emissions to reductions in accidents. An integrated resource planning approach, focused on the least cost provision of transport services, that comply with sustainability constraints offers a basis for consistent analysis of competing transport planning solutions see Section 4)

At present, responsibility for transport planning is spread across multiple organisations, including local Councils, the Ministry for Transport and the Department of Planning. This makes coordination and cross-modal assessment difficult and contributes to haphazard transport development, driven by powerful fiefdoms pushing a particular narrow philosophy. This is evidenced by the consistent prioritisation of road building at the expense of investment in public transport (*see Box 9 p.55*). An independent Transport Coordination Authority could provide a way to achieve the type of integration required by taking decision-making out of the hands of partisan groups. This idea is discussed in more detail in Section 4.

Integrated transport planning also means incorporating consideration of transport as an essential service at all levels of the planning system, from local to citywide. This means, for example, prioritising transport services in local development applications. Development in corridors that are well served by transport should be encouraged. Where transport services are poor, it may be appropriate to require developers to contribute to public transport infrastructure (see section 5.3.8) or to design developments that provide appropriate form and density for later provision of public transport. Parking policies are also important – where public transport is readily available there is justification for restricting the availability of parking, for example through parking levies. Current Sydney CBD parking levies could be increased and extended to further stimulate public transport patronage (see section 5.3.2).

In planning the transport network, it is important to consider all of the dimensions of sustainability, expressed through these sustainable transport principles, simultaneously. The strategic planning system should be strengthened and updated to explicitly embrace sustainability objectives (Troy & Smith, 2002). Ideally, transport policy would also be better integrated with other areas of policy, including economic and health policy. Sustainability principles generally call for more holistic approaches to planning, policy and departmental responsibilities.

2.2.5 Participatory decision-making

Principle 7: Transport decision-making processes should support, encourage and provide resources for public participation.

Public participation in decision-making is recognised as an important aspect of sustainability that increases the legitimacy and acceptance of decisions. Transport is something that affects almost everyone on a daily basis, so it is appropriate that a broad cross section of the community should have an opportunity to participate in transport decisions. As the recent protests over the Cross City Tunnel and Lane Cove Tunnel indicate, the NSW Government's record of public consultation on transport decisions is poor (*see Box 3 p.16*). In other cities in Australia, such as Perth, by contrast, citizens are working with government and preparing sustainable transport plans together.

For authentic public participation to occur, it is not enough to put transport proposals on display when they are almost a fait accompli. Citizens need to be involved from the earliest stages of transport planning processes so that they can contribute to setting objectives and directions and determine the types of proposals that are investigated in more detail. There are numerous innovative approaches to public participation available that can provide citizens with authentic opportunities to contribute to the democratic process, from citizens' juries to consensus conferences. However, citizens need to be appropriately supported and resourced to participate, as it is difficult for many people to take time out from their busy lives to learn about an issue and contribute in a meaningful way. The NSW Government has a tremendous opportunity to improve community consultation processes on important transport decisions. Sydney residents deserve to be involved in deciding how to improve their transport options, following years of enduring the consequences of poor decisions made on their behalf. Decision-making on Sydney's transport future is discussed further in Section 4.

Box 3 Lane Cove Tunnel

Lane Cove Tunnel

Scheduled for completion in 2007, the Lane Cove Tunnel is a key link in Sydney's Orbital Network, connecting the Gore Hill Freeway with the M2 at North Ryde (Roads and Traffic Authority, 2006b). However, the lack of transparency in many of the operations of the Project, including the altered ventilation system and new surface road changes, has meant the Project has received wide community criticism (Salusinszky, I., 2006).

Firstly, the community was not briefed about alterations to the tunnel's ventilation system, undermining public confidence in the Project. A planned 1.6km ventilation tunnel was scrapped during the construction process and replaced by jet fans, forcing pollution up to the tunnel's ventilation stacks. As a consequence, the tunnel will have no filters to limit the release of carbon particles into the atmosphere (Salusinszky, I., 2006).

Secondly, there was a lack of information provided to the community regarding new surface road modifications designed to filter traffic into the tunnel and to increase revenue for Connector Motorways. In response to community opposition to surface road changes, the narrowing of Epping Road from six lanes to two general lanes and two bus lanes, has been delayed, possibly to avoid a Cross-City Tunnel-style controversy before the March 2007 election (Baker, 2006).

The lack of public disclosure in the Lane Cove Tunnel Project is in contrast to active public participation in other transport projects, including the Bexley Road Upgrade in Kogarah and the Entrance Road Upgrade in Terrigal. As part of the Bexley Road Upgrade for example, a concept design, which went on public display for comment in May 2005, was modified in response to over 200 community submissions. A democratic process of community consultation also led to the identification of traffic safety concerns. The final design for the Upgrade incorporated these changes and other improvements in direct response to community feedback and consultation (Roads and Traffic Authority, 2006a). To ensure the long-term viability of transport projects, the State Government should adopt a participatory approach to transport decision-making, consulting citizens at every stage of the planning process.

Box 4 Project budget increases

	Original cost estimate 1999 \$m	Final cost estimate 2002/03 \$m
Cross City Tunnel	200	680
Lane Cove Tunnel	550	1100

(Source: Auditor-General's Report, 2006b, page 31)

2.3 Environmental sustainability

2.3.1 Pollution prevention

Principle 8: Transportation needs must be met within a framework which minimises the use of natural resources and land and reduces emissions that threaten public health and essential ecological processes.

A sustainable transport system must reduce outputs that threaten long-term ecological or human health. There are numerous ways in which Sydney's existing transport system fails to achieve this objective.

First, as discussed in Section 2.2.2, the transport system emits increasing airborne pollutants that threaten human health. According to Wilson (2002), 'it is the concentrated use of cars and trucks in major metropolitan centres for short distance travel that is the primary contributor to air pollution'. Since the release of *Action for Air* and *Action for Transport 2010*, NSW has met four of the six national air quality goals ahead of the 2008 target date, but it is not meeting the national goals for ozone and PM₁₀. Ozone and PM₁₀ are still a significant threat to urban air quality. Private car use remains the single largest contributor to ozone formation in Sydney and NSW records the highest number of exceedences of the ozone goal in Australia (Auditor-General's Report, 2006b). Strategies to reduce air pollution include promotion of active transport, greater use of public transport, reductions in vehicle kilometres travelled and technological innovation.

Second, the transport system is a major source of greenhouse gas emissions. Transport in NSW contributed 21.7 Mt CO₂-e to total greenhouse gas emissions in 2004, which was almost 14% of the State's total emissions. Road transport contributes 89% of NSW's transport emissions and the State's total transport emissions have grown by 18% since 1990, with emissions from light commercial vehicles, trucks and buses growing particularly rapidly (Department of the Environment and Heritage, 2006). Scientific consensus is that greenhouse gas emissions need to be reduced by at least 60% globally by 2050 to stabilise the climate system. The amount of greenhouse gas generated by a transport mode is a function of the amount and type of energy consumed. In Sydney, cars use the most energy per passenger kilometre; buses are roughly three times more efficient and trains are even more efficient (Glazebrook 2002b). This means that greenhouse gas emissions can be reduced by promoting active transport and public transport over cars, as well as by increasing the efficiency of car transport.

Third, the transport system can have impacts on ecological processes and water quality. These impacts arise at various points in the fuel cycle, during both construction and operation, when liquid, solid or gaseous pollutants make their way, directly or indirectly, into ecosystems and waterways. For example, oil refineries may release pollutants directly into the environment. Exhaust emissions that settle on surfaces are washed into waterways when it rains. Toxic metals, particularly lead, zinc and copper, can also make their way into waterways. In addition, paved areas affect 'run-off patterns and can result in flooding or in major changes in drainage patterns' (Wachs, 2000). Again, active transport and public transport have fewer ecological impacts per passenger kilometre than car transport.

Fourth, construction of the transport network converts land from other uses and can have direct impacts on habitats and biodiversity. It can fragment or remove habitats, place barriers between habitats and sources of food and water and interrupt animal migration routes, with consequent reductions in biodiversity (Wachs, 2000). A sustainable transport system would avoid direct impacts on land that supports important habitats or has high ecological value. Similarly, areas that are valued by the community, such as recreation areas and parks, should be retained.

In addition to land used directly for the transport network, there are land use impacts associated with mining of fuel and materials for the transport network. Important habitats may be removed to access metals for vehicles or energy resources. The existing transport system also depletes finite reserves of fossil fuels – coal, oil and natural gas. A transport system that relies on non-renewable sources of materials and fuel can never be sustainable in the long-term. The economic threat posed by depletion of oil reserves is considered in more detail in section 2.4.3 below.

The gravity of the ecological crisis, particularly the necessity to achieve deep cuts in greenhouse gas emissions, should be an incentive for Government, both State and Commonwealth to prioritise transport initiatives that reduce environmental harm. Instead, Government policy to date has achieved exactly the opposite, in other words, prioritisation of initiatives that encourage that most environmentally damaging of transport modes, private vehicle travel. Government has a responsibility to urgently reverse this trend. We must not leave, to future generations of Sydney residents, a legacy of irreversible damage to the ecological systems on which our welfare depends.

2.4 Economic viability

2.4.1 Efficient asset and resource use

Principle 9: Transportation systems must maximise the use of, and return on, transport assets and resources through better planning and accountability measures, while maintaining their long-term sustainability.

The large government capital expenditure in transport systems necessitates an efficient use of transport assets. A number of operational issues compromise maximum efficiency. Firstly, the capacity of the transport system is only required about 15-20% of the time, specifically in the AM peak two-hours and in the PM peak. The rest of the time the road network operates well under capacity, often mostly empty. Transport networks therefore need to have capacity to cope with a peak load much higher than their average operations require. Economically, this low usage rate is inefficient but, because most road system costs are not paid directly, motorists are not influenced to change their travel patterns. This means that for many hours of the day expensive assets are either empty (roads) or idle (vehicles).

Supportive strategies to change the times of day some people travel (to flatten out peak loads) could be implemented to reduce this inefficiency.

Many government resources also exist at the local scale but better use could be made of these. Resources sitting idle, such as community transport vehicles used for only a few services each week, could be shared or used for other kinds of service. Effective services, meeting the needs of target communities, are very important in terms of a return on the capital resources outlaid. Local government is an active provider of local transport for some special needs groups. These transport assets may be able to be managed more collaboratively to provide additional transport options for local areas. Fleet management and planning experience may be a necessary supporting measure government could provide.

Space efficiency is not clearly addressed in transport planning. The transport network requires a significant proportion of land in Sydney. Up to 40% of Australian urban areas is occupied by infrastructure for cars, including roads, car parking, service stations and manufacturing facilities (Campbell & White, 2003). Much of this is parking space, which is frequently empty. Transport modes with high capacity, such as heavy rail, make more efficient use of space. A given area of land dedicated to a heavy rail network can transport many more passengers than the same area of land dedicated to a road network. This reduces overall land use impacts. The use of land for both roads and parking spaces, to provide services for multiple vehicles with very low occupancy, is economically inefficient. The failed management of the transport system therefore contributes to the expense of land in Sydney and hence record housing prices.

Sydney has traditionally been a low-density city with a high degree of centralisation, in that the transport network is focused on the CBD (Troy & Smith, 2002). However, major centres are emerging outside the CBD and the current planning approach supports this development. As noted in Section 2.2.4, integrated planning is needed to increase urban density around high-capacity transit nodes in major centres and reduce the tendency for urban sprawl.

2.4.2 Economic efficiency

Principle 10: Transportation systems should be cost effective, now and in future, and transportation decision makers must move as expeditiously as possible towards fuller cost accounting, reflecting the true social, economic and environmental costs, in order to ensure that users pay an equitable share of costs.

Economic efficiency, defined as “maximising the benefits which users can gain from the transport system, after taking account of the resources costs of provision and operation of the transport system” (May, 2004) should be a core objective of transport policy. Economic efficiency involves reducing key costs such as travel time, whether caused by congestion, inadequate service provision or unreliability, and reducing and accounting for environmental and social externalities. Externalities, and mechanisms for accounting for them (including congestion charging and environmental taxes based on the ‘polluter pays’ principle), are discussed further in Section 5.

In a speech to the 1996 Sydney Transport Summit, Malcolm Turnbull stated that: “Sydney faces road congestion of around 33 seconds per kilometre. This may sound insignificant, but if a person were to travel 10,000 km in a year throughout Sydney, this would be equivalent of losing almost four days each year”. The roads in Australian cities are becoming increasingly congested. Approximately half of total urban VKT is currently performed under congested traffic conditions (BTCE Report 94, p. 312, cited in Bureau of Transport and

Regional Economics, 2000). That is, the travel is typically done on roads with either heavy congestion (involving average traffic speeds of less than a third of that possible on those roads under free-flow traffic conditions) or interrupted flow (where traffic is moving at around half that of free-flow or unimpeded speeds). (Bureau of Transport and Regional Economics, 2000)

Congestion is the result of demand exceeding supply. A road user joining a congested traffic stream is contributing to the marginal social costs of other road users in the congested traffic stream by further slowing the flow of traffic. As the road user does not pay for this cost, the result is excess consumption and inefficiency. Due to this inherent economic inefficiency, road building as a mechanism for reducing congestion does not work. More roads simply result in more traffic, due to the effects of induced traffic growth. The NSW Government's favoured policy, as evidenced by actual, on-the-ground initiatives, is therefore inherently flawed from the perspective of economic efficiency.

Congestion, as an economic externality, imposes significant costs on society. The BTE estimates a total cost of approximately \$12.8 billion per year due to traffic congestion in major Australian cities (with Sydney currently experiencing costs of around \$6 billion per annum, significantly higher than any of the other major cities). If nothing is done, the total cost of Australian urban congestion could rise to about \$29.7 billion per year by 2015 (table 1, BTE Information Sheet 14) May 2000, Bureau of Transport and Regional Economics information sheet 16 (Bureau of Transport and Regional Economics, 2000).

Transport policy should support the economic growth and vitality of a city or region, not impair it. Transport can improve access thereby increasing opportunities for economic exchanges. High levels of congestion, however, undermine economic growth and can lead to economic decline. This is because businesses' operating costs increase and customers go elsewhere. Interactions between the economy and transport issues are complex and not well understood, but there is evidence that transport problems can cripple economic regeneration. Congestion trends, if not addressed, could begin to undermine Sydney's economic strength and its position as a *'City of Cities'*. Sydney's transport system should sustain rather than corrode its economic vitality.

The absence of a well-planned sustainable transport policy, with service-focused objectives, can result in inefficient expenditure on transit. For example, expenditure to increase the size of the bus fleet may be ineffective if at the same time, measures are not taken to provide priority bus routes or otherwise ease traffic congestion. Increasing congestion in Sydney may mean that additional expenditure is required to maintain current levels of service, rather than providing improvements in service. Improvements to the transport system should be addressed holistically to optimise economic efficiency.

World Bank-funded research, found that cities (such as Zurich, Copenhagen and Stockholm) that emphasise walking, cycling and public transport are: "healthier financially and spend less of their wealth on transport costs". The report compares these cities, which spend only four to five per cent of their wealth on transport, to cities, including cities in Australia and the US, that are predominantly investing in roads and are using up to 17% of their wealth on transport (cited in Kenworthy et al, 2005). ABS 2003–2004 figures show that the average Australian household spends as much on transport annually as they spend on housing. North American, Australian and New Zealand cities also have the highest levels of car ownership in the world with over 500 cars per 1,000 people. Evidence from the Millennium Cities Database, (a database providing data from 100 cities from all continents for the year 1995) challenges the view that building roads is good for the economy while public transport is a financial drain. Database results suggest that the wealth of a city does not consistently explain patterns of increased energy use and motorisation. Overall, those cities

with higher public transport use spend a lower proportion of their wealth on passenger transportation (Kenworthy et al, 2005) and are therefore more economically efficient.

Cities based around high use of private vehicles are less economical partly because of the higher passenger transport energy requirements to generate an equal quantity of wealth in such cities. "In the US cities in the [Millennium Cities] database, 2.4 MJ of passenger transport fuel are used for each dollar of gross regional product generated. In the less car-oriented European and wealthy Asian cities, the figure is 0.8-0.9 MJ per dollar" (Kenworthy et al, 2005).

Data for Australia for 1990 show that cars in Sydney are the most energy intensive form of transit; buses are roughly three times more efficient and trains are even more efficient (Glazebrook 2002b). The energy intensiveness of Sydney's rail system was at this time one of the lowest for all cities, reflecting high patronage and electrification. Public transport is therefore significantly less energy intensive than cars. Glazebrook believes the same is likely to be true for infrastructure, particularly rail-based infrastructure that has a much longer life than roads.

Collectively, this evidence suggests that continued investment in roads at the expense of public transport is misguided and potentially economically destructive. The NSW Government should take immediate steps to enhance the economic efficiency of Sydney's transport system by investing in high-priority public transport initiatives that would both ease congestion and reduce energy use.

2.4.3 Peak oil

The energy intensiveness of Sydney's transport system will become increasingly important as cheap, easily accessible oil supplies diminish. UITPANZ states "it's now clear that the age of low-cost energy is coming to an end and that, over the next 10 to 20 years, many of us will not be able to afford to drive the distances that we presently cover". Indeed, as oil supplies and carbon emissions constraints increase, investment in fossil-fuel based transport systems is likely to become increasingly uneconomical (UITP, n.d). Presently the full costs of fossil fuel use are masked because externalities are not fully accounted for, and the fossil fuel industry benefits from a variety of subsidies. Recent estimates put total direct financial road transport subsidies in Australia at more than \$6.2 billion annually (Riedy, 2003). Other hidden costs of road transport are discussed in more detail in Section 5.

Oil is a finite resource, therefore no one can contest that supplies will eventually run out. What is currently debated is the point at which we will hit peak oil, that is, the point at which production rates start to decline. Some peak oil advocates believe this will happen within the next 5-10 years, although the data on global oil resources are very unclear. Not all analysts agree that peak oil will be reached so soon, but even so, there is acceptance that permanently higher fuel prices are an inevitable reality. In 1998, the Chartered Institute of Transport in Australia (CITIA) released a statement addressing this issue:

We have reached a crucial stage in the development of our local, national and international transport services. Our present path is leading us into potentially serious economic, social and environmental problems. New directions are needed for our future transport fuels and vehicles. 'More of the same' in our current transport plans and ways of thinking is no longer tenable...

The unlimited use of cheap oil that has characterised this century will end and we will be faced with one of the greatest transformations of human affairs.

The statement also calls for:

development of greater understanding and awareness of these crucial issues and for their consideration in all policy formulation and decision making relative to the future of transport and fuel in Australia (Chartered Institute of Transport in Australia, 1998).

Food production requires fertiliser, the manufacture of which is heavily fuel dependent. As the present Oil Age ends, transport requirements may well be de-prioritised in favour of agriculture. Urban car travel is arguably the least necessary transport priority and new urban road projects can therefore be seen as “disastrous investments” (Fleay, 1998, cited in Kilsby, 2002).

There is currently no feasible alternative to oil for powering high-speed passenger aircraft; therefore, aviation is possibly the mode most vulnerable to future energy problems. Rail transport, on the other hand, is much less vulnerable. Rail is inherently more energy efficient than road transport (lower friction, easier grades and fewer interruptions) and can also potentially be powered by whatever fuel is most economical at the time (Kilsby, 2002).

Kilsby believes that rising prices will probably hit Australia’s diesel fuel first and Australian transport users therefore need to be weaned off diesel use. The impacts of higher oil prices are already being felt in Sydney, with ferry and bus operators calling for an increase in fares to reflect higher fuel prices and the Commonwealth Government offering financial assistance to vehicle owners to convert cars to LPG. The impacts of fluctuating petrol prices are experienced differentially across Sydney, with those most dependent on car travel being most greatly affected. This reinforces existing economic inequities. Those least well provided for in terms of public transport often live in areas of low average income, such as Penrith, Wollondilly and Blacktown, and these people are further economically penalised by the necessity of car dependence (*see Box 2 p.12*).

If Sydney is to future-proof its transport system against the increasing cost of energy, the evidence suggests that further investment in private vehicle transport is not the most economically efficient or viable option. Instead, transport planners should manage the transition to non-oil based transport by mapping and implementing resilient and flexible pathways to new energy futures. Crucially, Sydney needs to move away from increasing, energy-intensive car dependency and instead begin to plan for and build-in resilience to future oil shocks by investing in less energy-intensive and non-oil dependent transit options. Planners will need to fundamentally rethink the robustness of plans for major infrastructure projects or other programs in the face of variations in future energy scenarios (Kilsby, 2002).

Box 5 Where are we now?

Objectives

Released in 1998, *Action for Air 2010* is a key policy document detailing the NSW Government's 25-year air quality management plan for the Greater Sydney Metropolitan Region. It sets the following targets for reducing the impact of transport on air quality:

1. To halt the growth in per capita VKT by 2011
2. To halt the growth in total VKT by 2021

To meet these targets, there will have to be a major shift of passenger journeys to work from cars to public transport (NSW Department of Transport, 1998).

The complementary document *Action for Transport 2010*, responds to the air quality targets set out in *Action for Air* by providing for a package of infrastructure development, service improvements and demand management strategies (Auditor-General's Report, 2006b)

Outcomes

Action for Transport committed \$4 billion to 2010 to investment in transport infrastructure with a mix of projects that reflected transport priorities at the time. Whilst some key transport projects have been completed, a number of projects have been brought forward, others deferred and new ones have emerged.

Completed projects.

Some public transport projects have been successfully completed or are on target for completion as planned. These include the Parramatta-Rouse Hill and Blacktown-Castle Hill Rapid Bus Transit Ways, as well as the heavy rail line from Epping to Chatswood, which are due to be operational by 2007. As promised, the light rail network was successfully extended westward to Lilyfield in 2001.

Deferred projects.

Overall, however, more road projects have been implemented than were planned and most major rail projects in *Action for Transport* have **not** proceeded as planned. Examples of delayed projects include:

- Parramatta-Strathfield Rapid Bus Transitway originally scheduled for completion by 2002
- Parramatta-Blacktown Rapid Bus Transitway by 2004
- North West Rail Link by 2010
- Sydney-Newcastle High Speed Rail by 2010
- Sydney-Wollongong High Speed Rail by 2010

(Auditor-General's Report, 2006b)

Problems with monitoring progress.

There are significant problems with the monitoring, review and scope of *Action for Air* and *Action for Transport 2010*. For example, *Action for Transport* has not been reviewed since its release, despite changes in transport priorities and directions since 1998. (Auditor-General's Report, 2006b)

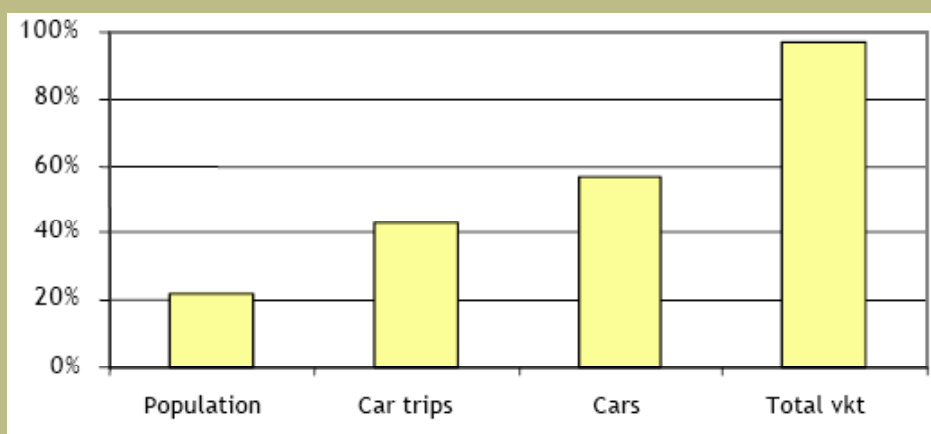
VKT is on the increase.

Both per capita and total VKT have increased since 1999.

	1991	1999	2000	2001	2002	2003	2004
Per capita VKT	17.9	20.1	20.3	20.0	20.4	20.4	20.3
Total VKT ('000)	64,038	79,497	81,238	81,365	83,867	84,245	84,535

Between 1999 and 2004, VKT grew at an average annual growth rate of 1.2%, exceeding population growth by an average of 0.2% per year. This reflects the broad trend of the past two decades, where car use has grown four times faster than population growth (TPDC, 2006).

Growth in population and travel (1981-2001)



(NSW Department of Planning, 2005)

A fall in public transport use.

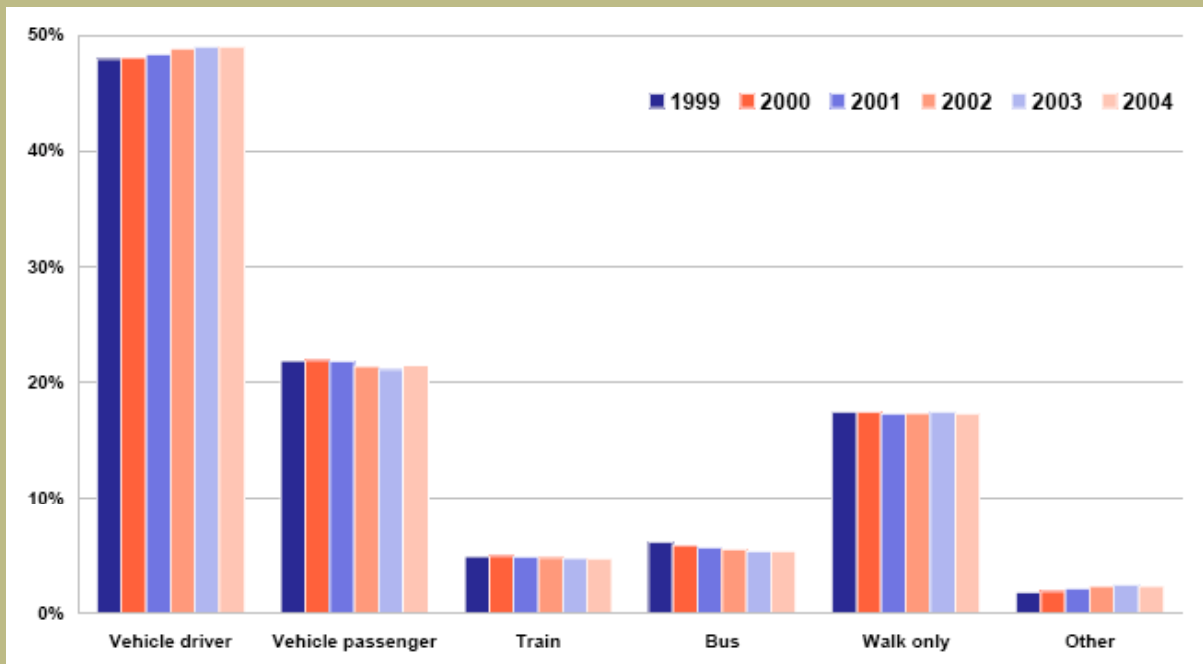
Between 1999 and 2004, the proportion of passenger journeys to work by public transport decreased.

In 2004, only 20% of passenger journeys to work were made by public transport, compared to 73% made by car, falling short of the 30% target in *Action for Air*

In 2004, the top 3 reasons for using a car to travel to work included:

1. Shorter travel time (47%)
2. Bus/train unavailable or inaccessible (33%)
3. Problems with public transport (26%)

Proportion of trips to work by mode on an average weekday



(TPDC, 2006)

3 Modes and Initiatives

[T]here are no simple solutions or magic bullets. Instead, there are dozens of elements that can be combined to provide greater mobility at lower social cost and less environmental burdens. Technology has a contribution to make, as does good planning and management.

~ Professor Martin Wachs, *Towards a City of Cities*, Warren Centre, 2002a

Ideas for improving Sydney's transport abound. Governments, universities, industry associations and community groups have all put forth proposals for transport initiatives. Some have become reality; many others exist mainly on the drawing board. Many of these ideas will have a part to play in a sustainable transport system. Below, is a review of the advantages and disadvantages of different transport modes and proposed transport initiatives in light of the sustainable transport principles defined in the previous section. These initiatives represent a rich stock of ideas on which the NSW Government can draw to fulfil its responsibility to provide a world-class sustainable transport system for Sydney.

3.1 Travel demand management

As noted in section 2.2.1, people do not demand transport in its own right, rather transport is a means to an end. In line with sustainability principles, the first job of planners should therefore be to design to reduce the need for transport as far as possible, or in other words, to manage travel and transport demand. This requires better integration of transport and urban land planning (discussed in section 2.2.4) and co-location of facilities to reduce the need for travel. In its submission to the *Sustainable Cities* inquiry, the Planning Institute of Australia (PIA) suggested that transport infrastructure funding should aim to reduce private transport needs.

An infrastructure approach more in tune with sustainability goals would look into transport reduction potential rather [than] trying to further expand mobility. For instance, this approach would examine how the excess of traffic demand that leads to congestion could be shifted to other modes of transport or to closer destinations and even prevented through alternative, non-transport inducing activities such as working at home or shopping through the internet. This highlights the importance of a close integration of infrastructure (supply) management and travel demand management approaches

(Planning Institute of Australia, 2005, cited in the Parliament of the Commonwealth of Australia, 2005).

3.2 Active transport

'Active transport' refers mainly to walking and cycling. More generally any travel relying on human power (non-motorised) can be included as active transport. In modern-day Sydney, the varied urban form results in varying opportunities for active transport. The walkable heart of the city is relatively small and many people access this central area by public transport and then walk within that area. Some local centres have high quality walking environments and a concentration of activities and services providing high levels of accessibility by walking/cycling. Other major centres are transit focussed, with higher densities surrounding major stations (including Bondi Junction and Chatswood). However, much of the city relies on access by private car.

Despite the highly varied quality of urban form for non-motorised modes, walking for 'whole trips' remains a very significant proportion of all trips (in Sydney as high as 17% in 2004 (TPDC, 2006). Walking and cycling easily meets the needs of many people for short trips, up to about 5km. In addition to these whole trips, walking and cycling is essential for access to most public transport trips (wherever park and ride is not used).

Significant attention has been focussed on active transport to date (particularly in the context of health-related benefits). Rissel et al (2002) report that almost 40% of urban NSW residents are not adequately physically active according to the levels of activity recommended for good health, 41% are overweight or obese and approximately 20% of Australian children and adolescents are overweight or obese. They note that 'physical activity that results from regular lifestyle behaviours has been found to be more cost-effective than physical activity achieved through structured exercise programs'. This makes promotion of active transport an important element in both health and transport policy.

Despite the benefits of active transport, 'facilities for walking and cycling tend to be what is left over when motorised transport has been catered for' (Kilsby, 2000). To change travel patterns in Sydney and increase walking and cycling, improved facilities at the local level are required. Importantly, density increases alone will not be sufficient to dramatically change travel patterns. The quality, safety, accessibility, connectivity, convenience and amenity of pedestrian routes are of prime importance (Troy & Smith, 2002). Perceived and actual safety, both from personal attack and from conflict with traffic is particularly important.

The localised nature of walking and cycling means that projects and initiatives to improve facilities will need to be distributed. A high quality network linking residential areas to local centres and public transport services must be a high priority. This requires many smaller projects in many locations rather than a smaller number of major projects.

Cycling network plans are increasingly well prepared (for example, the Cycling Masterplan in Action for Bikes 2010), but funding has tended to be relatively low, making progress slow. Typically, projects that are easier to construct proceed first and locations where space is constrained or there are conflicts with other modes tend to remain as gaps in the network. The continued implementation of the Cycling Masterplan is vital, combined with increased network development by local governments throughout Sydney.

There is much more that could be done to make cycling a viable and attractive transport option in Sydney. For example, in 2005, the French city of Lyons, in partnership with the advertising company JC Decaux, established a public bicycle network of 2,000 bikes that can be picked up or dropped off at stations around the city. In the first year of operation, bicycle traffic increased by 33%. A similar system could work in parts of Sydney along with appropriate measures to ensure the safety of cyclists.

The TravelSmart household program in Perth provides information on walking, cycling and public transport to receptive households and it has achieved a 14% reduction in car use (The Parliament of the Commonwealth of Australia, 2005). The *Sustainable Cities* report recommends funding to develop new programs and develop existing programs such as TravelSmart and the National Cycling Strategy.

Throughout the remainder of this paper, active transport is considered in the context of access to public transport.

3.3 Public transport

3.3.1 Heavy rail

The term 'heavy rail' refers to railways and distinguishes them from systems such as trams and light rail. Heavy rail is almost always built on a dedicated right-of-way, separate from road traffic. The systems are usually robust enough for heavy and high-speed trains and can accommodate freight trains, long distance trains and high-speed passenger trains.

'Metro' is a term used to distinguish between services that operate within the metropolitan area and longer distance, inter-city services. The term is used in locations where the systems are quite distinct from each other. In Britain the London Underground is an example of a local rail transit system that is distinct from the urban and suburban rail services operated by National Rail companies.

Heavy rail can provide high capacity movement of people at fast speeds due to its dedicated right of way. The right of way means reliability is not impacted by vehicle traffic but can be impacted by the interconnectedness of the network where incidents in one part of the network have flow on effects throughout. Increasing the sectorisation of a network reduces this issue. The NSW Government's current Rail Clearways project aims to separate the CityRail network into five independent sectors to improve capacity and reliability.

Fuel and greenhouse intensity per person kilometre is relatively low when trains are operated at high load levels (nearly full) however this advantage can be reduced if similar sized vehicles are operated during lower load times of day. The high capacity can be provided with comparatively low use of land space. A lane dedicated for buses or light rail can carry up to 5 times, and a heavy rail line up to 10 times as many people as a freeway lane (Pers. Comm. G. Glazebrook, 28 September 2006.). The *Sustainable Cities* report cites evidence from Newman that if the passengers currently using rail to travel each day to the Sydney CBD were to shift to cars, "an additional 65 lanes of freeway and 782 hectares of car parks would be required. This would require a multi-storey car park, 1,042 floors high" (The Parliament of the Commonwealth of Australia, 2005).

The constraint of vehicles operating on track means that new or expanded operations are limited until track networks are complete. New rail track requires high levels of investment on a per kilometre basis relative to road construction due to grade separation requirements.

Sydney's rail network is used for passenger trips within the city, intercity trips and freight movement. The Christie Report (Christie, 2001) identified how this multiple role impacted on network operations by requiring a range of varied stopping patterns (express, limited stops in parallel with all-stops) but in Sydney, these operations are constrained by limited overtaking opportunities. Christie described network constraints as "severe" mainly due to fifty years with almost no track amplification. This constraint is compounded by complex intersections between lines, lack of grade separation and signal constraints preventing trains from travelling close together. He forecast that by 2011 all existing lines into the CBD would be operating at maximum capacity.

The number of trains (rolling stock) is an additional constraint. Christie found that the proportion of the fleet available during the peak hour had been successfully improved, meaning the constraint that remained was the number of trains. Whilst the use of double deck trains has assisted in managing growth in the recent past, their use has meant that the time a train is stopped at the station while passengers disembark and board (dwell time) is long by comparison with single deck systems.

Reliability (also referred to as timetable adherence) is a key measure of public transport performance. In Sydney, this is measured in terms of 'on time running'. Since July 2005, on-time running has been defined for CityRail and suburban services as the proportion of peak services arriving at their destinations within 5 minutes of the timetabled time. In 2001, when on-time running was defined as within 3 minutes of the timetabled time, Christie described the situation as follows:

Since 1993-94 the target for this measure has been 92%. Although on-time running has generally improved over the last 25 years, it declined in 1999-2000 to levels not experienced since the late 1980s, and despite a strong recovery during 2000-01 on-time running is still only about 90%, below State Rail and customer expectations (Christie, 2001).

Christie went on to imply that Sydney's rail network is approaching tipping point when he described the "inherent and growing sensitivity of the near-capacity rail system to disruptions". In 2006, despite the introduction of a timetable with fewer, slower services and the adoption of a more lenient definition of on-time running, the proportion of on-time services in the suburban network had only increased to 91.2% (see Box 7 p.37).

Sydney's rail network development since the Christie report has focussed on sectorisation to improve network reliability. The Rail Clearways plan is a \$1.5 billion initiative of the NSW Government to improve capacity and reliability on CityRail's Sydney suburban network. It is due for completion in 2010. Projects already complete under this plan include the Bondi Junction and Macdonaldtown turnbacks and an extra platform at Berowra.

There are some major rail links planned for Sydney, including the North West (NWRL), South West (SWRL) and Harbour Links contained in the Sydney Metropolitan Strategy. However, these links are not due for completion until 2012 for the SWRL, 2014-15 for the NWRL and 2017 for the Harbour Link (see Box 6 p.36). Unless these links are accelerated or interim public transport measures are introduced, there is a danger that car dependence will already be "locked in" by the time the rail links become available.

There is need for significant investment in heavy rail if it is to provide an attractive alternative to private vehicles for most trips. The heavy rail network provides the skeleton of a world-class public transport system and a foundation for urban development. The existing plans to extend the heavy rail network to the north-west and south-west growth centres are critical and both rail links should be accelerated so that residents of the growth areas have viable public transport options as soon as possible. Further investigation of options for augmenting the capacity of the existing heavy rail network, building on the recommendations of the Christie Report, is recommended. It is also clear that gaps in the heavy rail network remain, such as the Epping-Parramatta link. Filling these gaps is a high priority. Bus services can provide an interim measure.

Most freight transport in Sydney is on roads. At a metropolitan scale, the NSW Government needs to have a strong focus on increasing the proportion of freight transport by rail to reduce environmental impacts and congestion. This means providing new rail freight infrastructure and multi-modal terminals in appropriate areas. At subregional and local scales, the NSW Government should explore innovative freight delivery options that provide an alternative to road transport as well as implementing measures to reduce the environmental impact of road freight transport (e.g. through improvements in vehicle technology and efficiency).

3.3.2 Light rail

'Light rail' operates on electric railways and usually has a lower (or lighter) traffic capacity than heavy rail. Light rail systems are diverse and can incorporate shared or exclusive rights-of-way, high or low platform loading and multi-car trains or single cars.

Reliability of service depends more on the level of priority than on the mode of transport. Where light rail operates in normal traffic conditions the light rail can be delayed by congestion or incidents. In some operating environments light rail is given priority within shared corridors, for example cars may be required to stop when light rail vehicles stop for passengers to disembark or signal pre-emption may be used to allow light rail vehicles priority through traffic signals. Full priority is only afforded using dedicated rights of way. In these operating environments light rail offers the same level of reliability as heavy rail although station spacing tends to be closer so more stopping is required.

Environmental benefits associated with light rail operations vary however typically these systems offer lower energy use per passenger kilometre than heavy rail and narrower corridor widths, providing even lower space requirements. Very low point source emissions can be achieved through electric operations and the vehicles are typically quieter than both bus and heavy rail operations.

Used extensively in Europe and increasingly in the US, the Australian examples vary from the widescale tram network in Melbourne (including a mix of historic tram and modern train-like vehicles) to the single Metro Light Rail line currently operating in Sydney. Since 1994, at least 100 cities worldwide have built or reintroduced systems (The Parliament of the Commonwealth of Australia, 2005) One of the major challenges prohibiting widespread use of light rail in Australia (outside of Melbourne) has been relatively high construction costs of lines already constructed, high cost of land acquisition for any dedicated corridors and existing reliance on bus networks. A further constraint is population density. Minimum population densities are required for light rail to be viable and it will therefore not be appropriate for all areas. Once light rail lines are operational however, they impact positively on land use, with development clustering along the routes. Light rail is more successful in attracting this sort of investment than buses because it is perceived to have greater permanency.

The existing Metro Light Rail line operates between Central Station and Lilyfield. The original line to Pyrmont opened in August 1997 and was extended to Lilyfield in August 2000. Currently privately owned by Metro Transport Sydney, the system carries 3.5 million passengers each year (Metro Transport Sydney, 2006). Numerous light rail proposals have been put forward in Sydney, some of which are listed in Section 3.8.2. However, the NSW Government has seemingly to date prioritised improvements to bus services over light rail development. The *Sustainable Cities* report has called on the Commonwealth Government to significantly boost funding for urban rail development, including light rail (see Section 5).

3.3.3 Bus

Buses have been used for public transport around the world since the early 1800's. Vehicle size ranges from small 10 or 12-seater vehicles through to articulated buses with seating for more than sixty people. Increasingly bus design improvements have provided low-floors for easier access. Applications of this range of vehicles vary to include shuttle services (for example between airports and city centres), school transport, fixed-route fixed-timetable services operating in general traffic, demand responsive services and bus rapid transit.

Bus rapid transit (BRT) is a special case where buses operate on dedicated rights of way. These applications are increasingly competitive with heavy and light rail in terms of capacity and level of service (travel time, reliability and legibility). High capacity bus systems (for example Curitiba), however, typically require 4 lanes to achieve high capacities (Pers. Comm. G. Glazebrook, 28 September 2006).

Until recently most buses used diesel, however compressed natural gas (CNG) is now common. Hydrogen fuel cell models are being trialled in Perth, and in nine European locations including London, hybrid models (diesel / electric) are also now available. Currently fuel cell buses are too expensive to be competitive with conventional buses on a pure financial cost basis. This may change in future as the costs of fossil fuels rise with declining reserves and, potentially, carbon pricing.

Buses typically provide a finer-grained network than rail based public transport and in less-dense areas this is vital to provide public transport access to more people. Buses also provide route flexibility. The main downside of bus transport has been its inability to compete with the car in terms of travel speeds and reliability. Passenger set-down and pick-up slows down what is otherwise a travel speed constrained by general traffic. BRT overcomes this issue through wider station spacing and dedicated rights of way.

The increasing range of fuel options, including cleaner diesel technology and CNG, is reducing the environmental impact of buses beyond the existing advantage per passenger when compared with car travel. Noise levels are also reducing through technological advances. The land required for bus travel is also space-effective when compared with private car travel and in the case of on-road operations existing infrastructure can be used.

In Australian contexts, bus-based public transport has continued to provide a cost-effective method of servicing relatively dispersed suburbs. Buses can provide access to public transport in low-density suburbs when rail alternatives are cost prohibitive or passenger loads are insufficient. The addition in some cities of transitways has resulted in dramatically increased travel speeds in inner areas resulting in higher levels of service generally. In addition, bus networks are much more easily incrementally expanded geographically and in terms of capacity than rail networks.

A key deficiency in Sydney's existing bus transport is poor reliability. This is largely due to road congestion. There are also problems of physical access for some users, although this applies more to private buses than STA buses. Increased use of bus lanes and bus priority, provision of real-time information at bus stops, and use of mini / midi-buses to provide flex route services during off-peak times will be needed to address these problems. Measures to reduce congestion would also improve bus running times.

A combination of bus services and light rail is appropriate to meet the need for access to major centres within the subregion and adjacent subregions of Sydney. These modes provide a finer network than heavy rail and can offer superior access and destination choice. They also provide important 'feeder services' to heavy rail networks and additional planning is needed to develop a comprehensive network.

3.4 Private transport

Since the 1950's, private motor vehicle travel has become an increasingly common, and later dominant, mode of transport. The car allowed for a new era of independent mobility and has impacted on the shape and size of cities and the way people move within them.

Private transport will remain an important component in more sustainable future transport systems. When the OECD considered the potential to meet quantitative sustainability criteria over the coming forty years, they forecast significant changes in motor vehicle usage. In terms of meeting the targets, the use of smaller vehicles and higher occupancy levels achieved more than 25% of the change towards sustainable transport (OECD, 2002). Current car usage patterns do not perform well when evaluated against sustainability criteria.

Typically cars provide us with access anywhere, anytime. The reliability of that access depends on traffic levels. Congestion impacts on travel time reliability in most cities during peak hour. Our ability to access private motor vehicles is not as equitable as the use of public transport. Age can be a barrier due to driver's licence requirements both for young people and for the elderly as their sight deteriorates. Economically, car use requires significant capital investment both to purchase the vehicle and for on-road costs and this can be beyond the financial means of some people or result in a reduction in other important spending. Typically we do not perceive up-front motoring costs as we use the vehicle but car use is a considerable component of the 16% of household income spent on transport—approximately equal to our spending on housing (ABS, 2006). Accident exposure rates for private motor vehicles are much higher than for other modes of transport.

Environmentally, despite vastly improved engine technology and resulting emissions reductions (according to the Australian Automobile Association, today's new car is around 30 times cleaner than a new car in the early 1980s) (The Parliament of the Commonwealth of Australia, 2005) the increased use of motor vehicles has tended to erode the environmental benefits of the technology improvements. The use of private motor vehicles is forecast to contribute over half of the growth in emissions for the transport sector through to 2010 (Australian Greenhouse Office, 2005). Estimates of the land used in cities for private motor vehicles are staggering. When roads, petrol stations and parking spaces are included, estimates are as high as 40% of urban areas in Australia.

Economically, car use costs individuals and the economy, particularly as congestion delays important freight vehicles and employees during otherwise productive time. As discussed in section 2.4.2, the cost of car-based transport systems cost cities a higher proportion of their GDP than more public transport-oriented cities.

In Sydney car use is increasing – both in terms of the proportion of trips and distance travelled (TPDC, 2006). Concurrently, the proportion of households with 2 or more vehicles is increasing and average vehicle occupancy is relatively stable (TPDC, 2006). Significant investment continues in the road network, including through a number of public private partnerships (PPPs) that have delivered tolled facilities. These trends are not sustainable. Investment in road construction does not relieve congestion over the long term, but instead induces demand. Government should instead focus attention on providing a world-class public transport system that provides an attractive and viable alternative to private car use. Additionally, measures should be taken to further reduce the environmental impacts of cars through fuel efficiency standards, proactive encouragement of cleaner technologies and tax regimes that favour less, rather than more polluting vehicles (see Section 5).

3.5 Alternative modes

Mass public transport in Australian cities has tended to be provided mostly using relatively traditional technologies operating in fairly conventional service models. The typical arrangement consists of fixed route, fixed timetable services on predominantly radial networks. This service arrangement has suited operator objectives relating to economic efficiency (limited services serving a few concentrated destinations) and suited cities needing to connect residential areas with a few major employment or educational centres.

Changing trip patterns (influenced by demographic, cultural and socio-economic changes), evolving city shapes (away from single centres), network congestion and environmental awareness combine to warrant increased public transport services. The number of destinations has increased, trip-making for purposes other than work and education has increased rapidly, the community service obligation has increased and the environmental benefits of moving more people using less energy and space have become more apparent.

Service structures vary across Australia, but, to date, demand-responsive transport has not been widely embraced. In contrast to fixed route, fixed timetable services, demand responsive transport can cater for pre-booked passengers or offer a hail-and-ride service similar to multi-hire taxis but offering regular services within a defined geographic zone. In Adelaide a demand responsive set-down approach is used to provide passengers with a service to their door in the evenings, again within a defined zone. These services bridge the gap between conventional public transport and private motor vehicles by offering higher levels of access (in terms of location and timing) or by catering for smaller markets where mass transit is not suited.

Community transport also plays an essential role in the transport system. Community transport services have enabled elderly people and people with disabilities to attend medical and other appointments and participate in recreational and educational events that it would otherwise have been difficult for them to attend. NCOSS has called for increased funding for these services as a necessary, but not sufficient, response to addressing transport disadvantage. Community transport options could be made more viable if low-utilisation community transport vehicles were also used to provide additional demand-responsive services. According to Whelan, in the long term, both Community Transport and taxis will be increasingly critical to meeting the transport needs of the ageing population. They stand out amongst transport providers because they can deliver door-to-door services. Taxis have the added advantage of being able to provide 24 hours a day, seven days a week transport from door to door. (Ministry of Transport, 2004). Taxis, however, are unaffordable for many.

There will always be a range of modes needed to provide a layering of different services to meet different travel needs in cities. Most of these needs can continue to be met via conventional public transport but more flexible approaches will also be needed to fill the gaps and enrich the level of service for all passengers. .

3.6 Future developments

It is not possible to comprehensively predict the full range of technologies that will be available in future years, nor the patterns of society and culture that will impact on future transport demand. New technologies and service models continue to be developed, tested and applied. At a minimum, changes in vehicle technologies will make an important contribution to more sustainable transport.

Private motor vehicles will remain important and engine technology will continue to develop to address environmental concerns. Low-emission hybrid cars are already gaining popularity, electric vehicles are being introduced and hydrogen fuel cell vehicles are under development. In addition, changed propulsion systems and a wider range of vehicles are also likely (SMART cars are an example of this kind of technology evolution).

Wachs (2000) suggests that Information Technology (IT) offers major potential in terms of change and that it warrants significant transport portfolio investment. The OECD in contrast has argued that technology will account for only about half of the kind of change sustainable transport requires. Whether change is attributable to technology or behaviour change tends to be a matter of definition. For example, if improved information about traffic conditions

supports people changing their travel patterns (timing or route) in congested periods this could be attributable to either. Wachs suggests IT will continue to change the way we work (and therefore influence commuter travel patterns), however others have argued that travel for social purposes increases, resulting in no net decrease in travel (although patterns and timing may change resulting in more even travel demand during the daytime).

For public transport applications, examples of recent technologies include very light rail technology, automated systems and guided busways. Guided busways, such as the O-Bahn operating in South Australia, offer higher operating speeds in narrow corridors combined with the flexibility of operating on normal streets, although comparison with dedicated rights-of-way through standard rapid bus transit is warranted. The Solar Sailor, a ferry powered by solar and wind power, points to the possibilities for water transport alternatives.

Other important innovations for further investment and development include collision avoidance systems, 'real-time' information regarding public transport or congestion levels, and the ability to reserve in advance, a time slot to cross a congested bridge or a parking space.

Ongoing investigation of, investment in, and uptake of emerging new technologies, is encouraged, particularly those that reduce the environmental impacts of mass and private transport.

3.7 Integration

A consistent critique of public transport is the lack of integration across and within modes. The unique characteristics of the range of public transport modes means different applications will be appropriate to specific roles within individual cities (also referred to as 'market niches' (Hann, 2002)). For example, higher capacity modes can be complemented by lower capacity modes to achieve economically efficient, quality services across a range of land uses. From the perception of the user however, the focus is on a journey, rather than on a bus or train trip. This focus means a passenger's interaction with the transport system commences at their origin and ends at their destination. Rarely is the origin or destination actually a station or stop so the concept of a 'door-to-door' journey is important.

In the Netherlands, integration is the focus of a strategy for achieving cost-effective increases in rail patronage. The Dutch Passenger Rail operators found, in their relatively mature rail system, investment in the 'journey chain' was more cost-effective in attracting passengers than investment in rolling stock or infrastructure (NS Reizigers cited in Transport 2000, 2001). As a result, they implemented a series of initiatives to reduce the overall, door-to-door journey time, including improved bicycle parking at stations (38% of Dutch rail trips start by bike or scooter) and a taxi-train system offering subsidised taxi links from the nearest station to the ultimate destination. The taxi component demonstrates the ability to integrate demand-responsive transport with conventional public transport to improve the overall service. Perhaps most interesting in this example is the use of 'chain managers' focused on each rail station. These people work with transport service operators (including taxi firms and bicycle hire companies) to improve the integration of the services and focus on reducing delays at individual stations.

There is a growing commitment to modal integration in Sydney's public transport system. Glazebrook (2002a) cites the commitment to integrated fare collection via smart cards and gradual improvements to information provision as important steps. However, actual progress to date is mixed. In June 2006, the *Sydney Morning Herald* reported delays to the implementation of Sydney's smart card ticketing system (called Tcard) and indicated the

successful tenderer, ERG, may face significant financial issues (Baker and Nixon, 2006). In parallel, whilst real-time information is available at major CityRail stations, at bus stops experimentation continues. Consistent numbering of stops to enable automated information provision has been a relatively recent improvement. Importantly, in the case of both fares and information, the level of technology implemented does not necessarily determine the degree of integration achieved.

Fare collection can be integrated whilst conventional ticketing is in place. In South East Queensland, the introduction of TransLink and a consistent system of fare zones across the region (together with service level improvements) was accompanied by an almost 10% increase in patronage in one year (Queensland Transport, 2005). Similarly, an alternative to significant investments in real time information is to develop cost-effective Transport Access Guides (TAG). The NSW RTA developed a TAG for their Parramatta site when relocating 500 staff in 2001 (Roads and Traffic Authority, 2001). The document drew together information about the range of transport modes available to the site in a simple, graphic format.

Timetable integration to enable a smooth transfer between modes via convenient interchanges is perhaps the most fundamental aspect of integration, reflected at least in part by the transfer penalty used in transport modelling. People reportedly perceive waiting time at stations as up to twice the actual time and thus transport modelling 'penalises' (in terms of modelled trip time) public transport trips requiring interchange. Glazebrook (2002a) describes some of Sydney's major interchanges as excellent (notably confining this to major interchanges such as Circular Quay and some relatively new facilities such as Blacktown, Parramatta and Liverpool). Despite this accolade, he suggests upgrades will need to continue for some time, indicating much opportunity remains. Kilsby (2000) makes the point that despite a number of operators and kinds of service, what the passenger sees must be "a connected network".

As discussed in previous sections, the space required for transport corridors in cities is a major resource constraint, meaning maximum effective use is required. Here too, integration offers potential. In Oberhausen, a medium-sized German city, corridor integration has been effectively achieved with two modes sharing the corridor. Glazebrook (2002a) reports the transitway in Oberhausen is accessible to both light rail and buses with vehicles sharing both station and guideway infrastructure. After exiting the transitway, buses continue on-street and light rail vehicles use the tram tracks. This approach to 'common space' is consistent in many areas of Germany where light rail vehicles running on-street share stops with buses, making for very easy interchanges and maximum space efficiency. Integration of

While the focus here is on modal integration, integration with land use planning, integration with the environment and integration across policy and departmental responsibilities are also essential (Department for Transport, 2000). Importantly, enhancing the benefits of one mode through integration with other modes is a major opportunity, demonstrated through examples like park-n-ride facilities at rail stations and car-sharing schemes linked to public transport usage (Nakamura, 2004). Transport integration has great potential to maximise the effectiveness of the existing transport system and to improve the public transport experience.

Box 6 North West Rail Link (NWRL)**North West Rail Link (NWRL)**

Announced in the State Government's *Action for Transport 2010* in 1998, the NWRL is an essential component of Sydney's \$8 billion new rail network. The NWRL was originally due for completion by 2010. The completion date was put back to 2017 and in November 2006, the Government announced it would be brought forward to 2014–2015 (Baker & Clennell, 2006). Starting on the main Northern Line and extending to Rouse Hill via Castle Hill, the NWRL will be the main public transport line linking residents of Sydney's North West with Epping, Chatswood, North Sydney and Sydney's CBD (NSW Department of Planning, 2006a).

Due to relatively low-density development in the catchment of the NWRL, the proposed Rail Link will be highly integrated with other public transport projects. It will complement the North West Transitway Network, consisting of two interconnected rapid bus transitway links, including the Parramatta-Rouse Hill and Blacktown-Castle Hill links to be operational by 2007 (NSW Department of Planning, 2006b). The T-Way corridor will in turn create opportunities for integration with new and existing bus services in the region, bridging the gap between heavy rail and local bus services (NSW Government, 2006c). This integrated model represents an ideal scenario where combinations of complementary transport modes will serve a variety of trip types and areas for the growing population in Sydney's northwest. For example, whilst heavy rail offers the best solution for the long-distance trips to the rest of the CityRail network, rapid bus transitways are most effective for the shorter cross-regional trips to Parramatta and Blacktown.

The next step to be undertaken in the planning process is reservation of the land corridor for the NWRL, which is a time-consuming process (NSW Department of Planning, 2006c). However, despite repeated calls from officials for sites to be bought as early as 1998, the State Government has failed to acquire land. As a consequence, acquiring land to build the future Rail Link will be more costly, with land prices having tripled in less than three years (Kerr, 2005). Therefore, to ensure the necessary land is available for the construction of the NWRL, immediate action should be taken.

Box 7 City Rail performance summary

City Rail performance summary

(Rail Corporation of NSW, 2004), (Source: Rail Corporation of NSW, 2005)

	99-00	00-01	01-02	02-03	03-04	04-05
City Rail passenger journeys (millions)	278.7	302.6	276.4	273.4	273.3	270.3
Suburban trains on time (%)	85.4	89.7	92.6	90.9	71.6	61.5
Intercity trains on time (%)	90.3	91.0	92.6	91.1	77.6	72.4

The NSW State Plan released in November 2006, reports that City Rail on time running is currently 91.2% (NSW Government, 2006)

3.8 Summary of initiatives

In *Towards a City of Cities*, the Warren Centre (2002b) identifies a hierarchy of access needs, from local, to intra-city, to inter-city. Similarly, in the *Sydney Metropolitan Strategy* (NSW Department of Planning, 2005), the NSW Government identifies a hierarchy from neighbourhood, to subregional to metropolitan. These hierarchies provide a useful basis for grouping transport initiatives, independent of transport mode. This kind of grouping helps to ensure that all modes that can serve a particular transport need are given fair consideration. The importance of this kind of decision-making approach is explored further in Section 4. In the sections below, various proposed transport initiatives are categorised according to this hierarchy.

The initiatives considered here have been proposed by others. Many of them have something to contribute to a sustainable transport system. Some are clear priorities. However, in general, there is still a need for the NSW Government to assess all these initiatives fairly, based on their contribution across all dimensions of sustainability. Therefore, in Section 4 the decision-making process is discussed in more detail.

3.8.1 Local transport

The local transport network is used for normal day-to-day activities, such as shopping and recreation, as well as for access to the subregional transport networks. Transport at this level needs to 'link neighbourhoods, villages and town centres to major centres' (NSW Department of Planning, 2005). The dominant transport modes at this level are walking, cycling, driving and local public transport (mainly buses).

Initiative	Examples	Mode	Key Benefits	Key Concerns
Co-location of facilities to reduce travel demand	Provide basic services in new development areas	Travel demand management	Reduces the need for transport provision	Requires minimum density and range of services for feasibility
Promote active transport	Advertising and awareness campaign to promote active transport	Active transport	Significant health benefits from activity, reduces local VKT	Relies on behavioural change which can be difficult without associated infrastructure improvement
Improve active transport infrastructure	Build local cycleways Provide bicycle parking and storage facilities Provide easy pedestrian access in new developments Establish a public bicycle system	Active transport	Improves safety, security and accessibility of active transport modes	Difficult to coordinate across multiple local Councils and difficult to implement in some urban areas Public bicycle system would be difficult in many parts of Sydney due to lack of safe cycling options
Provide flexible public transport alternatives to cars	Demand-responsive bus service	Bus	Potential to reduce car ownership and use	Level of service required may not be warranted by passenger loads
Reduce the environmental impact of local transport options	More sustainable fuels More efficient vehicles	Private and public transport	Reduce greenhouse gas emissions and air pollution from transport, increase resilience	Does not improve other aspects of sustainability, such as equity and access

3.8.2 Subregional transport

The Sydney *Metropolitan Strategy* divides Sydney into ten subregions, coinciding with local government boundaries. These are Central Coast, North, North East, North West, West Central, Inner North, Inner West, Sydney City, East, South and South West. Subregional transport provides access within subregions to the major centres within the Sydney metropolitan region, including links between nearby centres. The Sydney *Metropolitan Strategy* identifies five regional cities and 22 other strategic centres that act as major trip generators at a subregional level. Cars and buses currently dominate subregional transport, although heavy rail and cycling also play a role.

Initiative	Examples	Mode	Key Benefits	Key Concerns
Maintain or improve existing subregional links	Upgrade stations and vehicles to meet disability standards	Public transport	Improves access, equity and integration	Other actions are needed to improve the quality of service
	Improve passenger information systems			
	Improve station security			
	Improve ticketing			
	Extended bus priority: a suite of measures, including bus priority at traffic signals and dedicated lanes for use by buses	Bus	Improved travel speeds and reliability	Impacts on other traffic
	Incentives or regulation to increase private vehicle occupancy	Private	Reduces VKT associated with the transport task	Measures are difficult to enforce and past attempts have had little impact
	Transit lanes for vehicles with higher occupancy			

Initiative	Examples	Mode	Key Benefits	Key Concerns
	<p>More sustainable fuels</p> <p>More efficient vehicles (hybrids, fuel cell vehicles, smart cars, Solar Sailor)</p>	Private and public transport	Reduce greenhouse gas emissions and air pollution from transport, increase resilience	Does not improve other aspects of sustainability, such as equity and access
Provide additional transport options within and between adjacent subregions	CBD light rail proposals (Central Station to Circular Quay, via George Street or Castlereagh Street)	Light rail	Viewed by current light rail owner as a necessary step prior to further expansion	Interchange for bus passengers if some buses terminate at Central
	Bay Light Express (Central to Cronulla via La Perouse and Central to Caringbah via Newtown and the airport)	Light rail	Alternate approach to meet local transport needs and improve transit-oriented land use	Arose as a response to a specific road project (M6) and network contribution needs consideration
	Light rail extensions to Bondi, Leichhardt, Balmain, the harbour foreshore to the Rocks, along Parramatta Road to Burwood and to the University of NSW and Green Square	Light rail	Addresses CBD bus congestion and releases buses for alternative services	May impact on directness of public transport service and on general traffic if on-street
	Peninsula Light Rail (ultra-light rail network focusing on Chatswood, and serving mainly north shore and Warringah peninsula)	Light rail	If mode shift achieved, assists with major road network constraints	Cost and integration within the network

Initiative	Examples	Mode	Key Benefits	Key Concerns
	Sydney Overground: a networked bus system that can provide anywhere-anytime convenience, high service frequency and route redundancy at a comparable cost to present direct route systems	Bus	High frequency bus services (for example, every five minutes)	Difficult to transition to this approach when current approach is to provide more direct services.
	Car sharing (for example, Go Get Car Share)	Private	May reduce car ownership and VKT	Users may have got by without a car in absence of the service, car availability
Provide smooth interchanges between local, subregional and metropolitan networks and modes	Rail/bus interchanges Bicycle parking, lockers, showers at stations Taxi-train integration Integrated ticketing system (Tcard) Increase frequency of connections (timetable integration)	Private and public transport	Increases the convenience of using public transport	Can be limited by available space

3.8.3 Metropolitan transport

Metropolitan transport includes 'the longer cross-city and inter-regional connections, which link the suburbs to Sydney city, Port Botany and Sydney Airport, and link Sydney to the regions such as the Lower Hunter, the Illawarra and the rest of NSW and interstate' (NSW Department of Planning, 2005). At this level, the dominant modes are cars and heavy rail, with some contribution by buses (for example, the Liverpool-Parramatta T-Way).

Initiative	Examples	Mode	Key Benefits	Key Concerns
Maintain or improve existing cross-city links	Christie Report proposals including turnbacks, track duplication and station upgrades (Christie also recommends system expansion) Rail Clearways project	Heavy rail	Provides for more frequent services and reduces network impacts of delays	Potential Government deferral of network expansion to focus on improving existing network
	Purchase more rail rolling stock	Heavy rail	Allows for increased frequency and also supports development of new links	Major capital projects also required
	More sustainable fuels More efficient vehicles	Private and public transport	Reduce greenhouse gas emissions and air pollution from transport, increase resilience	Does not improve other aspects of sustainability, such as equity and access
Develop new cross-city links within Sydney	North-West T-Way (rapid bus transit) Hurstville-Strathfield rapid bus transit Guided busway (for example, Adelaide O-Bahn)	Bus	Flexibility of running directly onto the transitway (avoiding interchange)	High infrastructure cost

Initiative	Examples	Mode	Key Benefits	Key Concerns
	Motorway proposals	Private	Temporary reduction in congestion	Induced traffic growth, greenhouse gas emissions, not cost effective, does not improve equity and access
	North West Rail Link Harbour Rail Link South West Rail Link	Heavy rail	Essential to cater for future growth in north-western and south-western areas	Major infrastructure investment
	Epping-Parramatta link	Heavy rail	Increased rail network capacity and improved access to major centre at Parramatta	Major infrastructure investment
Upgrade or improve links between Sydney and the rest of NSW / Australia	Electrify the rail lines south of Kiama and south of Macarthur	Heavy rail	Faster, reduces interchange, reduces emissions and noise	Power supply capacity upgrades required as network expands
	Construct very fast train between Sydney, Canberra and Melbourne	Heavy rail	High quality public transport improves equity	Cost-effectiveness in terms of passenger loads
Improve regional transport in NSW	Introduce sprinter type trains for branch lines in regional / country areas	Heavy rail	High quality public transport improves equity	Cost-effectiveness in terms of passenger loads

4 Deciding our transport future

The traditional approach to appraising transport initiatives has tended to concentrate on individual modes, physical infrastructure solutions, and assessment via conventional project appraisal techniques. However, a more holistic, multi modal approach to transport planning, appraisal, investment, and evaluation is required at both the strategic and individual project level.

~ NSW Department of Planning, *Sydney Metropolitan Strategy*, 2005

As the previous section indicates, many possible transport initiatives have been proposed as partial solutions to Sydney's transport crisis. How are we to make sense of these diverse initiatives and choose those that will deliver the best environmental, social and economic outcomes? This section considers how we currently make decisions about transport and how decision-making processes could be improved to deliver a more sustainable transport system.

4.1 Existing decision-making processes

The NSW Government has primary responsibility for decision-making for Sydney's transport system. In its *Sydney Metropolitan Strategy* (NSW Department of Planning, 2005), the NSW Government concedes that the 'traditional approach to appraising transport initiatives has tended to concentrate on individual modes, physical infrastructure solutions, and assessment via conventional project appraisal techniques'. Similarly, the *Parry Inquiry* (NSW Government, 2003) argued that:

it is clear that there must be a much better framework for planning investment in future transport needs. The past lack of integration between road infrastructure planning and public transport planning and the failure to apply robust investment rules to both road and other transport infrastructure represent a significant and costly shortcoming.

This poorly coordinated approach to transport decision-making has tended to favour urban motorway projects over active transport and public transport initiatives.

In response, the NSW Government has committed to a multi-modal planning and evaluation approach, guided by the Australian Transport Council's *National Guidelines for Transport System Management*, released in December 2004. These guidelines provide a strategic framework and project appraisal techniques for transport decision-making. While the adoption of a multi-modal approach to transport decision-making would be a positive step, several practical challenges remain. These challenges, and possible responses, are discussed below.

4.2 Coordination

In practice, coordination of decision-making across the many government departments and state-owned corporations involved in transport planning and operation has been and remains difficult (Auditor-General's Report, 2006b). At the Ministerial level, the Minister for Transport is ostensibly responsible for coordination of decision-making on transport. However, the Premier, Treasurer, Minister for Roads, Minister for the Environment, Minister for Infrastructure and Minister for Planning all have major responsibilities with respect to transport planning. At the same time, there are numerous authorities and state-

owned organisations with a stake in transport decision-making, including the IPART, the RTA, RailCorp, the Transport Infrastructure Development Corporation (TIDC), the STA and Sydney Ferries Corporation. This fragmentation of transport responsibility makes coordination of decision-making a challenge.

A particular concern is the existing separation of Ministerial responsibility and budget allocations for public transport and roads. At present, the Ministry for Transport and RTA have separate budgets and Ministers. Cross-modal coordination of transport planning would be greatly enhanced by establishing a Department of Transport with overarching responsibility for all transport modes and a single transport budget (Mant, 2002). This would go some way towards addressing the privileged role of the RTA and road infrastructure in historical transport decision-making processes.

A more radical proposal, discussed by Mant (2002), would be to establish a single department (with a single Minister) with responsibility for both urban planning and transport. Given the evident need for integration of transport and land use planning, this proposal has definite merit. The *Sydney Metropolitan Strategy* prioritises integrated transport and land use planning – a merged department would give greater confidence that this might be achieved in practice.

Others have proposed the establishment of an independent Transport Coordination Authority (TCA) with long-term responsibility for the development of a sustainable transport system. The TCA would be comprised of transport experts and would report directly to Parliament. It would need to be established through statutory reform and given sufficient power to undertake its role. This option has particular advantages in terms of coordination, integration and putting different transport modes on a fair and equal footing in government.

At the very least, there needs to be long-term, annual dedicated funding for sustainable transport and a bipartisan commitment to pursue a long-term plan for sustainable transport reform.

4.3 Public participation

A second challenge for the NSW Government is to achieve genuine public participation in decisions about our transport future. The *National Guidelines for Transport System Management* recognise the importance of community engagement in transport decisions but provide little guidance on what form that engagement should take. All too often, the community is only consulted about specific transport proposals once the planning process is well advanced. Authentic public participation requires that citizens have an opportunity to shape the general direction of the transport system and determine the specific proposals that receive further attention.

Genia McCaffery, President of the NSW Local Government and Shires Association (2006) argues that NSW lacks a meaningful, proactive approach to consultation with local communities on transport initiatives. Instead, critical infrastructure decisions are thrust upon people. McCaffery points out that public consultation can draw out inexpensive and innovative ways of improving mobility, such as cycleways and car-sharing schemes. She emphasises the need for transparent, accountable consultation processes that involve the community from the earliest stages of the planning process.

As Searle (2006) points out, the development of the *Sydney Metropolitan Strategy* was marked by the strongest attempt yet to consult with the community on Sydney's future. The

NSW Government selected about 1,000 people at random to participate in 12 Community Forums during development of the Strategy. Transport was one of the top three issues raised at the Community Forums:

The community expressed concerns about service and reliability, the need for new rail lines in growing areas, improving connections — not only to Sydney city, but across suburbs and between centres — and about better integration between the different types of public transport (NSW Department of Planning, 2005).

While the Strategy addressed some of these concerns, it is slow to deliver new rail lines to growing areas and fails to consider the role of light rail in providing transport connections across the city, despite community support for light rail. Community Forums appear to have had little real influence on the final Strategy (Searle, 2006). That is, they were used to legitimate parts of the Strategy that were consistent with community views but not to introduce new ideas.

Both Melbourne and Perth offer recent examples of more participatory approaches to city and transport planning where there was a real sense that citizens had an opportunity to shape the resulting strategies. During the development of the *Melbourne 2030* strategy, there were two major consultation rounds involving five times as many people as were involved in the preparation of the Sydney strategy. An initial round of 17 *All Ears Listening* public forums had a broad focus on what was good and bad about Melbourne and ideas for the future. A second round of 17 *Moving Forward Together* forums distilled the ideas from the first round into 10 topic areas for further comment. There was also a specific youth forum and a forum on *Women in the City*. The process generated some 80,000 ideas for the strategy and reports from all the forums are available on the web.

In developing its *Network City* strategy for Perth, the Western Australian Government has used several innovative participatory approaches. The South West Metropolitan Public Transport Forum involved 80 people, including members of the community. The Forum piloted an innovative model of public consultation using computers to capture ideas and a “theme team” to consolidate these ideas and provide live feedback. This model was later used, on a large scale, for the *Dialogue With the City*. This was an interactive event in which 1,100 citizens worked together, assisted by technology, to create a common vision for Perth. Citizens were given briefing materials before the event to help them to deliberate in an informed way, rather than relying on popular opinion. The Western Australian Government also used a random survey of 1,700 people from the electoral roll to find out the issues that were considered important by the community. The survey was supported by special “listening sessions” with youth, Indigenous people and people from non-English speaking backgrounds to ensure that their voices were heard.

These are just two Australian examples of innovative approaches to public participation that support authentic involvement of citizens in shaping city and transport planning. There are many more examples from around the world, using a range of methods, including deliberative polls, consensus conferences, citizens’ juries and 21st century town meetings. The objective of these approaches is to provide citizens with the opportunity to guide decision-making, in an informed way, from the earliest stages of a planning process. The NSW Government needs to apply these and other methods to future transport planning to ensure that there is real community participation in decision-making on Sydney’s transport future.

4.4 Integrated resource planning

A third challenge is to consider all the sustainable transport principles discussed in Section 2 during transport planning processes. This requires a multi-criteria approach to decision-making that gives appropriate weight to environmental and social impacts alongside cost-benefit analysis. One decision-making framework that can assist with this process is an integrated resource planning (IRP) framework. Integrated resource planning is used in the energy and water sectors to identify the supply and demand-side options that provide the required amount of energy and water (the resource) at the least cost, taking into account environmental and social criteria. For example, more water can be made available either by building a dam or by improving water efficiency; IRP provides a consistent basis for deciding which approach to pursue.

The 2006 *Metropolitan Water Plan* is informed by an IRP approach, but IRP has not yet been applied to transport in Australia. IRP would allow for fair evaluation of all the options that can be used to provide the transport services people need, comparing road-based options with other modes, transport demand management and active transport options such as walking or cycling. For example, IRP could have been used to assess options for reducing congestion in the important Windsor Road corridor. Windsor Road congestion is being dealt with by augmentation of the existing road system at significant cost, which, experience suggests, is likely to be only a short-term congestion fix due to induced traffic growth. Although additional public transport provision, such as bus priority measures and a cycleway, is planned, it is not a comprehensive public transport solution to the congestion problem. An IRP approach would have helped to assess the optimal solutions in this particular scenario and may have resulted in an alternative series of public transport options, effectively removing the need for road augmentation. IRP is a methodology that considers the full effect of planning alternatives on different interests, including consumers, the community, business and industry, the environment and government. It has the potential to enhance the efficiency, equity, transparency and consistency of transport decision making. It guards against the lowest common denominator result, whereby good public transport plans can be shouted down by a vocal motorist lobby.

One of the difficulties in applying IRP is defining the 'resource' that is desired. Transport modes could be compared readily based on the net cost per passenger-kilometre, however, the real resource of interest is access to economic and social exchanges. When considered in this way, it is clear that access can be provided without the need for transport, for example by supporting structural changes that locate employment opportunities closer to home. The NSW Government should use an IRP framework to support decision-making on Sydney's transport future, focusing on the least cost provision of access.

4.5 Integration across scales

The final decision-making challenge discussed here is to achieve integration across multiple scales. Decisions made at city planning level need to be reflected consistently in sub-regional planning, national planning and local development planning. Policies at all levels need to be mutually supportive (ECMT, 2001). According to Brockhoff (2002), the local development approval process focuses exclusively on how to accommodate private vehicles and gives little attention to the provision of access for walking, cycling or public transport. Good work done at the city planning level can be undone if appropriate changes are not made throughout the planning system. The NSW Government needs to work with Councils to ensure that sub-regional and local planning processes support the development of a sustainable transport system. The NSW Government also needs to work closely with the

Commonwealth Government to ensure coordinated planning across all levels, particularly with regard to, for example, movement of freight.

5 Funding and pricing the transport system

The current policy and funding platform for Sydney's transport infrastructure as outlined in the [Metropolitan] Strategy will provide Sydney with what could be called a 'business as usual' infrastructure future. All indications are that this future will essentially be a continuation of the current policy environment, in which the government, on behalf of the community, trades off between lower investment in order to deliver a budget surplus in exchange for lower quality services that come with lower investment. Quite simply, 'balanced books' are being traded off against worsening transport.

~ Sydney's transport infrastructure: the real economics – Centre for International Economics (CIE), 2005

The full cost of addressing Sydney's transport problems will depend on what initiatives are implemented and how and when they are implemented. What seems clear is that the total cost will not be met from current funding sources. This section of the paper looks at potential alternative sources of funding for Sydney's transport initiatives.

Inextricably linked with funding, is the issue of transport pricing. There is agreement that current pricing arrangements do not capture, as they should, the full cost of transport provision. In particular, the costs of environmental and social externalities are not fully captured in current pricing arrangements. Here pricing is considered in terms of revenue raising (funding), cost-recovery and behavioural change.

5.1 Funding

5.1.1 Current funding

Sydney has adopted a 'stop-go' approach to funding public transport investment in the last 30 years. "Every decade or so, funds are made available to undertake a major project, but these tend to dry up shortly thereafter" (Glazebrook 2002a). It is important to secure guaranteed ongoing, annual funding for development of Sydney's public transport system to enable implementation of a long-term improvement plan and to achieve the undertakings set out in the NSW Government's *Metropolitan Strategy* (refer to Section 1). Funding must be sufficient to provide for new infrastructure and ongoing operating and maintenance costs; "the mere building of infrastructure is of little use unless the guaranteed operating resources are available to ensure that service quality is also improved in areas such as frequency, comfort, security, reliability, etc" (Warren Centre, 2002a).

Currently transport in Sydney is funded from a variety of sources:

- User payments including: public transport fares, registration charges (Motor Vehicle Tax) and fuel contributions from road users (Commonwealth Government fuel excises) and road tolls;
- Government funding including: Community Service contributions (covering concession fares), untied road fund allocations, public transport service delivery funding and direct capital works funding; and
- Other revenue including: non-operating revenue such as property rent and net debt.

(Pettigrew, 2002)

There is widespread agreement that current public transport funding is insufficient to provide Sydney with a system of adequate quality and scope (see Box 8 p.52 for analysis of recent budget announcements and Box 9 p.55 for historical investment). The goal of transport funding should be to support provision of “a high level of accessibility for all Sydneysiders consistent with limiting the harm done to the environment” (Kirwan, 2002). The emphasis should be on improving the quality of services. It is vital that the available funding is directed wisely. Historical spending on the transport system as a whole has been inefficient. A focus on building motorways to reduce congestion has only led to greater congestion. At the same time, spending on public transport has often been poorly targeted or based on public-private funding models that have not worked. More effective use of existing transport funds could go a long way to providing the funds required for a world-class transport system. A new injection of funds is needed, however, to ensure a level of quality, reliability and speed sufficient to attract current car drivers to more sustainable transport, in other words, to make public transport a realistic and viable alternative to car use.

As public transport benefits the entire community, the cost should be shared by the community, rather than relying solely on fare revenue. Successive Warren Centre Community Values studies indicate that there is community support for increased spending on public transport and that politicians underestimate the community’s preparedness to change.

5.1.2 Required funding

The Committee for Economic Development of Australia (CEDA) estimates that the total value of rail and road infrastructure under-investment is \$18 billion Australia wide. This under investment covers the deficiency in meeting current demand only (CEDA 2005, p. 22, cited in Centre for International Economics, 2005). Funding is required for capital works, maintenance and operations. Based on estimates provided by SRA and STA, the *Parry Inquiry* found that the total costs to **maintain** existing CityRail, Sydney Buses, Newcastle Buses and Ferries, and Sydney Ferries services will be nearly \$2.7 billion per year to 2010 (NSW Government, 2003). Therefore, the expenditure required to operate public transport services in NSW in a ‘steady state’ is expected to increase substantially to 2010. Clearly much more will be needed to fund improvements.

A recent study by the Centre for International Economics (CIE), analyses the social cost of road transport and from its analysis, derives a maximum justifiable expenditure to address these worsening costs of between \$800 million and \$11 billion in present value terms in 2005 (note this is only the expenditure justified to prevent social costs from rising above 2005 levels and is subject to simplifying assumptions) (Centre for International Economics, 2005). The Warren Centre has called for an increase in funds available for long-term investment in developing Sydney transport of an additional \$500 million per annum. Glazebrook indicates the need for a potential investment of \$19 billion in public transport development including heavy and light rail, ultra-light rail, buses, ferries and multi-hire vehicles over 20 years (Glazebrook 2002a).

As a first step then, the NSW Government should commit to continuous, annual funding at the level needed to deliver the improvements in public transport that Sydney deserves.

Box 8 Recent State Government investment announcements

In 2005 and 2006, the NSW Government announced significant spending commitments for public transport. This was accompanied, however, by continued significant commitment to spending on roads, particularly road construction. Further, as the evidence to date shows, announcements are not always followed through with implementation (*see Box 5 p.23*). Analysis of the announcements also reveals deficiencies.

In 2005 the NSW Government committed to several initiatives to meet expected future demand for transport in Sydney:

- \$3.6 billion investment in the arterial roads network including the Cross City Tunnel, the Lane Cove Tunnel, the M7 and the Windsor Road upgrade
- Public transport network and service improvements including:
 - \$1 billion for the Rail Clearways project
 - \$1.5 billion for new trains
 - \$1 million for the transport interchange at Parramatta.

(DIPNR 2004), (Centre for International Economics, 2005)

In the NSW Government's 2006–2007 Budget speech in June 2006, the Treasurer announced the following:

Increased spending in the transport portfolio of \$435 million, including:

- \$3.4 billion funding for railways and public transport, including capital expenditure of \$1.6 billion:
 - \$129 million to purchase corridors for the metropolitan rail expansion
 - \$207.8 million to continue the Rail Clearways program
 - \$327 million for work on the Epping–Chatswood Rail Line
 - \$275 million to purchase new rolling stock and upgrade the existing fleet
 - \$45 million for Bus Priority Measures
 - \$36 million for the first stage of a \$254 million program to purchase 505 new 'clean-diesel' and natural gas powered buses.
- \$3.3 billion for roads - the biggest-ever roads program for NSW – of which, a total of \$1.59 billion has been allocated towards road construction.

This is in addition to major projects worth more than \$15 billion over the next 15 years. (NSW Treasury, 2006)

About one-third (just over \$530 million) of the capital spending 'announced' in 2006 is for continued spending on two current initiatives: the Rail Clearways and the Epping-Chatswood Rail Line. While these are important initiatives, the announced spending is certainly not a new investment commitment.

Construction of the South West Rail Link (SWRL) is scheduled to commence in 2009, but the Budget papers indicate only \$34 million is for this project, despite land acquisition cost estimates of more than \$70 million for one-third of the corridor (\$75 to \$85 million for the section between Edmondson Park and Leppington) (Transport Infrastructure Development Corporation, 2006).

Investment in rail rolling stock represents a key step forward. The level budgeted (\$275 million) is close to what experts estimated was needed (\$200 to \$280 million) each year to maintain and grow the fleet. (Christie, 2001)

The \$36 million set aside for bus purchases in this Budget will give the STA 86 new buses for use on the Sydney and Newcastle networks. The budgeted purchase seems disproportionately small when cities such as Brisbane, with bus fleets less than half the size of the STA's, will purchase 71 new buses in the 2006–2007 financial year (Newman, 2006). It also appears low in light of the NSW Government's own commitment to purchase more than 1,000 new clean diesel and natural gas buses over the next seven years (NSW Government, 2006).

The State Infrastructure Strategy (SIS) is a very important commitment by the Government to long-term investment and some \$15 billion of projects are foreshadowed. Detailed funding allocations in the plan indicate where about one-third of this will be spent. Of the \$5 billion detailed in the SIS, more than half is for Rail Clearways and the Parramatta Chatswood Rail Link. It would be a disappointing ten years to come if we can expect only two major projects and two new rail corridors (NWRL and SWRL). The Clearways Projects is especially important because it is network development that should have been implemented progressively. However, this infrastructure catch-up game cannot be an acceptable reason for avoiding network development and growth over the next ten years.

November 2006 announcement

In November 2006, the NSW Government announced it would spend \$660 million fixing some of Sydney's worst roads and improving train and bus services. Although this amount includes provision for bus lanes, there is provision for further road investment including duplication of the Iron Cove Bridge (Baker & Clennell, 2006). While all contributions to public transport are welcomed, expenditure needs to be framed within a long-term, coherent, strategic plan with meaningful goals and targets, not piecemeal, ad hoc announcements in the run-up to an election

5.1.3 Commonwealth Government

Dedicated funds

It is appropriate for both the Commonwealth and NSW Governments to have a role in the provision of funding. The Commonwealth Government is responsible for Australia's economic performance and the efficiency of the transport system in Australia's largest city is a significant influence on economic performance. In line with this, the *Sustainable Cities*

report recommended, “the Australian Government significantly boost its funding commitment for public transport systems, particularly light and heavy rail, in the major cities” (The Parliament of the Commonwealth of Australia, 2005). The report also notes that the Commonwealth Government’s Auslink program does not provide for sustainable transport as the funds are mainly being spent on traditional road infrastructure. The Committee recommended investigating options to extend the *Roads to Recovery* program to include other modes of transport.

The Planning Institute of Australia’s (PIA) submission to the *Sustainable Cities* inquiry drew attention to the lack of funding for rail infrastructure. There is no designated Commonwealth funding program for urban railway infrastructure similar to those for freeway construction. This is ‘severely out of tune with urban transport funding regimes in practically every other OECD country’ (The Parliament of the Commonwealth of Australia, 2005). For example, the US Intermodal Surface Transportation Efficiency Act (ISTEA) provided a strategic investment framework for transport provision and dedicated Federal funding over a period of 5 years.

The Commonwealth Government collects fuel excise and it is appropriate to return a proportion of this money for development of the transport system. It is not clear what proportion of Commonwealth fuel taxes are currently directed towards transport funding. One estimate puts the return to NSW roads from the Commonwealth Government to be about 11% of fuel excise (Pettigrew, 2002).

There is currently an ‘artificial’ federal/state divide in Sydney’s transport funding arrangements. While the Commonwealth Government controls policies such as the planned expansion of Sydney’s airport, there is little federal funding assistance for the impacts of such policies on the wider transport system. The resulting increase in traffic on Sydney’s roads is likely to have serious knock-on consequences for local residents in particular, and Sydney’s transport system as a whole.

There is therefore a strong case for additional Commonwealth funding to support development of Sydney’s transport system.

Taxation and tariffs

The Commonwealth Government plays a role in influencing transport choices through taxation and tariff setting. Currently, people can choose to salary sacrifice for the novated lease of a car and taxation rules incentivise travelling longer distances. Employees are able to use pre-tax dollars to cover lease payments and running costs on a vehicle and fringe benefits tax (FBT) is then payable. Under this arrangement, the further a person travels a year, the less tax is assessed. Such concessions are not available for other forms of transport and therefore the system encourages car use. In evidence given to The *Sustainable Cities* inquiry, Dr Chloe Mason stated that in Sydney, some 50% of car use during peaking hour is estimated to be a result of concessional car use (The Parliament of the Commonwealth of Australia, 2005). As recommended by the Inquiry Committee, the Commonwealth Government should review these arrangements to ensure that other forms of transport are prioritised over cars.

Regulation affects not only distance travelled, but also car purchase choices. The import duty on four wheel drive cars is 10% lower than for all other imported cars. These cars have lower fuel efficiency and higher environmental impacts than other cars. The *Sustainable Cities* report also recommends review of this tariff policy with a view to increasing it (The Parliament of the Commonwealth of Australia, 2005).

Despite the clear case for Commonwealth Government funding assistance and taxation reform, the NSW Government should not use Commonwealth inaction as an excuse for State inaction. The NSW Government should press ahead with commitment of additional funding and consideration of alternative funding mechanisms discussed below.

Box 9 Historical State Government investment in transport

Difficulty in accessing data

The picture that emerges from research is that the public has limited access to data that compares the NSW Government's investment in State roads with the investment in public transport system, over time.

Neither *Action for Air* nor *Action for Transport* provides a historical time series of State investment in roads compared to rail or other forms of public transport. Surprisingly, neither the NSW Audit Office nor the Ministry for Transport provide access to 'big picture' comparative investment patterns. Gathering such data requires analysis of the Annual Reports of RailCorp and the RTA for example, which is awkward and time-consuming.

The difficulty in accessing data can be seen as an example of the lack of transparency in Government transport operations. The impact of limiting access to such information is that the average citizen cannot ascertain whether or not taxpayer dollars are being well spent or how they are being spent, thus undermining the democratic accountability of the Government.

Further, whilst policy documents such as *Action for Air* and *Action for Transport* commit to increasing investment in the public transport system, without access to information regarding actual investment patterns, it is difficult to judge the extent to which Government commitments have been met.

Below is an analysis of historical Government spending patterns that effectively illustrate the historical prioritisation of roads over public transport.

Reported average annual investment figures

Whilst the Roads and Traffic Authority (RTA) has on average an annual budget allocation of more than \$2 billion for the road system alone (Auditor-General's Report, 2006a), the NSW Government spends only \$1.9 billion annually on public transport, across all modes (including heavy rail, light rail, buses, ferries etc) (NSW Government, 2003)

Government Investment (RTA vs. RailCorp)

One way of calculating Government investment in roads is through the amount of State Government funding to the NSW Roads and Traffic Authority (RTA) each year. In the same way, Government investment in rail can be calculated through the amount State Government funding to RailCorp each year. RailCorp, which was formed in 2004 by a merge of the State Railway Authority of NSW (SRA) and the Railway Infrastructure Corporation (RIC), provides passenger rail transport throughout NSW via its CityRail and CountryLink services. Therefore, there is no data on RailCorp as an entity available before 2004.

(Sources: RTA 2002, RTA 2003, RTA 2004, RTA 2005, Rail Corporation 2004, Rail Corporation 2005)

	01-02	02-03	03-04	04-05
NSW Government funding to the RTA (millions)	\$2,039 million (capital and operating)	\$2,474 million (capital and operating)	\$2,333 million (capital and operating)	\$2,258 million (capital and operating)
NSW Government funding to RailCorp (millions)			\$253 million (\$172 million capital grants; \$81 million operating subsidies)	\$598 million (\$422 million capital grants; \$176 million operating subsidies)

The following data is also available:

Total road-related expenditure 2000-01 to 2003-2004 NSW

The following data includes Australian government grant money and is therefore not NSW Government expenditure alone. It also includes contributions to state and local government from private developers.

2000-01	2001-02	2002-03	2003-04
\$3,100.1 million	\$3,458.8 million	\$3,214.0 million	\$3,272.0 million

(Bureau of Transport and Regional Economics, 2006b)

5.2 Pricing

As well as being a potential source of revenue to fund new initiatives, pricing should cover the full costs of service provision, including the costs of environmental and social harm. Exceptions can be made where there is a social or environmental basis for subsidisation, for example, cross-subsidisation of public transport by road users. Public transport fares should be “set to cover the marginal cost of the level service that is not funded by other revenue streams” (Kirwan, 2002).

The CIE study supports the view that car users are currently heavily subsidised by society as a result of hidden costs, namely environmental and social externalities – congestion, accidents, greenhouse gas emissions and air pollution - as well as subsidisation from the RTA. CIE estimates the total subsidised costs to be in the region of \$18 billion in 2005. (Centre for International Economics, 2005) There are additional hidden subsidies in ‘free’ car parking at work, retail centres and other public facilities such as sports grounds. In reality, free parking at retail centres is subsidised by the price of goods and hence public transport users. There are also issues of perception. Evidence presented by Glazebrook to the *Sustainable Cities* inquiry suggests that the average person perceives the cost per passenger kilometre for car use as being 6 cents compared to 11 cents for trains and 20 cents for buses (The Parliament of the Commonwealth of Australia, 2005). When externalities are accounted for however, the real costs per passenger kilometre for cars, trains and buses are 86 cents, 47 cents and 57 cents respectively (Glazebrook, 2006). Individuals therefore perceive only a fraction of the true cost.

To encourage public transport use, parking policies and road pricing must be considered. Fully-fledged road pricing “under which each road user would meet a charge that reflected the direct and external costs of road use, varying by locality and time of day” (Kirwan, 2002) is an ideal, but in the short-term, less ambitious schemes need to be considered. Pricing should more accurately reflect the full costs of service provision, even if absolute precision is not possible.

An important issue is whether any new funding/pricing method will be an additional tax or income stream, whether it will be a replacement for existing methods and therefore fiscally neutral, or whether it will be a reallocation/ redistribution of funds. Any new or different charging regime to cover the direct costs of providing transport infrastructure could be introduced as a substitute for existing charges, leaving the total burden unchanged. To achieve this, some taxes, such as stamp duty on vehicle transfers may have to be abolished (Keane, 2002). The exception is charges to cover externalities, such as environmental and social costs, which, should be used to address the impacts of those externalities or recycled back to public transport users.

Transparency and hypothecation are key to public acceptance - transparency of funding and pricing, and hypothecation of transport pricing charges to transport funding (Kirwan, 2002). There should be clear links between pricing revenue streams and transport funding. There is however, currently little transparency in the transport pricing and funding system (*see Box 9 p.55*).

5.3 Funding and pricing mechanisms

In 2003, GVA Grimley conducted a study for the Royal Institute of Chartered Surveyors (RICS), London region and Policy Unit (Whelan, 2003), in which they reviewed potential ‘innovative’ funding methods for funding London transport infrastructure schemes. To assess the various funding schemes the authors developed a set of criteria and a taxonomy

of funding methods based on existing literature. The criteria were based on previous studies (notably EC DG TREN, 2000 and Ubbels and Nijkamp), but modified to suit the needs of the RICS study. The RICS study assessed each method in relation to the following evaluation criteria: revenue potential; operational costs; practicality; transparency; transferability; acceptability; and effectiveness. The taxonomy organises funding methods according to the following factors:

- Whether they represent an approach based on the polluter pays principle
- Methods that are essentially general taxation based
- Methods that are mainly based on the 'beneficiary pays' principle, although this may overlap with the general taxation approach
- A 'non-specific' approach that also falls into the general taxation category, namely state grants and loans.

Funding mechanisms discussed in the literature are categorised in Table 1 using the RICS taxonomy structure:

Table 1 Funding mechanisms

Taxonomy	Funding method
Polluter pays	1. Road charging: <ul style="list-style-type: none"> ○ Road pricing mechanisms including Congestion charging or CBD cordon toll
	2. Workplace parking and parking charges: <ul style="list-style-type: none"> ○ Increasing CBD parking levies
	3. Motor tax: <ul style="list-style-type: none"> ○ Hypothecation (allocation) of Commonwealth Government fuel taxes to public transport (discussed above) ○ Increases in car user taxes, including environmental taxes
	○ Increases in public transport fares
General Taxation	4. Consumption tax
	A. Sales Tax
	B. Gambling Tax
	5. Employer tax: <ul style="list-style-type: none"> ○ CBD employee/ payroll tax such as France's Versement Transport
	6. Cross-utility funding
Beneficiary Pays/General Taxation	7. Property-related taxes: <ul style="list-style-type: none"> ○ Betterment tax ○ Sale of airspace over transit facilities
	8. Development Charges: <ul style="list-style-type: none"> ○ Increasing Section 94 contributions and developer levies ○ Developer bonuses to encourage contributions to public transport development
	9. Bond financing
Non-specific/General Taxation	<ul style="list-style-type: none"> ○ Reallocation of NSW roads budget to transit ○ Federal Government assistance (discussed above)

Below, the methods listed in the bullet points above and additional funding sources, are briefly analysed. Contributions from consumption tax and cross utility funding are not considered:

5.3.1 Road pricing

Primary objectives of road-pricing are economic efficiency and mitigation of environmental and social impacts. A further objective is to raise revenue, either to fund transport or as part of general taxation. Economically optimal road pricing involves levying charges that cover the difference between private costs of road use, such as vehicle operating costs, and the marginal social cost of road costs, such as damage to roads, increased risk of accidents and environmental externalities (Harvey, 2002).

Road tolls

A September 2006, *Sydney Morning Herald* article drew attention to the current inequalities in Sydney road tolls, estimating that some drivers pay up to \$4,000 a year in tolls, while others in different geographical locations pay as little as \$165 a year. The article discusses a system whereby the Government would collect a distance-based rate, as already happens on the M7, then divide the revenue among the operators, in other words, a network toll, rather than separate road tolls. A funding option for public transport is to continue levying tolls on toll roads after current concession periods expire and allocating the revenues to public transport. (Baker & Norrie, 2006)

Congestion charging

A vehicle entering a congested traffic stream contributes to social costs, such as time costs of other road users, by further slowing the traffic stream. Congestion charging involves levying a charge on road users to cover the gap between private and social marginal costs. This would cause some road users' behaviour to change, thereby easing, but not eliminating, congestion. Congestion charging improves economic efficiency and government gains the additional revenue. There are however issues of acceptability because it can be shown that road users themselves are worse off on average. It is also important to ensure that there are adequate public transport services in place to offer alternatives to road use, otherwise increases in road pricing could discriminate against those who lack access to public transport.

Cordon toll

Cordon pricing is described by Harvey (2002) as a "coarse form of congestion pricing" because the price does not vary with distance travelled, time or geographical location. It could however, be the first step towards more comprehensive congestion charging. A CBD cordon toll, such as that introduced in central London, could be considered for Sydney and Parramatta CBDs, using an electronic tagging system. Such a system could help to raise revenue for public transport and reduce congestion, improving overall economic efficiency. It could also, however, have a regressive impact on low-income car owners. Implementation in Parramatta may also be problematic as there are fewer alternative transport options available than in the CBD. Implementation of a cordon toll should be preceded by community consultation.

5.3.2 Parking levies

An alternative to the cordon charge that was considered in London, is workplace parking charges. Wachs (2002) cites evidence that removing or reducing parking ‘subsidies’ is an unpopular but effective mechanism for reducing car dependence. A Parking Space levy has been operational in Sydney CBD and North Sydney / Milsons Point since 1992. In June 2000 it was extended to Bondi Junction, Chatswood, Parramatta and St Leonards. A rate is levied on commercial and office parking spaces and, according to the Ministry of Transport, the revenue is used to finance public transport infrastructure. In 2002–2003 collections were around \$45 million (Ministry of Transport, 2006). The current levy rates could be increased as a means of further discouraging private vehicle transport and raising revenues to fund public transport. There is also a need for greater transparency in the allocation of revenue.

5.3.3 Car user taxes and environmental taxes

As discussed, road users do not currently meet the full cost of externalities associated with road use. Environmental taxes could be imposed through annual vehicle licence fees, or perhaps more directly through fuel taxes. Pricing of externalities should match the costs of externalities as closely as possible, although arriving at an accurate assessment of the cost of externalities is problematic. Such taxes may serve several purposes – revenue raising, cost-covering and potentially behaviour-changing, although it is difficult to assess the likely impact on behaviour. NCOSS also cautions against cost reflective pricing to avoid penalising growth communities, communities in decline and low income people (NCOSS, 2006a, and Submission to the Ministerial Inquiry, p3, cited in Campbell & White, 2003). Plans to increase or introduce new taxes should take these concerns into consideration.

5.3.4 Increases in public transport fares

Some commentators support a limited increase in public transport fares, with the provision that any such increase is clearly linked to improvements in services. The *Parry Inquiry* concluded that, “There is a strong case for transport users to contribute a greater share. In particular, transport users can reasonably be expected to contribute to the additional funding that is required for improvements to the current system—as long as they do benefit from this additional investment”.

5.3.5 Payroll tax

A further option is a CBD transport tax on employers. The rationale behind such a tax is that the concentration of activity in business centres, makes provision of public transport to such centres a necessity. Businesses benefit from this provision and the economies of agglomeration but they do not pay for the diseconomies, such as congestion. In France, businesses over a certain size in concentrated centres are subject to a quasi payroll tax known as the *Versément Transport*. Introduction of such a system in Sydney is likely to be more contentious than say, an increase in parking levies, since the parking levy system is already well established. There is also a risk that such a levy could result in relocation of businesses to areas that may be less well serviced by public transport.

5.3.6 Betterment tax

This refers to development of mechanisms to recoup the increased value received by property developers and owners of commercial premises when rezoning or construction of public transport infrastructure increases land value. One such mechanism advocated in the RICS report for London, is Tax Increment Financing (TIF) (Whelan, 2003). Using this

mechanism, local government can carry out improvements in an area without raising taxes, to attract businesses. The tax increment is the difference between the amount of property/rating tax revenue generated before the creating of a TIF area or district, and the amount of property/rating tax revenue generated after designation. TIF involves the issuance and sale of tax-exempt governmental revenue bonds to finance public infrastructure redevelopment, and subsequent ring-fencing of a proportion of the incremental growth in property tax collections to secure repayment of the TIF bonds.

5.3.7 Sale of airspace

Development of airspace over transport interchanges and corridors (including roads) is another way of capturing some of the increase in land value that arises from the consolidation of commercial centres and development along the transit corridors. This is already happening in Australia and further development is encouraged.

5.3.8 Section 94 Contributions/developer levies

Section 94 of the *Environmental Planning and Assessment Act 1979* (NSW) gives Local Councils the power to levy contributions from developers for public infrastructure required as a consequence of their development. There is no uniformity, however, in the amount that developers are required to contribute, or the way in which contributions are spent. There is no legislative requirement for developers to invest in, or contribute to, public transport infrastructure. *Our Public Transport* calls for an increase in Section 94 developer contributions based on the contribution a development makes to traffic generation (Campbell & White, 2003). Ideally, the levy should take into account the estimated total vehicle kilometres generated annually by the development, based on the nature of the development, its location and the amount of parking provided (Glazebrook, 2002a). Developer levies could also be implemented for re-developments. The *Sustainable Cities* inquiries found that state governments and/or developers should be required to include transport infrastructure to new developments and that this should be incorporated in the planning approval process (The Parliament of the Commonwealth of Australia, 2005).

5.3.9 Developer bonuses

Some commentators have supported proposals to offer bonuses to developers who contribute financially to public transport. The *Parry Inquiry* interim report proposed offering rights such as floor space bonuses subject to the payment of a transport levy (NSW Government, 2003).

5.3.10 Reallocation of NSW roads budget to transit

As already noted, there is community support for greater spending on public transport at the expense of the roads budget. Despite this, the dominant trend over a number of years has been to build more roads at the expense of public transport initiatives (*see Box 9 p.55*). There is clearly a case for a reallocation of spending from roads to public transport. New South Wales' 2006 budgetary documents confirm that more expenditure is required for public transport.

5.3.11 Private sector finance

The RICS study concludes that it is vital for government to continue to support the funding of transport improvements, but that private sector investment would continue to play a part (Whelan, 2003). The *Sustainable Cities* inquiry cites the view that the PPP model is underused

and could be advantageous “as long as monopolistic power is not exercised and that the safety of road users is not compromised by the return expected by investors” (The Parliament of the Commonwealth of Australia, 2005). The report also concludes that PPPs will remain a significant aspect of future transport infrastructure provision, at least to some degree. The role of private sector finance is likely to be limited when infrastructure projects, (such as light rail), are uneconomical to finance, build and operate (Keane, 2002).

The record to date in Australia has been mixed. Privately financed initiatives, such as the troubled Sydney Airport Link, have been strongly criticised. There is some support for the view however, that the private sector has matured in its acceptance of risk in major transport infrastructure projects. At the 2006 Sydney Transport Summit, John Martin, (Head of Structured Finance, ABN Amro), presented an analysis of trends in Australian infrastructure investment demonstrating that private sector investment has been steadily increasing for the past 4 years (Martin, 2006). Martin highlighted a series of successful PPP/Private Finance Initiative (PFI) transport projects, although the majority of these are roads projects. Successful examples of PPP's in Australia for public transport are limited, and there is a risk of 'cream skimming' in which high return routes are selected for private sector roles, and less economical routes are left for the public sector. PPPs should therefore be treated with caution. Where PPP arrangements are used, they should incorporate sustainability principles (The Parliament of the Commonwealth of Australia, 2005). PPPs should not be used to perpetrate the myth that public transport can be achieved at “no cost to the taxpayer”. If exorbitant charges, such as occurred on the airport line are to be avoided, there will need to be some contribution by the taxpayer and to promote any other concept is misleading.

5.3.12 Government borrowing

In recent debates about the decline in investment in infrastructure in Australia, the trend for reduced levels of debt has been raised as a key indicator. As Tanner (2005) notes, by 2002-03, Australian government debt is amongst the lowest in the OECD (Tanner, 2005). The Allen Consulting Group, in a report for the Property Council of Australia (PCA, 2004:20), suggest that government debt is a very appropriate means of funding the provision of infrastructure. The contribution of future generations to servicing this debt is reasonable, given that they will benefit from the availability of this infrastructure. There is also strong community support for this form of transport funding. In the most recent Warren Centre Community Values survey, respondents were at least three times more likely to 'agree strongly' that funding transport improvements be by public (state government) borrowing than by any other funding method in the survey (10,000 Friends of Greater Sydney, 2006).

5.3.13 Other mechanisms

Other potential funding mechanisms that are worthy of note include:

- Mandatory contributions from insurance companies: the rationale for such a mechanism is that insurance companies benefit from their customers using public transport – reduced car use means fewer accidents and fewer claims. As beneficiaries therefore, insurance companies could contribute to development of public transport.
- Allocation of some part of land tax revenues, from residential and commercial properties, to public transport: like a betterment tax, this would also capture the benefits of increased land value through provision of public transport. Land taxes, however, tend to be unpopular.

5.4 Conclusions

The NSW Government could conduct its own assessment of potential funding methods, using the RICS or similar criteria. It is important to note however that no simple pattern of results emerged from the RICS assessment, which, the report states, supports the findings of other research in this area. In terms of overall effectiveness, the study concluded that it is difficult to make too definitive a distinction between all the methods (Whelan, 2003). "Of more relevance in terms of effectiveness, perhaps, is how the funding method interacts with other factors". Funding and pricing structures are enabling and supporting mechanisms. New pricing and funding mechanisms should therefore not be introduced in isolation but as part of broader transport planning and land use strategies (Kirwan 2002).

A variety of methods will probably be needed to raise the required funds. The success or failure of any particular method will depend on the circumstances of its introduction and implementation. The RICS study make a series of recommendations for the introduction of innovative funding mechanisms including: phasing in, building from initially simple schemes, linking charges to needs and reducing other taxes to compensate the biggest 'losers'. Good communication of new schemes to the public will also be essential to acceptance (Whelan, 2003).

There are a number of tasks for the NSW Government in planning the funding of Sydney's transport future:

- The starting point must be a clear commitment to continuous, annual and substantial funding for the development of a world-class transport system in Sydney.
- There must be a realistic assessment of the cost of achieving sustainable transport objectives and of optimal funding allocation. IRP could be used to guide this process (as discussed in Section 4).
- The Government must also consider how the cost is to be met:
 - There is a strong case for more Commonwealth assistance and for allocation of the NSW roads budgets to public transport.
 - Government borrowing and further private sector financing should also be considered.
 - New mechanisms that could have a role in Sydney include congestion charging or a CBD cordon toll. Introduction of new mechanisms must be handled sensitively.
 - Existing mechanisms that could be extended include CBD parking levy increases and developer charges.
- Crucially, funding must be wisely allocated to long-term and durable improvements in the quality and sustainability of the transport system.

6 A 10-point plan for a sustainable transport future

I'd go so far as to say for every optimist who makes a transport plan for Sydney, there are a dozen pessimists who shout it down.

~ Genia McCaffery, speech to *Sydney Transport Summit*, 4 August 2006

Identifying the initiatives, engagement processes and funding sources is not enough to secure sustainable transport in Sydney. Fundamental structural change is needed to bring these three elements together and to manage implementation; otherwise, election commitments will remain long-awaited promises.

Based on our research and discussions with experts, we have identified ten key policy changes that would help to create a sustainable transport future for Sydney. This section sets out our recommendations.

A funded commitment with an independent overseeing body is the first step (Points 1 to 3). Engaging citizens in a framework focussed on sustainability, equity and fit-for-purpose projects is the second phase (Points 4 to 7). Finally, while the long-term strategy is developed, there is a need to press ahead with 'no regrets' short-term projects across the full range of infrastructure, behaviour change and enabling policy measures (Points 8 to 10).

We recognise that the Sydney transport task is not an easy one, but the plans have been written and the solutions are available and feasible. The community is eager for change. What is missing is the one major component required to make it happen – leadership. The coming NSW State election is a pivotal opportunity for all political parties to consider the kind of leadership for sustainable transport that they offer to the people of NSW. The time for empty promises and unfulfilled commitments is past. This paper is a call to action.

1. Commit to a long-term legislated plan for a world-class public transport system in Sydney that provides a real alternative to car use.

The development of Sydney's transport system has been haphazard, piecemeal and heavily influenced by the electoral cycle. To develop a world-class transport system, we need firm commitments and funding over a period much longer than an electoral cycle. This commitment will require bipartisan political will and the vision to see beyond the next election. That is, it will require political courage and leadership. The key objectives and the plan to achieve them, including a timetable for major infrastructure enhancements and initiatives, should be enshrined in legislation to provide greater certainty and to reduce the influence of electoral cycles.

As part of the plan, the NSW Government needs to commit to reducing car dependency and to increasing public transport usage in Sydney, in recognition of the many negative impacts of car use. In 1998, the NSW Government established a target to stabilise vehicle kilometres travelled (VKT). Since then, data shows that between 1999 and 2004 VKT has continued to grow faster than population (*see Box 5 p.23*). The stabilisation target is not being achieved because there is no funded plan to manage VKT.

Current public transport patronage targets are inadequate. The *NSW State Plan* includes a target to increase the share of total journeys to work by public transport by only 3–5 % over the next 10 years (NSW Government, 2006). Targets like this are essential in transparent governance as they provide important feedback to the community about progress; however, isolated from an implementation plan they achieve little. Existing targets for VKT stabilisation need to be revisited, strengthened and supported with a clear VKT management plan and further, more ambitious public transport usage targets need to be set.

The major component of the plan must be a commitment to the development of a world-class public transport system that provides an attractive alternative to the private car. For a world city like Sydney, public transport needs to be understood as an essential service. It is the only way to deliver equitable, efficient access to the many economic and social exchanges that characterise a major city.

The NSW Government must support its commitment to public transport with firm targets for increased public transport patronage and similar targets for improved accessibility, frequency and quality. Public transport must be appropriately priced, fast, efficient, close, reliable, frequent and safe. These targets, and the VKT reduction targets, should be included in the legislation to reflect the strength of the commitment.

2. Commit continuous, annual and substantial State and Commonwealth funding to the development of a world-class transport system in Sydney.

The development of a world-class transport system is not possible without a genuine commitment of continuous long-term funding. An unreliable, run-down transport system threatens Sydney's position as financial capital of Australia and gateway to Asia. Economic activity (GDP) generated in the City of Sydney alone in 2003–2004 was approximately 8% of the total Australian economy (City of Sydney, 2006).

Successive Governments (State and Federal) have failed to recognise this. Investment has been incremental and opportunistic (*see Box 9 p.55*). Whilst trying to rectify a historical lack of investment, the NSW government has capitalised on some relatively 'easy wins' to new development sites and what initially seemed like lucrative offers from private financiers. The challenge now lies in established suburbs like Bankstown and Carlingford, where simple charges cannot be levied across an entire new sub-division. A more sophisticated approach is needed.

Estimates of how much transport funding is needed Australia-wide vary. However, widespread agreement exists that current levels of investment are insufficient and a major injection of funds is needed. Based on estimates provided by SRA and STA, the *Parry Inquiry* found that the total cost to **maintain** existing CityRail, Sydney Buses, Newcastle Buses and Ferries, and Sydney Ferries services would be nearly \$2.7 billion per year to 2010. Therefore, the expenditure required to operate public transport services in NSW in a 'steady state' is expected to increase substantially to 2010. Clearly, much more will be needed to fund improvements.

It is appropriate for both the Commonwealth and NSW Governments to have a role in providing this funding. The Commonwealth Government collects fuel excise and it is appropriate to return a proportion of this money to develop the public transport system in major cities. Further, the Commonwealth Government is responsible for Australia's economic performance and the efficiency of the transport system in Australia's largest city is a significant influence on economic performance. The *Sustainable Cities Inquiry Report*

recommended that, “The Australian Government significantly boost its funding commitment for public transport systems, particularly light and heavy rail, in the major cities” (The Parliament of the Commonwealth of Australia, 2005).

Historical spending on the transport system has been inefficient. A focus on building motorways to reduce congestion has clearly failed due to induced traffic growth, leading only to greater congestion. At the same time, spending on public transport often has been targeted poorly or based on public-private funding models that have not worked (for example, the Sydney Airport Link). More effective use of existing transport funds could go a long way to providing the funds required for a world-class transport system. The NSW Government should pursue an integrated resource planning approach to identify the most efficient allocation of resources to improve Sydney’s transport system.

Even with improved spending efficiency and a contribution from the Commonwealth Government, a funding shortfall is likely. The NSW Government can choose from a suite of possible funding options to meet this shortfall, some of which appear more feasible in the NSW context. For example, parking levies are already in place and could be expanded. While this would no doubt be unpopular, the existing levies are now accepted. Extending developer charges, and value capture along public transport corridors should also be pursued.

New mechanisms that could have a role in Sydney, include congestion charging or a CBD cordon toll. These mechanisms should be investigated in detail. Any measures to increase funding for public transport would need to be assessed thoroughly, with a particular focus on their equity impacts. Where a funding mechanism has the potential to reduce equity, it should be supported by other measures that reduce these impacts.

Whatever funding mechanisms are chosen should be incorporated in legislation to ensure that funds are protected from being siphoned off for other uses.

3. Establish an independent NSW Transport Coordination Authority to oversee the development of a sustainable, world-class transport system for Sydney.

One of the biggest challenges to developing a sustainable transport system is coordination of transport planning, decision-making and funding. At present, responsibility for transport planning is spread across numerous government departments and authorities and too much power rests with the RTA.

To achieve the degree of coordination required to develop a world-class transport system, the NSW Government should establish an independent Transport Coordination Authority (TCA). The TCA would draw on the successful example of the Olympic Roads and Traffic Authority (ORTA) and would be a statutory body, ideally reporting directly to Parliament. Leading up to and during the Olympics, ORTA dictated the forms of infrastructure required to meet the Olympic transport task (including frequencies and standards of delivery) and initiated and delivered a transport education and information programme. Similarly, the TCA would be responsible for transport planning and allocation of transport funding across all modes. It would be charged with developing and implementing a plan to achieve a world-class public transport system. The TCA would provide a means to coordinate decision-making across modes and across levels of government.

The TCA could comprise a relatively small, experienced group of transport and government experts, which would seek input from government departments but would make final

decisions itself on allocation of funds. It would have a particular focus on financing, fare structures, providing better public transport information, safety, community consultation and reporting against the targets discussed above.

It would take substantial political courage to establish an independent Transport Coordination Authority, as it would challenge the existing power structures that continue to prioritise motorway construction. However, it is difficult to see how Sydney could successfully develop a world-class public transport system without establishing a new body to oversee the process and to allocate funds.

4. Adopt principles of sustainable transport to provide a framework for the development of Sydney's transport system.

The TCA should be established with the objective of moving towards a transport system compliant with the 10 principles for sustainable transport identified in *Box 1 p.xiv*.

Transport is not something that people demand in its own right. Rather, people demand the access to other people, places, goods, services and opportunities that a transport system provides. Sydney's transport system is currently failing to deliver the access that its citizens deserve and that is expected of a world city. Although access to public transport in Sydney is constrained in different ways in different locations, solutions are available.

High quality service is also important. Poor quality transport contributes to social and health problems and potentially to economic problems, through lost time. Conversely, a world-class public transport system conceivably could provide an enjoyable travel experience. If a public transport service is to be attractive, passengers seek a frequent service that arrives on time, is clean and comfortable, provides a fast and convenient trip and is affordable. As citizens of a world city, this is the experience Sydneysiders deserve, and it should be a transport planning objective.

Transport can be bad for human health in many ways. Car accidents kill or injure people directly and air and noise pollution from motor vehicles contribute to health problems. Congestion can increase stress levels and road rage incidents. Reliance on passive transport options contributes to higher rates of obesity and related diseases. Public transport can expose passengers to assault risks. All of these issues need to be addressed in a sustainable transport system.

It is widely recognised that effective transportation planning needs to be integrated with broader urban planning. Transport networks help to shape patterns of urban development and changes in urban form affect the viability of different transport options. The NSW Government's *Sydney Metropolitan Strategy* is a step in the right direction, as it defines major centres and developing centres within the city and seeks to develop improved transport links between these centres. It also seeks to define planned land uses to capitalise on the strengths of the existing transport system. When judging specific transport initiatives, it is critical to consider their impact on land use and their role within the *Sydney Metropolitan Strategy*.

A sustainable transport system must not generate outputs that threaten long-term ecological or human health. Sydney's existing transport system fails to achieve this objective in many ways – airborne pollutants, greenhouse gas emissions and impacts on ecological processes and water quality. As the threat of climate change becomes clearer, the need to shift towards transport modes with lower greenhouse gas emissions is becoming urgent. Because of its high capacity, public transport has significant advantages over private vehicle transport in terms of energy and greenhouse intensity. A shift to public transport is part of the solution.

It will also be necessary to reduce the greenhouse intensity of all transport modes by improving efficiency and shifting to renewable fuel sources.

The transport network occupies a significant proportion of land in Sydney. Construction of the transport network converts land from other uses and can have direct impacts on habitats and biodiversity. A sustainable transport system would avoid direct impacts on land that supports important habitats or has high ecological value. Up to 40% of Australia's urban areas are occupied by infrastructure for cars, including roads, car parking, service stations and manufacturing facilities (James, 2001, cited in Campbell & White, 2003). Much of this is parking space that is frequently empty. Transport modes with higher capacity, such as heavy rail, light rail and bus transport, make more efficient use of space.

Economic efficiency should be a core objective of transport policy. Economic efficiency involves reducing key costs such as travel time, whether caused by congestion, inadequate service provision or unreliability, and reducing and accounting for environmental and social externalities (that is, costs associated with transport use that are not paid for by transport users, and are instead imposed on the rest of society, such as health costs associated with air pollution). Submissions to the *Sustainable Cities Inquiry* stated that strong rail cities are 45% wealthier than weak rail cities. Strong rail cities spend less on road transport and are more cost effective in their transit operations. Proper use of rail saves money and time (The Parliament of the Commonwealth of Australia, 2005).

Peak oil constitutes another significant threat to the sustainability of the transport system. The NSW Government should be seeking to 'future-proof' the economy and to improve its resilience by diversifying transport modes and shifting away from fossil fuels.

All the sustainable transport principles are important and all need to be addressed when planning Sydney's transport future.

5. Give high priority to initiatives that will improve transport equity in Sydney.

Sydney has a particular problem with transport equity. In general, poorer people in Sydney have poorer transport. In western Sydney, limited access to public transport combined with rising fuel and housing prices limits access to economic and social opportunities (see Box 2 p.12). A pressing need exists to extend the reach of the public transport system to make access more equitable across Sydney.

The necessity to 'catch up' on years of under-investment across the transport system cannot be used as an excuse to fail the residents of Sydney's outer western suburbs, who have never had viable public transport options. Residents of Campbelltown and Blacktown pay dearly. Transport costs them time away from their families. They sit in traffic instead of coaching children's sport after school. They pour dollars out of the weekly household budget into a petrol tank because there isn't a decent public transport system. Fuel discount vouchers have become important to help manage tight budgets but are not a solution.

The NSW Government should give high priority to those initiatives that will improve transport equity in Sydney. Improvements in bus services, consistent with the recommendations of the *Unsworth Inquiry*, should be a strong priority in the short-term. In this context, the development of the Liverpool-Parramatta T-Way and North West T-Way is a positive step for transport equity in western Sydney.

In the medium term, the Metropolitan Rail Expansion Project, including planned extensions of the heavy rail network to growth areas in the north-west and south-west, is vital. The

south-west has been announced for completion by 2011/12 and the north-west for completion by 2014/15. (*see Box 6 p.36*). Strong grounds exist for accelerating the development of these heavy rail links, given the population already living in the north-west and the rapidly expanding population in the south-west. Public bus and light rail services will also need to be planned to provide 'feeder services' to major rail stations.

A review of the provision of public and community-based transport services is clearly needed. Improved integration of services to transport disadvantaged people will make a major contribution to providing more equitable access in Sydney. Specifically, focus is required on people with disabilities and people with mobility issues as a result of ageing. This group is increasing as a proportion of the population and meeting their access needs will accordingly become increasingly important.

There is a strong case for implementing a more equitable system of road tolls in Sydney, which does not penalise unfairly the residents of particular areas.

Whatever actions the NSW Government takes to improve the transport system, it is vital to consider the impact of its actions on equity.

6. Establish citizen-driven transport planning processes at multiple levels to identify preferred targets and initiatives.

Historically, opportunities for the public to participate in Sydney transport planning have come too late in the process, few people have been involved and there is little evidence that citizens' views have had a significant influence on outcomes. Examples abound, both in Australia and overseas, of citizen-driven planning processes which involve citizens in all stages of transport planning from establishing system objectives to decisions on specific initiatives.

One of the responsibilities of the TCA should be to establish authentic, democratic processes to guide transport planning at the metropolitan, sub-regional and local level. At the metropolitan level, citizens from across Sydney should have the opportunity to deliberate on the objectives of a sustainable transport system and to identify targets for measuring achievement of objectives. At the sub-regional level, citizens from a region should have the opportunity to deliberate on modal mixes and the desirability of particular proposals. At the local level, citizens should be able to guide the development of active transport infrastructure and initiatives.

At each level, processes should be participatory, deliberative and have a real influence on outcomes.

7. Develop 'fit for purpose' public transport infrastructure with a heavy rail base at the metropolitan level, buses and light rail operating on a regional scale and more active use of Government provided transport assets at the local level.

Some important initiatives are already underway. The Rail Clearways project, a \$1.5 billion initiative of the NSW Government to improve capacity and reliability on CityRail's Sydney suburban network, is important. It is due for completion in 2010 and rail commuters have supported the long-term nature of this project, meanwhile relying on the existing system, despite lower service levels (*see Box 7 p.37*). Although the Rail Clearways plan will improve the reliability, frequency, comfort and capacity of existing train services, it does not expand

the CityRail system to areas not served currently by the heavy rail system, such as Sydney's northwest (Cityrail, 2006).

The commitments to new infrastructure are welcomed as well; however, the community has heard promises of new infrastructure in the past. Long project lead times as well as delays and budget overruns are common. Current commitments need clearer management and rapid, transparent progress.

The transport system needs to be developed in a way that is 'fit for purpose' and transport requirements change with spatial scale.

At the metropolitan scale, the need is for high-speed transport between major centres within Sydney. The orbital motorway network and heavy rail network are best placed to meet this need; however, significant investment in heavy rail is required for it to provide an attractive alternative to private vehicles for most trips. The heavy rail network provides the skeleton of a world-class public transport system and a foundation for urban development. Existing plans to extend the heavy rail network to the northwest and southwest growth centres are critical and both rail links should be accelerated so that residents in the growth areas have viable public transport options as soon as possible.

There remain concerns about the capacity of the heavy rail network to cope with increasing patronage under a policy of urban consolidation. Further investigation of options for augmenting the capacity of the existing heavy rail network, building on the recommendations of the Christie Report, is recommended. It is clear that gaps in the heavy rail network remain, such as the Epping–Parramatta link. Filling these gaps is a high priority. Bus services can provide an interim measure and additional bus priority measures are recommended where buses provide major metropolitan-scale links. We support the Government's commitment to implement bus priority measures on the 43 strategic bus corridors across Sydney (NSW Government, 2006).

In regions across Sydney, the need is for access to major centres and adjacent regions. A combination of bus services and light rail is appropriate to meet this need. These modes provide a finer network than heavy rail and can offer superior access and destination choice. As discussed above, planning processes should be conducted at the appropriate scale to determine which specific initiatives and modes best meet the needs of each region.

At the local level, the need is for access to local services and to the wider transport network. Measures to promote active transport and small-scale buses and demand responsive services are recommended at this level. Many government resources already exist at this scale but better use could be made of these. Resources sitting idle, such as community transport vehicles used for only a few services each week, could be shared or used for other kinds of service. Effective services, meeting the needs of target communities, are very important in terms of a return on the capital resources outlaid. Local government is an active provider of local transport for some special needs groups. These transport assets may be able to be managed more collaboratively to provide additional transport options for local areas. Fleet management and planning experience may be a necessary supporting measure government could provide.

8. Pursue and fund specific high-priority initiatives in the short-term while establishing the long-term plan.

Most of our recommendations focus on the structural changes required to oversee a transition to a sustainable, world-class transport system. However, the NSW Government should **not delay** implementing specific, high-priority initiatives while these other

recommendations are implemented. Several specific initiatives across multiple spatial scales have clear merit and should be pursued.

At the metropolitan level, we recommend:

- Resumed planning of the Epping–Parramatta heavy rail link
- Electrification of the Southern Highlands rail line and the Kiama–Bomaderry rail line.

At the sub-regional level, we recommend:

- Overhaul of fare structures to take into account multi-modal trips and ensure that multi-modal tickets can be purchased across all existing and new public transport modes. There is no reason why existing computerised ticket sales systems should not be used as a point-of-sale for multi-modal trips across NSW.
- A comprehensive examination of new and existing light rail and bus proposals with a view to rapidly implementing several of the proposals with the highest merit.

At the local level, we recommend:

- A local trial of demand-responsive bus services integrated with community transport resources in an appropriate location.

9. Use appropriate planning and accountability measures to support the development and integration of new transport infrastructure.

Several planning and support measures should be implemented to enable the transition to a sustainable transport system and to provide improved integration across modes. First, there is little doubt that an emissions trading scheme applied to the transport sector would provide a strong incentive over time to shift away from greenhouse-intensive transport modes. The emissions trading scheme currently proposed by the National Emissions Trading Taskforce does not apply to the transport sector. We recommend that investigations be undertaken into the impacts of an emissions trading scheme applied to transport. Clearly, such a scheme would increase the price of petrol and public transport tickets, which would be politically unpopular. However, the price increases could be offset by concessions or rebates so that there was no negative impact on equity. Major structural change in the transport system will be greatly facilitated if there is a price on carbon.

Second, a need for better public transport information services exists, particularly for buses. While useful services are available online, little in the way of real-time information for bus services is available and bus maps are difficult to decipher. The Warren Centre has suggested the development of a colour-coded bus service map similar to the map for the London Underground. Public and private timetabling could be integrated in the 131 500 service. This kind of integrated information greatly simplifies the task of identifying a transport option, particularly in unfamiliar areas.

Third, modal integration needs to be a continuing focus. After numerous delays, Sydney's integrated transport ticketing system (Tcard) is undergoing trials with school students and some commuters. When Tcard is introduced, there will be an opportunity to review and simplify fare structures and to introduce fares based on the trip, rather than the number of modes used. We recommend a review of public transport fare structures as part of the

introduction of Tcard, with the objective of achieving seamless integration across modes. This is included as a high priority initiative in point 8 above. Ongoing attention to the design of modal interchanges is also important.

10. Use behavioural change programs to challenge “car culture” and strengthen “public transport culture”.

Individual responsibility is an important element of a sustainable transport system because our individual transport choices play a large part in determining the environmental and social impacts of transport. While some Sydney residents have few transport choices, others have access to a range of transport options and can choose between them. In this situation, the choice to drive, walk, cycle or use public transport becomes an ethical one. If we are to move towards sustainability, individuals need to take responsibility for their environmental impacts and choose transport options with a lower impact when they are available.

It is not enough to plan new infrastructure and implement enabling mechanisms without also approaching the difficult area of behavioural change. Currently, Sydney has a strong car culture. Social marketing and education programs to promote public transport should be an important part of the plan for development of a world-class public transport system.

Of course, marketing can only go so far if there is not a quality product. There needs to be a strong focus on making the use of public transport an enjoyable experience. This means developing a service that is reliable, safe, comfortable and frequent. The transport services available during the 2000 Sydney Olympics are often cited as an example of what is possible.

Some significant experience exists in Australia of individualised travel behaviour change but more attention should be focussed on the cost-effectiveness and benefits of major programs with trip generators (universities, hospitals and large businesses for example). Such programs incorporate negotiating cultural change within workplaces (for example flexible starting times) and implementing localised infrastructure (for example lighting between public transport stops/stations and major workplaces) where required. This kind of intervention recognises that transport choices are influenced by many factors and that some (but not all) are beyond the control of the individual.

7 Conclusion

A sustainable transport system is possible in Sydney. Volumes of reports and studies tell us how this can be achieved. There can be no argument that this is needed urgently, for the sake of the community, the health and well being of residents, the environment and the economic base of this great city.

Transport shapes a city, and is the single largest influence on the city's amenity for its residents. A more sustainable transport system would transform Sydney in many ways. Fast, reliable and safe public transport options would reduce reliance on motor vehicles and the damage they inflict. It would reduce the isolation and dependence of the many transport-disadvantaged in our community. It would result in a fitter, healthier community in more liveable streets and neighbourhoods. Fewer accidents, reduced noise and air pollution and a reduction of our contribution to global climate change would be amongst the benefits. Governments would benefit from the increased trust of citizens as they become involved in the decision-making process and see decisions being made on the basis of sound and transparent planning, adequate funding and good monitoring. The economy would benefit as the massive costs of our current misallocation of funds are removed and congestion and travel times are reduced.

All of this is possible. It is not a lack of solutions or of technology that prevents it. It is merely a lack of vision and the lack of will to take the steps that are needed. The community will get behind the government that has the courage to take these steps.

8 References

10,000 Friends of Greater Sydney, 2006, Measuring Up, The Sustainable Sydney Scorecard Project, Community Values Survey.

ABS (Australian Bureau of Statistics), 2006, Household Expenditure Survey on Goods and Services 2003/2004.

Auditor-General's Report, 2006a, Performance Audit, Condition of State Roads, Roads and Traffic Authority of NSW, Source:

http://www.audit.nsw.gov.au/publications/reports/performance/2006/roads/condition_roads.pdf

Auditor-General's Report, 2006b, Performance Audit, Managing Air Quality, Department Of Environment And Conservation

Australian Greenhouse Office, 2005, Tracking to the Kyoto Target 2005: Australia's Greenhouse Emissions Trends 1990 to 2008-2012 and 2020, Department of Environment and Heritage, Canberra.

Australian Heritage Council, 2003, Ch 6: Transport and the Making of Cities 1850 - 1970, Linking a Nation: Australia's Transport Communication 1788 – 1970, Source:

<http://www.ahc.gov.au/publications/linking-nation/chapter-6.html>

Australian Transport Safety Bureau, 2005, Road Deaths Australia 2005 Statistical Summary, Canberra, ACT. http://www.atsb.gov.au/publications/2006/pdf/rda_ss_2005.pdf

Baker, J and Nixon, S., 2006, Jammed New Transport Card, The Sydney Morning Herald, 16 June 2006.

Baker, J. & Clennell, A., 2006, Iemma's poll ticket: \$660m transport fix, Sydney Morning Herald, written and accessed on 20 November 2006,

<http://www.smh.com.au/news/national/iemmas-poll-ticket-660m-transport-fix/2006/11/19/1163871272062.html>

Baker, J. and Norrie, J., 2006, How inequality rules Sydney's road network, Sydney Morning Herald, written and accessed on 4 September 2006, www.smh.com.au/news/national/inequality-rules-sydneys-roads/2006/09/03

Baker, J., 2006, Clear road ahead for the election, Sydney Morning Herald, written on 28 August 2006, Source: <http://www.smh.com.au/news/national/clear-road-ahead-for-the-election/2006/08/27/1156617213443.html>.

Brockhoff, J., 2002, Integrating Land Use and Transport: An Overview of the Policy Package, "A City of Cities", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Bureau of Transport and Regional Economics, 2000, Urban Congestion – the implications for Greenhouse Gas Emissions, Information Sheet 16, <http://www.btre.gov.au/docs/infosheets/is16.pdf>

Bureau of Transport and Regional Economics, 2006, Public road-related expenditure and revenue in Australia(2006 update), Information Sheet 25, www.btre.gov.au

Campbell, S. and White, S., 2003, Our Public Transport, A Community View, An initiative of Labor Council of NSW, Rail Tram and Bus Union, Australian Services Union and NSW Transport Unions

CEDA (The Committee for Economic Development of Australia), 2005, Infrastructure: Getting on with the job, Growth 54, April 2005.

Centre for International Economics, 2005, Sydney's Transport Infrastructure; The Real Economics, prepared for The Sydney Morning Herald

Chartered Institute of Transport in Australia National Symposium 1998, Beyond Oil: Transport and Fuel for the Future: Launceston Country Club Casino, Tasmania, Australia

Christie, R., 2001, Long Term Strategic Planning for Rail, Greater Sydney Metropolitan Region (The Christie Report), <http://www.aptnsw.org.au/christie/6.html>

City of Sydney, 2006, Sydney at a Glance, Accessed October 2006, Source: <http://www.cityofsydney.nsw.gov.au/AboutSydney/CityResearch/AtAGlance.asp>

Cityrail, 2006, Rail Clearways – untangling our complex network, Accessed September 2006, Source: <http://www.cityrail.info/news/clearways.jsp>

Department for Transport, 2000, A New Deal for Transport, Better for Everyone, UK Government, London.

Department of Environment and Conservation, 2006, Major Noise Sources, Source: NSW EPA, http://www.dec.nsw.gov.au/soe/97/ch1/15_4.htm Date accessed September 2006

Department of the Environment and Heritage, 2006, State and Territory Greenhouse Gas Inventories 2004, (Australian Greenhouse Office) Canberra ACT

DIPNR (Department of Infrastructure, Planning and Natural Resources), 2004, Metropolitan Strategy Discussion Paper, Planning for a Better Future, www.dipnr.nsw.gov.au

Dodson, J. & Snipe, N., 2005 "Oil Vulnerability in the Australian City," Research Paper 6, Urban Research Program, Griffith University, December 2005

DUAP (Department of Urban Affairs and Planning), 2001, Improving Transport Choices: Guidelines for Planning and Development, Department of Urban Affairs and Planning, Sydney.

ECMT (European Conference of Ministers of Transport), 2001, Implementing Sustainable Urban Travel Policies, Key Messages for Governments.

Elms, C.P., 1989, Issues and Requirements of Real Estate Developers, In Light rail transit: New system successes at affordable prices, Transportation Research Board, Special Report 221, Washington D.C.

Fleay, B., 1998, 'Climaxing oil: how will transport adapt??', In Chartered Institute of Transport in Australia National Symposium 1998, *Beyond Oil: Transport and Fuel for the Future*: Launceston Country Club Casino, Tasmania, Australia

Frith, J., 2002, *Environmental Health – Sources, Effects and Strategies for Air and Noise Pollution*, "Healthy Transport, Healthy People", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Glazebrook, G., 2002a, *A Public Transport Strategy for Sydney*, "Moving People", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Glazebrook, G., 2002b, *Transport and Energy Use in Sydney*, "A City of Cities", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Glazebrook, G., 2006, *Taking the Con out of Convenience: The True Cost of Transport Modes in Sydney*, Faculty of Design, Architecture and the Built Environment, University of Technology Sydney. (Forthcoming)

Goodsir, D., and Dick, T., 2005, *Crowded, polluted and a mess – the fix list for Sydney*, *The Sydney Morning Herald*, 30 May 2005, <http://www.smh.com.au/news/national/crowded-polluted-and-a-mess-150-the-fix-list-for-sydney/2005/05/29/1117305504228.html>

Hann, N., 2002, *Financing urban mass transit opportunities in Australia*, "Transport Pricing: More Than Just a Tax", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Harvey, M., 2002, *Road Pricing and Funding*, "Transport Pricing: More Than Just a Tax", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Henderson, M., 2002, *Road Crashes and Road Trauma*, "Healthy Transport, Healthy People", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Holmes, B. and Jones, N., 2003, *Brace yourself for the end of cheap oil*, *New Scientist*, London, Aug 2, 2003, Vol 179, Iss. 2406; pg 9.

James, B., 2001, *Potential for Increasing Walking Trips, Walking in the 21st Century*. Perth: International Walking Conference, 20-22 February cited in AGO (2003) *Cities for Climate Protection – travel demand management module*

Keane, A., 2002, *Private Financing of Transport Infrastructure*, "Transport Pricing: More Than Just a Tax", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Kenworthy, J., Murray-Leach, R. & Townsend, C., 2005, Chapter 19, *Sustainable Urban Transport, The Natural Advantage of Nations*, edited by Hargroves, K & Harrison Smith, M. James & James / Earthscan

Kenworthy, JR and Laube, FB. et al, 1999, *An International Sourcebook of Automobile Dependence in Cities 1960-1990* University Press of Colorado, Boulder

Kerr, J., 2005, *Inaction causes cost blow-out*, *Sydney Morning Herald*, written on 31 May 2005, accessed September 2006, Source: <http://www.smh.com.au/news/national/inaction-causes-cost-blowout/2005/05/30/1117305563802.html>

Kilsby, D., 2000, Sydney's Transport, "The Way We Live: The State of Play", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Kilsby, D., 2002, Transport and Oil, "A City of Cities", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Kirwan, R., 2002, The Pricing and Funding of Urban Passenger Transport in Sydney – A Vision for 2021, "Transport Pricing: More Than Just a Tax", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Mant, J., 2002, Decision Making and Institutional Structures, "Removing The Barriers", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Martin, J., 2006, Will PPP's deliver Sydney's much needed Transport Infrastructure?, Sydney Transport Summit, Radisson Plaza Hotel, 3 and 4 August 2006.

May, A., 2004, Ch 4 Transport and Land Use Instruments for a Better Environment, in Urban Transport and the Environment – An International Perspective, World Conference on Transport Research Society and Institute for Transport Policy Studies.

McCaffery, G., 2006, Panel Session: The Future for Sydney, Sydney Transport Summit, Radisson Plaza Hotel, Sydney, Friday 4 August 2006.

McKerral, J., 2002, Towards a City of Cities, "Towards A City of Cities" Final Report, Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Metro Transport Sydney, 2006, Accessed Oct 2006,
<http://www.metrotransit.com.au/aboutus.asp>

Ministry of Transport, 2004, Wheelchair Accessible Taxi Taskforce, Interim Brief to the Minister for Transport Services, Source: <http://taxi-reg.home.att.net/nswwat04.pdf>

Ministry of Transport, 2006, Parking Space Levy, Accessed October 2006,
<http://www.transport.nsw.gov.au/aboutus/psl.html>

Nakamura, H., 2004, Ch 1 Transport and Land Use Instruments for a Better Environment, in Urban Transport and the Environment – An International Perspective, World Conference on Transport Research Society and Institute for Transport Policy Studies

NCOSS (NSW Council of Social Services), 2006a, "\$10 Ticket For Sydney Public Transport A Smart Move", Media Release 31 July 2006

NCOSS (NSW Council of Social Services), 2006b, Submission to the Inquiry Into Australia's Future Oil Supply and Alternative Transport Fuels, 24th February 2006

Newman C., 2006, The Lord Mayor's Budget Speech 2006-07, An address to the Council on Wednesday 14 June 2006, by the Right Honourable the Lord Mayor of Brisbane (Councillor Campbell Newman)
http://www.brisbane.qld.gov.au/bccwr/lib179/budget0607_lord_mayors_budget_speech.pdf

Newman, P. & Kenworthy, J., 1999, Sustainability and Cities, Overcoming Automobile Dependence, Island Press, Washington, DC, USA

NSW Department of Planning, 2005, City of Cities, A Plan for Sydney's Future, NSW Government Metropolitan Strategy, www.metrostrategy.nsw.gov.au

NSW Department of Planning, 2006a, North West Rail Link, Source: <http://www.planning.nsw.gov.au/nwrl/index.asp> Accessed September 2006

NSW Department of Planning, 2006b, North West Rail Link Overview, Source: <http://www.planning.nsw.gov.au/nwrl/p/overview.pdf> Accessed September 2006

NSW Department of Planning, 2006c, North West Rail Link Process, Source: <http://www.planning.nsw.gov.au/nwrl/process.asp> Accessed September 2006

NSW Department of Transport, 1995, Integrated Transport Strategy for the Greater Metropolitan Region

NSW Department of Transport, 1998, Action for Transport 2010, An Integrated Transport Plan for Sydney. www.transport.nsw.gov.au

NSW Government, 2003, a Ministerial Inquiry into Sustainable Transport in NSW, A framework for the Future. (The Parry Inquiry), <http://www.transport.nsw.gov.au/ministerial-inquiry/parry-final-report.pdf>

NSW Government, 2004, Review of Bus Services in NSW, forward by Unsworth, B., Chair of Review of bus Services in NSW, February 2004.

NSW Government, 2006a, A New Direction for NSW, State Plan, www.nsw.gov.au/stateplan

NSW Government, 2006b, Accessible Transport Action Plan for NSW, Roads and Maritime Agencies, Source: http://www.transport.nsw.gov.au/using_trans/access-trans-action-plan.pdf

NSW Government, 2006c, T-way: Be Transported, Source: <http://www.t-way.nsw.gov.au/default.htm>, Accessed September 2006

NSW Treasury, 2006, NSW Treasurer's Budget Speech, delivered by the Hon. Michael Costa, in the Legislative Assembly of the NSW Parliament at 12:00pm on Tuesday 6 June 2006., Source: <http://www.treasury.nsw.gov.au/bp06-07/bp1/budspch.htm>

OECD (Organisation for Economic Cooperation and Development), 1997, OECD Proceedings: Towards Sustainable Transportation, The Vancouver Conference, conference organised by the OECD, hosted by the Government of Canada, Vancouver, Canada.

OECD (Organisation for Economic Cooperation and Development), 2002, OECD Guidelines Towards Environmentally Sustainable Transport, OECD Publications Services, France.

PCA (Property Council of Australia), 2004, Metro Strategy: A Property Industry Perspective, November, <http://www.propertyoz.com.au/nsw/Metro%20Strategy%20FINAL.pdf> [accessed 24 Oct 2006].

Pettigrew, K., 2002, Source and Application of Funds for Transport in Sydney, "Transport Pricing: More Than Just a Tax", Series: Sustainable Transport in Sustainable Cities, The

Warren Centre

Physical Disability Council, 2006a, Access to Public Transport in NSW, Source:
<http://www.pdcnsw.org.au/archive/06/decencydaypt.html>

Physical Disability Council, 2006b, Transport, Accessed September 2006, Source:
<http://www.pdcnsw.org.au/publications/statements/transport.html>

Public Health Division, 2001a, 'Physical activity: Energy expenditure – 1998', Report on the 1997 and 1998 NSW Health Surveys, NSW Health Department, Sydney (Online). Available:
http://www.health.nsw.gov.au/public-health/nswhs/phys/nsw_phys_pcat98_reg.htm
(accessed 11 Feb 2002)

Public Health Division, 2001b, 'Overweight and obesity: Body mass index category', Report on the 1997 and 1998 NSW Health Surveys, NSW Health Department, Sydney (Online). Available:
http://www.health.nsw.gov.au/public-health/nswhs/phys/nsw_phys_pcat98_reg.htm (accessed 11 Feb 2002)

Queensland Transport, 2005, Annual Report 2004-05, Queensland Government

Rail Corporation of NSW, 2004, 2003-04 Annual Report, Source:
http://www.railcorp.info/__data/assets/file/1329/RailCorp_Annual_Report-2003-2004.pdf

Rail Corporation of NSW, 2005, 2004-05 Annual Report, Source:
http://www.railcorp.info/__data/assets/pdf_file/2787/RailCorp_Annual_Report_2004-2005.pdf

Riedy, C., 2003, Subsidies that Encourage Fossil Fuel Use in Australia, Institute for Sustainable Futures working paper CR2003/01. Available on-line at
<http://www.isf.uts.edu.au/publications/Riedy.html>.

Rissel, C., Bellew, B., Napier, I. & Mason, C., 2002, Walking, Cycling, Physical Activity and Healthy Lifestyles, "Healthy Transport, Healthy People", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Roads and Traffic Authority, 2001, RTA Transport Access Guide for Parramatta Office,
http://www.rta.nsw.gov.au/trafficinformation/downloads/rta_tag_parra_office_dl1.html

Roads and Traffic Authority, 2002, Annual Report, Source:
http://www.rta.nsw.gov.au/publicationsstatisticsforms/downloads/rta_annual_report_2002.pdf

Roads and Traffic Authority, 2003, Annual Report, Source:
http://www.rta.nsw.gov.au/publicationsstatisticsforms/downloads/rta_annual_report_2003.pdf

Roads and Traffic Authority, 2004, Annual Report, Source:
http://www.rta.nsw.gov.au/publicationsstatisticsforms/downloads/rta_ann_rep_2004_all_w.pdf

Roads and Traffic Authority, 2005, Annual Report, Source:
http://www.rta.nsw.gov.au/publicationsstatisticsforms/downloads/2005_rta_annual_report.pdf

Roads and Traffic Authority, 2006a, Bexley Road Upgrade – Shaw Street to Kingsgrove Avenue, Source:
<http://www.rta.nsw.gov.au/constructionmaintenance/majorconstructionprojectssydney/bexleyroad/index.html>

Roads and Traffic Authority, 2006b, The Lane Cove Tunnel, accessed September 2006, Source:
<http://www.rta.nsw.gov.au/constructionmaintenance/majorconstructionprojectssydney/lanecovetunnel/index.html>

Salusinszky, I., 2006, Labor repeats tunnel disaster, The Australian, written on 21 August 2006, Source: <http://www.theaustralian.news.com.au/story/0,20867,20195695-2702,00.html>

Searle, G., 2006, Is the City of Cities Strategy the Answer for Sydney?, Sydney Futures Twilight Symposia, University of Technology Sydney, 1 June, 2006.

Stone, C., 2000, Sustainability Defined and Envisioned, "The Way We Live: The State of Play", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Tanner, L., 2005, "Infrastructure: the new hot topic", On-Line Opinion, 11 July 2005, <http://www.onlineopinion.com.au/view.asp?article=3638> [accessed 24 Oct 2006].

The Parliament of the Commonwealth of Australia, 2005, Sustainable Cities, Chapter 5, (House of Representatives Standing Committee on Environment and Heritage) Commonwealth of Australia, Canberra, Australia.

<http://www.aph.gov.au/house/committee/envIRON/cities/report/fullreport.pdf>

The Warren Centre, 2002a, "Moving People", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

The Warren Centre, 2002b, A City of Cities – A Perspective, "Towards A City of Cities" Final Report, Series: Sustainable Transport in Sustainable Cities, The Warren Centre

TPDC (Transport and Population Data Centre), 2003, Regional Transport Indicators for Sydney, Department of Infrastructure, Planning and Natural Resources, Sydney.

TPDC (Transport and Population Data Centre), 2006, 2004 Household Travel Survey, 2006 Release, Department of Infrastructure, Planning and Natural Resources, Sydney

Transport 2000, 2001, Destination Passenger, Towards a door-to-door railway

Source: NS Reizigers cited in
http://www.transport2000.org.uk/library/DestinationPassenger/section_01.htm.

Transport Infrastructure Development Corporation, 2006,
http://www.raillink.nsw.gov.au/Documents/731_projapp3.pdf

Troy, P. and Smith N., 2002, Sustainable Transport for Sustainable Cities: Land Use Planning Issues, "A City of Cities", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

UITP (International Association of Public Transport), Energy Crisis? Climate Change? - Breathe Easy, How a properly-balanced transport system can help preserve and improve our urban environment, A UITPANZ Policy Statement (n.d.)

Wachs, M., 2000, Perspectives Of An Outsider, "The Way We Live: The State of Play", Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Wachs, M., 2002a, No Simple Solutions or Magic Bullets, "Towards A City of Cities" Final Report, Series: Sustainable Transport in Sustainable Cities, The Warren Centre

Westacott, J., 2004, Sydney Metropolitan Strategy: Address to Sydney Futures Forum, Department of Infrastructure, Planning and Natural Resources, Sydney.

Whelan, J., 2003, Funding London's transport needs, RICS London Region and RICS Policy Unit, The Royal Institute of Chartered Surveyors, London, United Kingdom.

White, M., 2002, The "Arms Race" On American Roads: The Effect of Heavy Vehicles on Traffic Safety and the Failure of Liability Rules, Working Paper 9302, National Bureau of Economic Research, Cambridge, MA. <http://www.nber.org/papers/w9302>

Wilson, A., 2002, We Need Healthier Transport, "Healthy Transport, Healthy People", Series: Sustainable Transport in Sustainable Cities, The Warren Centre