THIRD REVIEW OF ACTION FOR AIR

THE NSW GOVERNMENT'S 25 YEAR AIR QUALITY PLAN WITH RECOMMENDATIONS FOR NEW INITIATIVES

Total Environment Centre Inc

www.tec.org.au
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ACKNOWLEDGEMENTS

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SUMMARY

With *Action for Air* approaching its tenth year the 2007 Clean Air Forum provides a timely opportunity to assess progress to date and focus on initiatives for the future. Despite progress on reducing emissions from fixed sources, air quality goals for ground level ozone and fine particles are regularly exceeded. This is likely to be directly attributable to the failure to meet targets for curbing growth in vehicle kilometres travelled (VKT) and insufficient investment in public transport.

Progress against each of the strategies in *Action for Air* was assessed. The results show mixed performance:

- Integrating urban infrastructure and public transport – poor
- Improving management of freight transportation – poor
- Providing better public transport – poor
- Providing for cycling and walking – average
- Changing travel behaviour through education – average
- Reducing car emissions – good
- Reducing diesel emissions – good
- Promoting cleaner fuels – good
- Reducing Industrial emissions – average
- Developing cost effective approaches for small businesses – average
- Reducing emissions from solid fuel heaters – average
- Improving energy efficiency of homes – good
- Managing the impact of open burning – good
- Monitoring, reporting and reviewing air quality - average

It is clear that a major effort is required to improve public transport by investing in new infrastructure. This should be coupled to strong demand management measures such as congestion charging and a major overhaul of parking policies.

There is also a strong need to refocus *Action for Air* to reflect new knowledge and information. In its original form *Action for Air* did not address greenhouse gas emissions or indoor air quality. Monitoring and reporting procedures adopted by *Action for Air* no longer reflect international best practice.

Another concern is the degree of seriousness that air quality is given in development decisions. There are doubts that at the macro and regional planning levels, institutional arrangements have the capacity to treat air quality as an eminent matter, even though it is mentioned in planning strategies.

Action for Air should be revised and updated to address the various challenges.

TEC also recommends that the components in *Action for Air* and experience gained from the last ten years be a basis for a national template applied to capital cities in Australia, to protect air quality for urban citizens.

Action for Air is the State Government's 25 year plan to improve air quality in the Greater Metropolitan Region of Sydney, the Illawarra and the Lower Hunter. Launched in 1998 the aim of the plan is to improve air quality in the Greater Metropolitan Region (GMR) of Sydney, Newcastle and Wollongong. It provides a framework for measures to improve air quality across a number of government agencies.

Action for Air seeks to improve air quality by tackling the two major pollution problems in the GMR - photochemical smog and particle pollution.

Photochemical smog is the result of the atmospheric reaction of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs), triggered by sunlight. Major sources of VOCs are unburnt fuel emissions from vehicle exhausts, evaporative losses from vehicles and industries, solvents and vegetation (VOCs are sometimes also grouped under the heading reactive organic compounds or ROCs). Major NOx sources are emissions from vehicles and industry.

The principal measure of photochemical smog is ground level concentrations of the major smog component, ozone. Ground level ozone has been shown to have adverse effects on human health including triggering asthma attacks and other respiratory problems and impairing immune function.

Apart from its role in producing ozone, nitrogen dioxide (NO_2) has also been found to trigger asthma and respiratory problems on its own. It has also been found to increase the effects of some allergens and is associated with increased hospital admissions for heart disease.

Particle pollution arises from a variety of natural and human sources. Fine particles with a diameter under 10μm (PM_{10}) are of greatest concern as they are small enough to be inhaled and remain within the respiratory system. Health effects associated with fine particles include increased hospital admissions and mortality from cardiovascular and respiratory diseases, reduced lung function in asthmatic children and respiratory problems in children.

Since *Action for Air* was first released in 1998, it has become apparent that very fine particles of 2.5μm or less ($PM_{2.5}$) pose the greatest health risk as these particles are inhaled more deeply into the very small airways of the lungs (DEC, 2006a). While an advisory reporting standard for $PM_{2.5}$ was added to the NEPM in 2003, there is currently no health based standard for these very fine particles.

The main sources of fine particles are motor vehicles (especially diesel), industry, and the commercial and domestic sector (particularly solid fuel heaters).

Action for Air has seven principal objectives designed to reduce emissions of NOx, VOCs and PM_{10}:

1. Integrate air quality goals and transport planning.
2. Provide more and better transport choices.
3. Make cars, trucks and buses cleaner.
4. Promote cleaner business.
5. Promote cleaner homes.
6. Manage the impact of open burning.
7. Monitor, report and review air quality.

Each of these objectives includes a range of strategies and actions designed to improve air quality in the GMR.

As much can be lost in the translation of plan to

INTRODUCTION

reality, with bureaucratic and Treasury hurdles, TEC undertook to conduct regular comprehensive audits of the State Government's implementation of *Action for Air.* The results of our previous reviews were presented at the 2001 and 2004 Clean Air Forums (see www.tec.org.au).

This review presents the results of our most recent audit of *Action for Air.* With *Action for Air* approaching its tenth year it is also appropriate to examine the program itself, in light of lessons learnt so far, new information and technological developments, as well as the need to address greenhouse gas emissions and indoor air quality as part of overall air quality management.

With some of the strategies contained in *Action for Air* now incorporated into national approaches it is also appropriate to consider the development of a national template for managing air quality in Australian cities.

This report is thus divided into three sections. Part One presents the results of our review of progress in implementing *Action for Air* since 1998 by way of discussion and detailed analysis in tables.

 Part Two proposes new initiatives and directions for *Action for Air.* Part Three examines how lessons learnt from *Action for Air* and latest information may be applied in developing a template for managing air quality in Australian cities.

Information required to complete this review was obtained from wide variety of sources including government publications, direct requests to government agencies, local government and regional organisations of councils, industry groups and independent experts.

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The ultimate test of the effectiveness of *Action for Air* is performance in meeting air quality goals. Unfortunately the NSW State of the Environment Report 2006 (DEC, 2006b) reveals that the GMR continues to suffer from major air quality problems, particularly in relation to ground level ozone and fine particles. This points to a failure of strategies intended to reduce emissions of NOx, VOCs and PM_{10} and to meet air quality goals.

Ground level ozone concentrations are of particular concern. The NSW goal for ground level ozone concentration is currently set at the National Environment Protection Measure (NEPM) standards of 0.10 ppm (averaged over one hour) and 0.08 ppm (averaged over 4 hours). World Health Organization (WHO) standards of 0.08 ppm and 0.06 ppm (averaged over 1 and 4 hours respectively) are listed as long term goals in *Action for Air*. A key objective of *Action for Air* was to

achieve compliance with NEPM standards by 2008.

The 2006 NSW State of the Environment Report (SoE) (DECC, 2006b) makes it clear that this objective will not be achieved. Both NEPM and WHO goals are exceeded on a regular basis. Between 1994 and 2005 the 4 hour standard was exceeded between 1 and 21 days per year while exceedences of the 1 hour standard ranged from zero to 19. In 2005 the 4 hour standard for ground level ozone was exceeded in Sydney on 12 days while the 1 hour standard was exceeded on 8 days (figure 1). It is clear that, while the actual number of exceedences varies from year to year, the overall trend has been no improvement since the introduction of *Action for Air*.

While some may argue that the level of air pollution could have been worse, given the growth in motor vehicle use and population, this is not a reason to draw any satisfaction with the current situation.
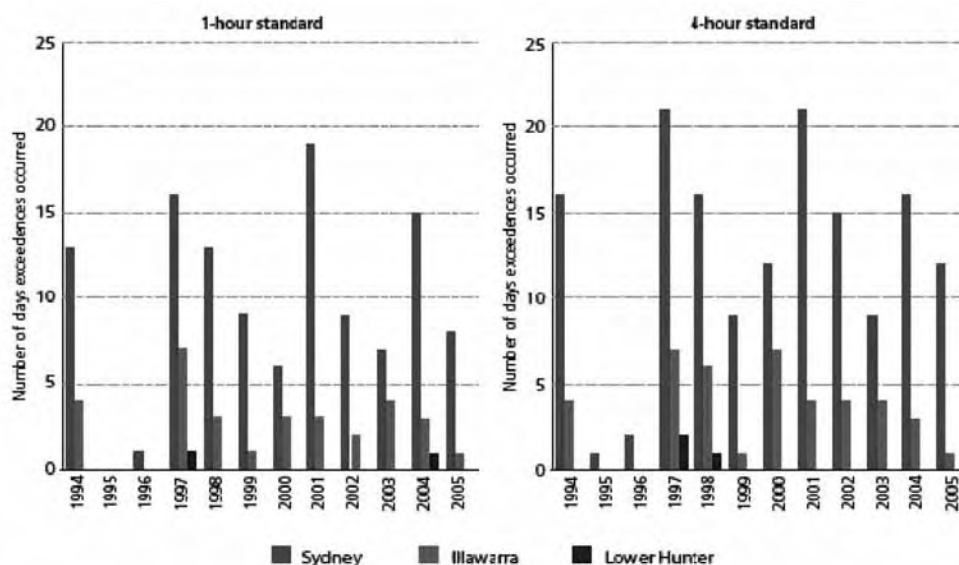

Figure 1: Exceedences of the 1-hour and 4-hour AAQ NEPM standards for ozone in GMR (From NSW State of the Environment 2006, DEC 2006b).

This indicates that emissions of ozone precursors (NOx and VOCs) have remained high throughout the life of *Action for Air*. While the actual number of exceedences may vary according to weather conditions, it is clear that the continued presence of precursors will lead to high levels of ground ozone on hot sunny days.

The 2006 State of the Environment Report indicates that the NEPM standard for NO_2 has generally been met, with exceedences now rare. In particular the highest 1 hour value recorded between 2002 and 2005 was less than 75% of the standard (DEC, 2006b). Despite this, ozone exceedences remain common. It is clear, therefore, that while NO_2 levels may be below the NEPM standard, the levels of NO_2 and other NOx are sufficient to permit high levels of ozone formation under suitable conditions. This highlights the continued importance of strategies to further reduce NOx emissions.

The 2006 SoE report claims that the national goal of 50µgm/m3 for PM_{10} is generally being met in Sydney, except for years with bushfires or dust storms. High levels of PM_{10} in the Greater Metropolitan Region (GMR) in the period 2001-03 are attributed to bushfires (DEC, 2006b). While bushfires are clearly responsible for a significant number of exceedences in those years, it is equally clear that underlying problems with PM_{10} emissions from other sources remain. Figure 2 shows exceedences for the period 1994 to 2005. It is clear that exceedences continue to occur during the winter months throughout the GMR. In 2005 there

were two exceedence days in winter in Sydney. In rural areas winter exceedences are particularly high, indicating the likely contribution of solid fuel heaters.

It is difficult to determine a clear trend in particle pollution figures from the 2006 SoE report. It is significant, however, that annual peak 1 day concentrations (fig 2) have remained above the NEPM standard.

Poor air quality results over recent years, particularly for ozone, indicate that *Action for Air* is failing to achieve air quality goals set when the strategy was released in 1998. This failure is attributable to poor progress in fully and quickly implementing many of the objectives set out in the strategic plan. A detailed analysis of progress on each objective is provided below, however two areas in particular stand out - continuing rapid growth in vehicle kilometres travelled (VKT) and poor progress in implementing *Action for Air* commitments to improve public transport. While there has been good progress on some strategies, particularly those tackling emissions from fixed sources, continuing rapid growth in VKT is undermining the benefits of these strategies and gains from cleaner vehicles and changes to fuel composition in recent years. A critical question, later addressed here, is whether recently announced plans are adequate to make significant advances.

It is clear that a major effort is needed to improve progress in meeting commitments and reaching air quality goals. It is also clear that *Action for Air* needs
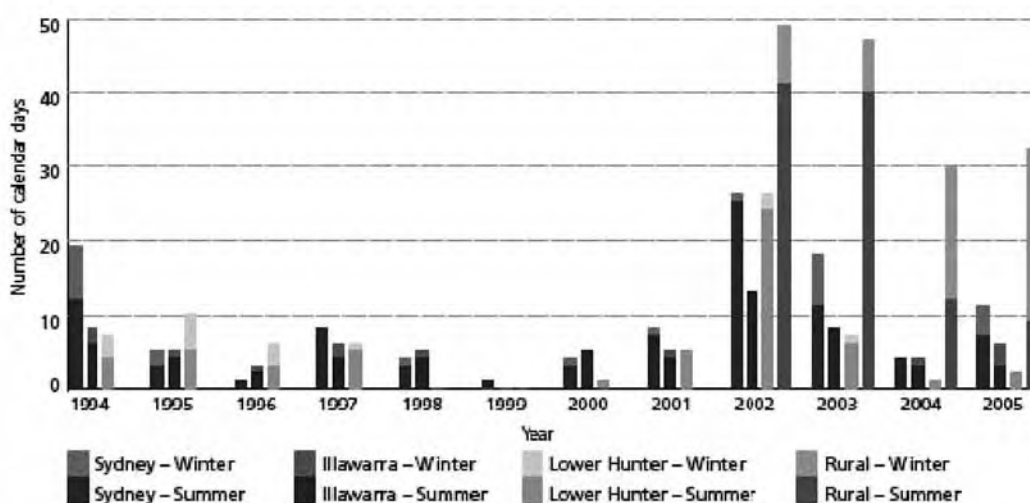

Figure 2: Exceedences of the 24-hour AAQ NEPM standard for particles (PM) in NSW regions 10 (From NSW State of the Environment 2006, DEC 2006b).

to be updated to take into account developments since 1998 and latest research. Recommendations to improve implementation of existing *Action for Air* commitments are provided in the review of each objective. Recommendations for new initiatives to update *Action for Air* are provided in Part 2.

OBJECTIVE 1 (see Table 1)

Objective 1 of *Action for Air* has two aims: increasing the use of public transport (Strategy A) and improving the efficiency of freight transport (Strategy B).

Two critical elements of Strategy A are to develop a transport plan to reduce Vehicle kilometres travelled (VKT) growth (Action 1.1) and to make the reduction of VKT a planning priority across government (Action 1.2).

Strategy A – integrate urban infrastructure and transport planning

In 1998 the integrated transport plan, Action for Transport 2010 was developed. Its aims were to set goals of reducing by 2011 the per capita increase in vehicle kilometres travelled (VKT) and stopping total VKT growth by 2021. Progress in achieving this aim has been poor. According to figures produced by the Transport Data Centre (www.transport.nsw.gov.au/tdc) Per capita VKT increased by 15.3% between 1991 and 1997 and a further 1% between 1999 and 2003. Total VKT increased by 23.5% between 1991 and 1997 and a further 6.2% increase between 1999 and 2003. This equates to an average annual increase in total VKT of 2.3%.

It appears that VKT is continuing to outstrip population growth, eroding some of the benefits of cleaner vehicles, other air quality measures, and the *Action for Air* targets. Clearly more effort is needed to improve our public transport system. Unfortunately major elements of Action for Transport 2010 aimed at reducing VKT have not been implemented (particularly key rail links) and the strategy itself appears to have been abandoned. Progress on improving public transport will be examined in detail in the review of Objective 2 below.

Forecasts for VKT in Sydney (fig 3) are also far from encouraging with a 29% increase expected between 2005 and 2020. This includes a projected increase in car VKT of 21% and a 64% increase in light commercial VKT (CIE, 2005).

There have, however, been some encouraging signs of a trend toward increased public transport use by Sydney residents over the last 12 months. In the 12 months to September 2007 there were 3.7% more passenger trips on the city rail network than in the preceding 12 months. This equates to an extra 280 million passenger journeys (Sydney Morning Herald, 25/10/07).

A key factor in this increased CityRail patronage is likely to be rising petrol prices. Whilst a welcome development, the increased patronage is creating problems with capacity on the network and overcrowding has become a major problem on CityRail services. It is essential that any move toward increased public transport patronage as a result of rising petrol prices be supported by investment in public transport to increase capacity
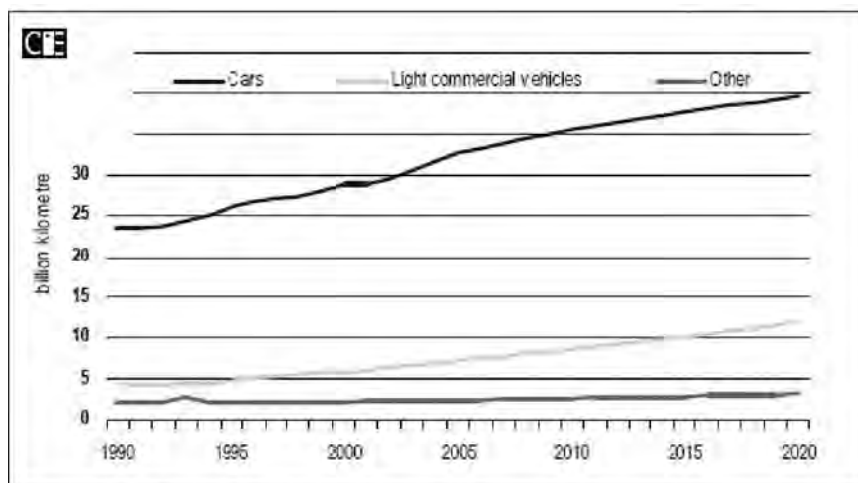
Figure 3: Historic and forecast vehicle kilometres travelled for Sydney
(From Centre for International Economics, 2005)

and quality of services. Failure to do so will inevitably lead to a drift back towards private vehicle use and consequent impact on family budgets.

Action 1.2 seeks to make the reduction of VKT a planning priority across government. Progress in this area appears to have stalled. *Action for Air* and *Action for Transport 2010* included strong targets for reducing and stopping VKT, while environmental impact statements for individual projects such as the Liverpool-Parramatta Transitway provide VKT reduction estimates. Recent planning documents such as the NSW Urban Transport Statement (New South Wales Government, 2006a), NSW State Plan (New South Wales Government, 2006b) and Metropolitan Strategy (Department of Planning, 2005) make no mention of reducing VKT. While it may be argued that strategies included in these documents will assist in reducing VKT, the failure to specifically address VKT reduction in these crucial documents is disturbing. It is critical that curbing VKT remains at the heart of transport and air quality management. VKT targets are essential to driving public transport improvements and providing a reference point against which to measure progress.

The aim of including transport issues when local and regional planning decisions are made is outlined in Action 1.3. These include: higher development densities near public transport; concentrating community facilities into centres that can be served by public transport; improving road design and maintenance. The Metropolitan Strategy gives effect to these objectives and is an important step toward achieving the goals of Action 1.3. A key factor in its ultimate success will be the provision of public transport infrastructure and service improvements.

Against the progress of the Metropolitan Strategy are deficiencies in integrating transport issues into local planning identified by the NSW Auditor General's Performance Audit on air quality management (Audit Office of NSW, 2005). In particular, there is a lack of regional *Action for Air* plans to address region specific issues and a lack of strategic planning for long term transport improvements and integration with strategies for road planning and pricing.

In Action 1.4 criteria for closeness to public transport in new residential developments have been established and included in the Urban Development Program. SEPP 5 amendments have also introduced public transport accessibility requirements for SEPP 5 housing. Despite this the

Rhodes Peninsula development has been criticised for locating housing too far (800m) from the railway station (SMH, 4/7/02). Accessibility of public transport is also a key factor in precinct planning for the North-West and South-West Growth Centres.

In Action 1.5 the Parramatta Regional Environmental Plan includes journey to work targets. The aim is to increase use of public transport from 25% to 40-60%; however, the plan lacks specifics in many areas, such as pedestrian access, cycling and parking and is largely restricted to statements of intent. While the Metropolitan Strategy and the 2006 Transport Statement aim to improve the integration of public transport and increase the share of peak hour journeys on public transport, there are no specific targets for achieving these goals.

The institutional capacity to deliver better public transport is on trial in coming years and governments will need to resist developer pressure to release urban land in an uncoordinated way and to ensure that infrastructure levies or government support continue and that LEP and precinct planning implement public transport goals and programs.

Result – poor

Strategy B – improve management of freight transportation

Strategy B, improving the management of freight transport, has the potential to significantly reduce emissions of fine particles and NO_x by reducing the growing dependence on diesel vehicles for freight transportation. In 2005, approximately 38% of the domestic freight task was carried by road. At the same time road transport was responsible for 84% of total freight emissions. Hence, road based freight emissions are disproportionately higher than other forms of freight transport (Macintosh, 2007).

Unfortunately progress on this strategy has been very poor. The aim of Action 1.6 is to develop an integrated freight strategy by 1998. At this stage, the study, Freight 2010, has not been released. In May 2007 the government released its Freight Initiative plan to increase freight on rail and ease congestion, which includes goals to:

- Establish new freight terminals at Enfield and, subject to discussions with the Commonwealth, at Moorebank;
- Achieve a target of 40% of freight carried by rail, from the current rate of 36%, which will reduce the number of truck movements on key arterial

roads by approximately one million truck movements per year; and

- Reduce truck movements around Port Botany and inner metropolitan suburbs by up to 300 per day.

Details on how these goals will be achieved have not been released.

Result - poor

Recommendations

1. Bring forward capital works on major public transport initiatives to increase capacity and service levels.

2. Maintain commitment to VKT targets and incorporate them into major planning initiatives and documents such as the State Plan, Metropolitan Strategy, local plans and Urban Transport Statement; and upgrade institutional capacity to achieve the targets.

3. Release Freight 2010 strategy – update with new implementation timetables.

4. Provide details on how goals of the Freight Initiative will be achieved.

Objective 1. Integrate air quality goals and urban transport planning

"Goal: To reduce the growth in vehicle kilometres travelled by effectively integrating urban and transport planning and improving transport choices"

TEC Action for Air Review 2007 Table 1

Review	Key Agencies	Stated goals	Timelines/ $$$ (where stated)	Related plans/ strategies	Progress to date
Actions					
Strategy A. Integrate urban infrastructure and transport planning	Ministry of Urban Infrastructure Management. Urban Infrastructure Management Committee. DOP. Public Transport Authority Public Transport Advisory Council	Long-term transport plan for the Greater Metropolitan Region (GMR)		Urban Infrastructure Management Plans (yearly)	Infrastructure Implementation Group established within NSW Department of Premier and Cabinet to facilitate selected infrastructure projects.
1.1 Develop a transport plan to reduce vehicle VKT growth	Minister for Transport & Roads. RTA DOP DoT	Stopping VKT per/cap growth	By 2011	Integrated transport plan *Action for Transport 2010*	Integrated transport plan released in 1998 as *Action for Transport 2010*. Although it had as its policy the stabilisation of vehicle kilometres traveled (VKT) per capita, there was no guidance as to how this would be achieved, and in fact it has not been achieved. As it now stands 'VKT per capita stabilisation' seems problematic and 'Action for Transport 2010' appears to have gone by the wayside.
		Stopping total VKT growth	By 2021.	State Infrastructure Strategy 2006/7-2015/16	Between 1999-2004, while population grew at an average of 1% annually: -Total distance traveled also grew by 1% per year (5%) -Per Capita VKT grew by 1.2% per year (6%) -No. of private vehicles grew by 2.4% per year (11.2%)
				2006 NSW State Plan	In 2004 private cars were used for 80.8% of total km travelled in Sydney.
				Urban Transport Statement 2006	Between 1999-2003 kilometres travelled by car rose 4.8%, while kilometres travelled by train and bus both **decreased** by 2% and 5.2% respectively.
					In 2005, 32.8 billion km were travelled by car, this is projected to increased by 20.9% to 39.6 billion km in 2020 (Centre for International Economics, 2005).
					Strong population growth in Sydney likely to result in continued VKT increases unless major improvements are made to public transport.
					The Transport & Population Data Centre (TPDC) Key Transport Indicators, Household Travel Survey data set 2004 http://www.transport.nsw.gov.au/tdc/documents/hts-2004-2006-release.pdf

Review	Key Agencies	Stated goals	Timelines/ $$$ (where stated)	Related plans/ strategies	Progress to date
1.2 Make the reduction of VKT a planning priority across government	Department of Planning	Stopping VKT per/cap growth	By 2011	Urban infrastructure management plan (yearly for 5yrs)	Environmental Impact Statement (EIS) for Parramatta rail link estimated 180 million km/yr reduction in VKT and peak hour traffic volume reduction of 3-4%.
	Department of Transport	Stopping total VKT growth	By 2021	State Infrastructure Strategy 2006/7-2015/16	EIS for Liverpool-Parramatta Transitway estimates 13, 825, 000 km reduction in VKT by 2016, against base case.
	Road and Transport Authority	Reduction of 9 % in per/cap VKT	2011-2021	2006 NSW State Plan	New roads such as the Western Orbital, Windsor Road upgrade and associated urban/commercial growth are likely to counter VKT reductions in Western Sydney.
		Reduce projected VKT growth by 43%	1991-2021	Urban Transport Statement 2006	Private cars continue to account for 70% of trips on the average weekday. This is only likely to increase with the further extension of motorways and construction of tunnels, which will encourage new and induced traffic growth.
		Increase public transport journeys to work (JTW) to 30%	By 2021		Construction of the Western Orbital is yet another example of continued road building.
					Proposal to extend the M4 East with either a short or a long tunnel under Parramatta Road. Whilst intended to reduce freight traffic along Parramatta Road, the preferred long tunnel option would encourage more private vehicles to commute into the CBD and nearby areas, and would require a minimum of two ventilation stacks.
					In October 2004, the RTA also announced it is considering an additional westbound lane on the Anzac Bridge to improve traffic flow'. The Anzac Bridge already has four city bound and three west-bound traffic lanes. The addition of another is only likely to increase traffic in the area, without improving traffic flow in the long term.
					Parramatta to Epping section of Parramatta Rail link cancelled.
					VKT targets lack enforceability.
					http://www.rta.nsw.gov.au/newsevents/2004_10_anzacbridge.html?hhid=2
					Sydney's vehicle kilometres travelled is forecasted to grow exponentially by 28.8% over the next 15 years from 42.4 billion km in 2005 to 54.65 billion km in 2020 (Centre for International Economics, 2005) with the associated costs of congestion increasing proportionately.
					The NSW Urban Transport Statement (2006) has **NO** mention of reducing VKT. The NSW State Plan (2006) has **NO** mention of reducing VKT. The Metropolitan Strategy (2005) **NO** mention of reducing VKT
					The State Environmental Planning Policy (SEPP66) Integration of Land Use and Transport was to guide transport planing in new urban areas , so as to maximise access to services by non-motorised modes, helping reduce VKT. This planing policy has not been finalised and remains in draft form since 2001.

Review	Key Agencies	Stated goals	Timelines/ $$$ (where stated)	Related plans/ strategies	Progress to date
1.3 Integrate transport issues in regional and local planning	DoT RTA DOP Local councils	Higher-density development close to transport nodes

Concentrate retail, commercial, entertainment, community services into centres | | Urban consolidation policies

Centres policies

Metropolitan Strategy (Released December 2005) | A *Metropolitan Strategy Discussion Paper* was released by DIPNR(now DOP) in September 2004. It is the basis for developing a *Metropolitan Strategy* for Sydney over the next 30 years. Nine directions for Sydney are outlined:
1. Plan for balanced growth within natural resource constraints
2. Strengthen the regions
3. Manage growth and value non-urban areas
4. Build liveable new communities
5. Renew existing areas
6. Strengthen employment centres and precincts
7. Connect centres with the transport network
8. Target infrastructure
9. Use appropriate funding and governance arrangement

Metropolitan Strategy *City of Cities: A plan for Sydney's future* released December 2005, giving effect to directions outlined in discussion paper.

The move to strengthen employment centres and precincts is a positive move towards reducing car dependence and integrating transport planning. The 'Centres Policy' encourages jobs to locate in centres such as Sydney, Parramatta, St Leonards, Hurstville, Hornsby, Penrith and Liverpool, with centres connected by the transport network.

Parramatta Road Committee established to advise on urban redevelopment along Parramatta Road corridor.

Success of the Metropolitan Strategy in addressing transport and air quality problems and curbing VKT growth will depend on delivery of key public transport infrastructure.

The Ministry of Transport commenced a Transport Coordination Program covering Regional and Metropolitan areas to address the needs of people facing transport disadvantage. In NSW there are 13 Transport Coordinators - 2 Sydney Metropolitan Coordinators and 11 in rural and regional areas. They aim to reduce the negative effects of transport disadvantage through improved coordination with community stakeholders, transport operators and other agencies.

The Auditor General's Performance Audit on the management of air quality points to a number of shortcomings in the integration of transport issues into local and regional planning, including:
- Lack of regional Action for Air plans, that will address region specific transport and air quality issues, which could also assist in developing local government. Air Quality Management plans
- Lack of strategic planning for long term improvement of public transport and integration with strategies for road planning and pricing. |
| **1.4** Implement accessibility criteria for new residential development | DoT DOP Growth Centres Commission | Maximise accessibility to public transport for new residential areas | | Metropolitan urban development program (UDP) | Accessibility criteria for new residential development prepared by DOT included in accessibility criteria for additions to the Government's Urban Development Program (UDP) in October 1997. These were updated by an inter-agency land and housing supply forum held in February 2000.

The new criteria consider *Action for Air* goals and require that decision makers address the capacity of the land use/transport patterns of the site make a positive contribution to the achievement of travel and vehicle use goals. These criteria have been applied to all assessments of potential UDP additions since their initial adoption.

Despite this the Rhodes Peninsula development has been criticised for locating housing too far (800m) from the railway station. |

Review	Key Agencies	Stated goals	Timelines/ $$$ (where stated)	Related plans/ strategies	Progress to date
1.5 Set targets for JTW by public transport at key centres		Increase public transport JTW from 25% to 40-60%		Parramatta Regional Environmental Plan (REP) (2006)	SEPP 5 amendments effective 1/12/00 require consent authority to refuse a DA for SEPP 5 Housing unless it is within 400 metres of certain services or a transport service will take residents to those services. The service must operate Mon-Fri in daylight hours.
				NSW State Plan (2006)	Direction 4 of the *Metro Strategy Discussion Paper* to 'build liveable new communities' is further recognition of the need to maximise accessibility in new residential development. It states new Greenfield communities will be planned to incorporate local jobs, schools, shops and parks, and with access to safe and reliable public transport.
				Metropolitan Strategy (2005)	The Growth Centres Commission, a new NSW Government body, was established in 2006 to manage the planning and infrastructure coordination for the land release areas in the North West and South West of Sydney. Provision of public transport to North-West and South-West Growth Centres a key component of planning. Success will depend heavily on delivery of new transport infrastructure, particularly the North-West and South-West rail links.
				Transport Statement (2006)	Parramatta REP set target to increase JTW by public transport from 25% to 40-60% by improving public transport and increasing density and providing mixed use zones around transport nodes.
					More detail and specific timelines needed on strategies to improve pedestrian access and cycling. REP largely restricted to statements of intent.
					REP lacks specific details of parking policies needed to support transport initiatives if JTW targets are to be achieved. Need firm commitments and timelines. REP contains only statements of intent and possible strategies.
					Integrated approach to Parramatta REP, including growth target for public transport in line with growth in the workforce, to be used as model for planning development of other centres.
					Statistics could not be found on Parramatta City Council or Transport and Population Data Centre websites to indicate they have met their targets, or any increase in JTW by public transport.
					The Parramatta City Community Profile states 64% of JTW was by car, but this is based on 1996 statistics.
					However, major transport interchange constructed in Parramatta, incorporating:
					> a new bus/rail interchange on Argyle Street > upgraded western concourse and station facilities > a new bus underpass linking Argyle & Hassall Streets > improved safety and amenity at Parramatta Station Transport Precinct
					A Draft Transport Management and Accessibility Plan (TMAP) was written in 2002 to integrate the Parramatta REP Access Strategy, together with more recent planning for the introduction of a rapid transit bus network, pedestrian and bicycle network implementation programs and the Civic Place master planning study.
					One of the stated goals in the 2006 Transport Statement is to provide "An effective transport system, with an increasing share of peak hour journeys on safe and reliable public transport..." but there is no mention of specific targets.

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Review	Key Agencies	Stated goals	Timelines/$$$ (where stated)	Related plans/ strategies	Progress to date
					Similarly, the Metropolitan strategy aims to "Improve the integration of public transport", but does not mention any specific targets. Transport data shows that since 1999 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 Action for Air target of 30%. Transport and Population Data Centre (2004) Household Travel Survey Rail Tram and Bus Union (2006) Moving On- Summary Paper
Strategy B Improve management of freight transportation		Improve efficiency of urban freight movements Reduce the impact of heavy vehicles in built up areas		More integrated planning for the management of freight	In 2005, 37% of transport emissions on a full fuel cycle basis were freight-related. The overwhelming majority of freight emissions are attributable to road transport. In 2005, approximately 38% of the domestic freight task was carried by road, at the same time road transport was responsible for 84% of total freight emissions. Hence, road based freight emissions are disproportionately higher than other forms of freight transport. (Macintosh 2007,The Australia Institute Discussion Paper no.97 http://www.tai.org.au/documents/downloads/DP97.pdf) Despite being prompted by a Legislative Council Committee report in December 2000 calling for release of this Strategy, the promised NSW Freight 2010 strategy is still to be released.
1.6 Design and implement an integrated freight strategy	Ministers for Transport & Roads	Develop integrated strategy	end of 1998		On a federal level, The Australian Logistics Industry Strategy was released in July 2002 as part of the Commonwealth Government's Freight Transport Logistics Industry Action Agenda – to form a united logistics industry. The Strategy is the responsibility of the newly formed industry group, the Australian Logistics Council. http://www.ministers.dotars.gov.au/ja/releases/2002/July/a89_2002.htm In May 2007 the government released its Freight Initiative plan to increase freight on rail and ease congestion , which includes goals to: -Establish new freight terminals at Enfield and, subject to discussions with the Commonwealth, at Moorebank; -Achieve a target of 40% of freight carried by rail, from the current rate of 36%, which will reduce the number of truck movements on key arterial roads by approximately one million truck movements per year; and -Reduce truck movements around Port Botany and inner metropolitan suburbs by up to 300 per day. http://www.transport.nsw.gov.au/news/media/2007/07-05-31-premier-ports-freight-strategy.pdf However, the details on how these goals will be achieved have not been released.

OBJECTIVE 2 (see Table 2)

Objective 2 aims to improve transport choices by providing better public transport, promoting cycling and walking and using education to change travel behaviour.

Strategy A – provide better public transport

Strategy A aims to provide better public transport. This is the key to achieving VKT targets set out in *Action for Air*. As discussed in the review of Objective 1, latest figures indicate that VKT continues to outstrip population growth. This is largely a result of inadequate public transport and an emphasis on road building.

This approach is out of step with public opinion. A 1999 study by the Warren Centre (Glazebrook, 2001) revealed that 71% of Sydney residents surveyed favoured improved public transport over building more toll roads as the solution to traffic congestion. Of those surveyed, 73% believed there was not enough investment in Sydney's public transport, compared with 52% who believed there was insufficient investment in roads. Only 14% support more investment in roads at the expense of public transport, while 70% would support increasing spending on public transport at the expense of the road budget.

Unfortunately it appears that government decision makers continue to prioritise roads over public transport. Recent Federal Election announcements of funding for transport infrastructure are heavily biased toward road construction.

As discussed in the review of Objective 1, there are signs of increased public transport use by Sydney residents over the last 12 months partly in response to rising petrol prices. This shift in preference toward public transport creates an opportunity to address VKT growth by improving public transport to make it an increasingly attractive alternative to private car use.

Unfortunately, progress in improving public transport as outlined in Strategy A of Objective 2 has generally been quite poor (table 2). The emphasis on road building as the solution to transport problems continues, as seen in the construction of the Western Sydney Orbital and proposals such as the three way motorway.

A major focus of improving public transport in Strategy A of *Action for Air* is the upgrading of public transport in Greater Western Sydney (Strategy A.1), an area poorly serviced by public transport. This

included Action 2.1, "consider funding for public transport" involving the development of an integrated public transport plan. This was released in 1998 as Action for Transport 2010. It is extremely disappointing, however, that many of the rail links proposed in Action for Transport have been deferred or delayed, including the Parramatta to Epping section of the Parramatta to Chatswood Rail link (Action 2.2), the Hurstville to Strathfield link, Liverpool Y-link and North West Rail Link.

While funding for public transport has been provided through a range of initiatives, it has clearly not been sufficient to allow for growth of the public transport system as proposed in Action for Transport.

On the positive side of the ledger the 2006-07 NSW budget increased spending in the transport portfolio amounting to a total of $6.7 billion. Of this, slightly more than half is to be spent on public transport. Thus, it is claimed that in 2006-7, for the first time, public transport spending will exceed road spending. However, a closer look reveals that about one third of the capital spending announced is for continued spending on two current initiatives: Rail Clearways and the Epping-Chatswood Rail Line (RTBU, 2005). The Rail Clearways project is an important step toward improving the efficiency and capacity of the network; however, it will not address the problem of lack of transport infrastructure in many parts of the GMR.

Also on the positive side of the ledger are commitments to complete the North-West Rail Link to Rouse Hill by 2017 (although this was originally proposed for 2010), a South-West Rail link to Leppington by 2012 and a new Harbour Rail Link by 2017. There have, however, been recent moves by Treasury to downgrade the North West Rail Link to a Bus Transitway and not construct the Harbour Rail Link. The Premier and Minister for Transport have since stated that the rail links will proceed. It is vital that these links be completed on or before schedule.

Another aspect of improving public transport in Greater Western Sydney covered in *Action for Air* was to consider fast-tracking public transport on the Hoxton Park to Parramatta corridor (Action 2.3). This was opened in 2003 and the project was fully completed in 2004. The Department of Transport estimates that 39,000 people use the service each week (www.t-way.nsw.gov.au).

There has been progress on Action 2.4 – plan for

public transport in north-west Sydney, specifically linking the Rouse Hill release area with Mungerie Park, Blacktown, Parramatta and other centres. Bus services commenced on the Parramatta Rouse Hill T-way in March 2007 with the Blacktown-Parklea T-way due to open in late 2007. There appears, however, to have been no progress on assessing the feasibility of light rail along the corridor to connect with the Blacktown/Riverstone railway line while, as discussed above, completion of the North West rail link has been delayed from 2010 to 2017.

There has been good progress on some aspects of improving bus services in Western Sydney (Action 2.5) with bus interchanges and new cross-regional bus services. As noted above, a number of transitways have been completed, while the Unsworth Review bus reforms will be a major step toward improving the quality of bus services.

Significantly Pensioner Excursion Tickets have been extended to private bus services, addressing a major inequality that existed between government and private bus services.

There has also been progress on the development of a Performance Assessment Regime (PAR) to improve private bus service standards before renewal of contracts, however this process needs to be finalised quickly.

Some progress has been made on providing public transport to new suburbs (Action 2.6) with the release of the Urban Greenfield Policy to commercial contract holders in May 2000 and commencement of a competitive tendering process in the Illawarra in June 2000.

The Growth Centres SEPP and DCPs also include provisions for public transport routes and rail infrastructure as well as street layouts to facilitate road based public transport.

In general it can be stated that there has been significantly better progress in improving bus transport in western Sydney than has been achieved in improving rail services and infrastructure. It is clear that more funding and effort needs to be directed toward improving rail transport.

Projects to extend the heavy rail network (Strategy A.2) have met with mixed fortunes. Extending the Eastern Suburbs line to Bondi Beach (Action 2.8) has been abandoned, due to rising costs, anticipated low patronage and environmental issues. This has been replaced with a turnaround

loop at Bondi Junction to increase services on the Illawarra line. The turnaround loop was opened in May 2006 and has increased capacity on the Illawarra line with a new morning peak service and three additional services from Bondi Junction to the city.

The New Southern Railway (Action 2.7) was opened in 2000 but the Airport Link fell into receivership and the line was taken over by the State Government. The link has now been sold to Westpac. Patronage has been poor due to high costs of tickets, timetable and access problems, among others. Delays in related infrastructure developments, such as the Green Square residential/commercial project, have also exacerbated the difficulties.

The Homebush Bay rail loop (Action 2.9) proved successful during the Olympics and now with other major events such as the Royal Easter Show. Restrictions on parking in the precinct need to be retained to ensure the continuing success of the line.

Light rail has an important role to play in improving public transport in Sydney. This is the focus of Strategy A.3 with Action 2.10 to integrate light rail into the transport network. Good progress has been achieved on the extension of the Inner West Light Rail to Lillyfield. Patronage exceeded targets in the first year of operation, underlining the important contribution that light rail can make to reducing vehicle use. A proposal to extend the system through the CBD was shelved in 1998 and is now actively opposed by the NSW Government. This once again shows the preference of the government for constructing roads over improving public transport. The CBD extension is essential to ensure the long term viability of the light rail system. Plans to conduct a feasibility study for extending the network to Ashfield Railway Station have also not been completed.

Little work appears to have been done by the State Government to promote light rail in other parts of Sydney. The Bay Light Express proposal for an Eastern Suburbs and Southern Sydney light rail system has received little support from the government and is threatened by a proposal to sell UNSW land which would form part of the light rail corridor.

In addition to improving public transport by rail and promoting light rail, it is important to upgrade the performance of road based public transport, i.e. buses. As noted above, the Unsworth bus reform

process and development of bus transitways will result in significant improvements in bus transport. *Action for Air* also includes a range of specific bus transport strategies

A major factor in improving road based public transport is targeting particular projects and allocating funding to the Public Transport Infrastructure Improvement Program (PTIIP) (Action 2.11). In 2002-03, the RTA investigated and trialed a 'Public Transport Information and Priority System (PTIPS)', a system allowing real-time traffic signal priority for buses. The Minister for Transport has announced that this system will be installed on government buses by 2009 and private buses by 2011.

Some goals, such as the M2 Public Transport Management Plan (Action 2.12), have been reached, with a review leading to additional infrastructure. PTIIP funds are to be used to implement an extensive bus priority scheme (Action 2.14). Bus priority works have been completed along the Warringah Freeway/Falcon Street Crows Nest, in both directions along Parramatta Road from Balmain Road to Broadway and transit lanes on Victoria Road have been extended.

Improving bus services to the Eastern Suburbs (Action 2.15) has progressed well with implementation of a bus priority plan for the Eastern Suburbs. In July 2001 the $9 million Bondi Junction bus and rail interchange was completed and is working effectively: 50,000 bus passengers and 42,000 rail patrons use the terminal each weekday. Each bus arrives at a separate air-conditioned area where sliding doors, triggered by a transponder on the bus, allow passengers access.

A new express bus service from North Bondi to the City began operating in 2006, the cashless "Bondi Bendy" bus was a successful trial of 'pre-paid only' bus services.

There has also been progress on upgrading bus services on the Warringah Peninsula (Action 2.16) with a bus passenger information system commissioned in 1999 and establishment of 'park and ride' systems.

A major concern is the reduction in air quality standards for the M5 East motorway. The use of an unfiltered stack has resulted in substantial amounts of particulate pollution from the tunnel. This has had significant impact on local air quality. Failure to filter emissions from the tunnel will adversely affect regional air quality, particularly given the stack's

location within the valley.

In June 2004, internal RTA documents tabled in NSW Parliament revealed carbon monoxide has been regularly pumped from the portals of the M5 East tunnel instead of its exhaust stack. This is despite approval conditions that vehicle emissions only be emitted from the tunnel's entrances and exits in extreme circumstances – eg emergencies and major maintenance.

In June 2006, the Minister for Roads announced a plan to improve air quality in the M5 East tunnel including Australia's first trial of air filtration technology. The air quality improvement plan includes: twelve additional jet fans, video detection of smoky heavy vehicles, a new ventilation strategy including partial portal emissions and a trial for tunnel filtration technology.

The RTA announced a 'trial' to filter both particulate matter and NO_2 in the tunnel. The filtration trial will include two filtration plants (four times the capacity of the original trial) and is expected to cost $50 million over two financial years. The plants are expected to be operational in 12-15 months. There are concerns that this trial will only cause further delays, and will be costly, ineffective and unnecessary when proven technology already exists, especially given the fact that there is no certainty that it will produce a noticeable improvement of in-tunnel air quality or achieve its own objectives.

Many of the above improvements to in-tunnel air quality will be achieved through the use of portal emissions, which have the potential to significantly harm air quality in the residential area around the tunnel portals.

Current data shows concentrations of NO_2 are below the air quality goal (MUAP goal = 256 micrograms/m3). However, monitored PM_{10} average concentration has exceeded the air quality goal on several occasions. There is also no monitoring of finer particles such as $PM_{2.5}$ which have been proven to have adverse health impacts even at low concentrations.

A condition of approval of the M5 was the development of the M5 East Sub regional air quality plan (Action 2.13). The NSW Parliament General Purpose Standing Committee No 5 Inquiry into the M5 East Ventilation Stack recommended that development of the draft sub-regional air quality plan be completed by June 2000.

Work on the plan only began in March 2001 with a survey sent to 3000 randomly selected households regarding car use, heating, lawn mowing etc and the RTA wrote to Council seeking information on businesses. TEC believes that this work should have been completed prior to the decision not to filter tunnel emissions. This decision was based on assumptions regarding the impact of solid fuel heaters and local business such as dry cleaning premises.

The decision to construct an unfiltered stack also ignored the findings of the International Tunnel Ventilation Workshop and CSIRO report.

In particular, the CSIRO report found that:

- stack emissions of particulate matter would be more than double that expected by the RTA
- CSIRO could not agree with the approach taken by RTA consultants in part of their report
- modeling carried out by the RTA was not valid under certain conditions of calm winds or re-circulation of pollutants by local winds which occur almost half the time.

It is likely that problems with emission from the M5 East Tunnel will be replicated with the Lane Cove and Cross City Tunnels.

A key factor in promoting public transport is to make it a more attractive option for the traveling public. Strategy A5 of Objective 2 is concerned with making public transport more attractive by improving transport management.

An important step toward making public transport more attractive is to simplify and integrate ticketing arrangements (Action 2.17), particularly by combining private bus ticketing with rail. There have, however, been serious delays with the development and introduction of the proposed T-Card system and it remains to be seen when and if the system will be introduced.

Public transport information services have been improved (Action 2.18) with the establishment of a centralised phone information system (131 500) in November 1999. This includes details of private bus routes. The transport website, www.131500.com has also been introduced and is operating successfully.

The comprehensive Public Transport Directory was only issued once in 1998 and is now out of date.

A major demand management tool to discourage car use is reducing the availability and increasing

the expense of parking. The aim of a metropolitan parking policy (Action 2.19) is to achieve some consistency between the various agencies involved, including councils. To this end the Parking Space Levy is an important contribution to managing demand and providing a source of funds for public transport. Exemptions for retail shopping centres weaken its effectiveness, however.

Measures to increase availability of parking near railway stations under the 2006 Transport Statement (NSW Government, 2006a) are an important step in encouraging commuters to use public transport for at least part of their journey. Ideally, however, local bus services should be available to act as feeder services for rail services.

Teleworking is a potentially significant method of reducing car usage. Action 2.20 seeks to promote teleworking in the government and business sector. A successful RTA telecentre trial at West Gosford has become permanent and a telecentre has also been established at Penrith. The RTA also provides advice in setting up a telecentre. In 1993/94 an RTA teleworking project found that trips by all transport modes by teleworkers on work days fell by 53%, while journeys to work locations fell by 86%.

The potential contribution of teleworking to reducing emissions is revealed by a recent report showing that telecommunications networks can help reduce Australia's greenhouse gas emissions by almost five per cent by 2015 and deliver up to $6.6 billion a year in financial savings for Australian businesses and households (Climate Risk, 2007).

With rapid population growth in regional areas, improved regional transport planning is essential. Failure to adequately provide for growth in travel demand will see a marked increase in VKT in regional areas. Strategy A6 of Objective 2 is aimed at improving regional transport planning.

Reducing urban sprawl and development in areas with poor public transport by promoting increased density in well serviced areas is a vital measure for curbing VKT growth. The Central Coast, expanding by over 2% per annum, is the fastest growing area in the Greater Metropolitan Region. Many Central Coast residents work in Sydney and approximately 62% of commuters do so by car. In 2000 DUAP released a settlement strategy, Shaping the Central Coast, (Action 2.21) which includes strategies for increased use of medium density development with good access to public transport. Gosford Council's residential strategy discourages the expansion of its urban areas.

The Central Coast Regional Strategy outlines positive initiatives such as connecting the centres through improved connection of the region's centres via existing train services, improved local bus services, walking and cycling facilities.

The Illawarra region is also experiencing rapid population growth. This will result in increased vehicle use unless public transport is improved to cope with increased travel demand. In recognition of this, *Action for Air* proposed the development of a long term strategy to improve transport in the Illawarra (Action 2.22). The strategy, Illawarra's Action for Transport, was launched in March 1999. The strategy provides a detailed approach for improving public and freight transport in the Illawarra region. A major deficiency, however, is the lack of figures on funding or clear timeframes for implementation. A further deficiency is that performance indicators have not been developed for all aspects of the plan.

The Illawarra Regional Strategy (released 2006) includes goals to consider access to transport in planning decisions, however, the strategy lacks quantifiable targets to achieve this objective.

Progress on the development of a Newcastle-Sydney corridor study (Action 2.23) appears mixed. While a feasibility study of phase 1 of a high speed rail link has been completed there does not appear to have been any progress toward developing the high speed link. Regional Strategies have been developed for the Hunter and Central Coast to guide planning decisions in the region.

There also appears to have been some progress on the development of a Penrith-Orange corridor road and rail strategy (Action 2.24). There is a heavy emphasis on road upgrading, however, commitments to improve rail services are also included.

Result - poor

Strategy B – provide for cycling and walking

Strategy B focuses on reducing car dependency by improving government support for safer and more convenient bicycle use (Action 2.25) and facilitating walking as a mode of transport (Action 2.26). In 1999 Action for Bikes: BikePlan 2010 was released, setting out a 10 year $251 million program of state-wide cycleway construction. While major components of the Sydney Bike Network have been completed this is undermined by loss of access and safety through roadworks which are unsympathetic

to cycling including the removal of William Street cycle lanes.

BikePlan also lacks targets for increasing cycling. In addition, information on progress of the Department of Transport's Bicycles and Public Transport Strategy has not been forthcoming. However a RTA survey of all NSW councils on bicycle planning may provide a clearer picture.

Major road projects continue with inadequate provision for cyclists. Examples include upgrades of Redfern Street and Glebe Point Road. The RTA has also ignored calls to introduce Advanced Stop Lanes (ASLs) as in Victoria and overseas and as recommended by national road design rules.

There has also been mixed progress on facilitating walking as a mode of transport (Action 2.26). Both Road Safety 2010 and the Pedestrian Safety Plan for 2002-04 have strong objectives and activities for improving pedestrian safety, but neither include dates for meeting targets.

Pedestrian Access and Mobility plans have been developed or are being developed for a range of Councils and the Pedestrian Crossing Upgrade Program announced in May 2006 seeks to improve pedestrian safety.

Leichhardt Council's "walking bus" program for school children, in which groups of children are supervised on their trips to and from school, has been expanded to include a number of schools. This program provides a model that should be employed in other areas.

Countering this however is a tendency for pedestrian refuges to be used in preference to crossings, especially at roundabouts.

Result - average

Strategy C – change travel behaviour through education

Strategy C aims to change travel behaviour through education programs, particularly through schools and community groups (Action 2.27). Initiatives have included SmogBusters Day, Travel Smart Day, Public Transport Day and support for Bicycles NSW National Ride to Work Day. Unfortunately SmogBusters no longer operates due to withdrawal of Federal Government funding. Support for the Pedestrian Council's Walk Safely to School and Walk to Work Days has also assisted with community education.

Result - average

Recommendations

Strategy A

1. Bring forward funding for the North-West, South-West and Harbour Rail Links to fast track completion. Announce funding for the Epping to Parramatta section of the Parramatta to Chatswood link.

2. Continue Unsworth bus reform process and finalise Performance Assessment Regime (PAR) for private bus company service standards.

3. Improve baggage facilities on airport link line and alter timetabling arrangements to address current problems.

4. Maintain parking restrictions at Olympic Park and Easter Show.

5. Ensure CBD light rail extension is constructed and complete feasibility study of extension to Ashfield.

6. Promote light rail as transport in other parts of Sydney including Bay Light Express proposal. Prevent sale of UNSW land which would block development of the system.

7. Provide detailed information on future funding allocations for and work completed under, the Public Transport Infrastructure Improvement Program (PTIIP).

8. Install filtration equipment on M5 East, Lane Cove and Cross City Tunnels.

9. Finalise and introduce T-Card integrated ticketing system.

10. Produce new edition of Public Transport Directory. Make available on- line and update regularly.

11. Remove parking space levy exemptions for retail shopping centres.

12. Provide additional opportunities for teleworking in government sector. Promote results of RTA teleworking trial to private sector.

13. Provide detailed funding commitments and timetable for implementation of Illawarra's Action for Transport. Finalise performance indicators for all aspects of strategy.

Strategy B

14. Targets for increasing bicycle use should be established and incorporated into BikePlan 2010, and funding secured.

15. RTA to produce standards for roadwork designs that do not impede safe cycling.

16. Continue upgrading of pedestrian crossing facilities. Avoid using pedestrian refuges where crossings would be more appropriate.

17. Extend "Walking Bus" program to other areas. This would help eliminate many vehicle trips of parents taking children to school.

Strategy C

18. Continue school and community programs such as, Public Transport Day, Walk Safely to School Day and Walk to Work Day.

Objective 2. Provide more and better transport choices

"Goal: To improve transport choices and encourage reduction in vehicle trips and kilometres travelled by both passenger and commercial vehicles".

TEC Action for Air Review Table 2

Review Actions	Key Agencies	Stated goals	Timelines/$ ($$ where stated)	Related plans/ strategies	Progress to date
Strategy A. Provide better public transport		Improve public transport – road and rail.		'Greater Western Sydney (GWS) Public transport Strategy'	The Rail Clearaways plan aims to improve capacity on City Rail's Sydney suburban network, and is due for completion in 2010. The plan comprises 15 projects to separate the network's 14 metropolitan rail routes into 5 independent clearways. The aim is to remove bottlenecks and junctions, reduce congestion and delays, and allow for simpler timetables. It will mean delays on one train line will not affect the timetable of another line, as is currently the case. http://www.cityrail.info/news/clearways.jsp
		Extend heavy rail		NSW Metropolitan Strategy (2005)	
		Integrate light rail		Urban Transport Statement (2006)	*Accessible Transport Action Plan for NSW Transport Agencies* released in December 2002 to guide the following agencies:
		Improve public transport on roads		State Infrastructure Strategy (2006)	Ministry of Transport Rail Infrastructure Corporation Roads and Traffic Authority State Rail Authority State Transit Authority Waterways Authority
		Improve public transport management		NSW State Plan (2006.)	
		Upgrade regional transport strategies			for the provision of access to transport services for all sections of the community including people with a disability, older persons, children, students and commuters. http://www.transport.nsw.gov.au/using_trans/access-trans-action-plan.pdf
A.1 Greater Western Sydney Public Transport Strategy		Improve public transport in GWS		'GWS Public Transport Strategy'	
2.1 Consider funding for public transport		Promote growth in public transport		'Integrated Transport Plan' 'Action for Transport 2010'	Integrated transport plan *Action for Transport 2010* released 1998, however, it has not been implemented and appears to have been largely abandoned.
		Allow medium & long-term public transport		State Infrastructure Strategy (2006)	*Action for Transport 2010* documents are no longer available from the Ministry for Transport website. http://www.transport.nsw.gov.au/pubs_legal/act2010.html *Action for Transport 2010* is not mentioned on the DOP website except an acknowledgement that informs *Shaping*

2.2 Enhance the Parramatta rail link				
	Improve rail access to Parramatta, South West, North West and Western Sydney.	Train services to commence 2006	Environmental Impact Statement (EIS) & summary	*our Cities – The Planning Strategy for Western Sydney.*
				In 2005 and 2006 the NSW government committed significant funding to public transport through the NSW *Urban Transport Statement*, and the *State Infrastructure Strategy*. However, at the same time significant funding commitments were made towards road construction. There is evidence which shows not all commitments to the former were followed through.
				In 2005 $3.6 billion was committed towards investment in arterial roads network. While $2.6 billion was committed towards public transport improvement including the Rail, Clearways project, new trains and the Parramatta interchange.
			Urban Transport Statement (2006)	In April 2006 the Premier and the Minister for Transport announced a $250 million program to purchase 505 new 'clean-diesel' and natural gas powered buses over a five year period. The program will see 255 natural gas powered buses and 250 diesel buses purchased for Sydney and Newcastle (DoT Annual Report 2005-6) www.transport.nsw.gov.au.
				The NSW government's 2006-2007 Budget speech announced increased spending in the transport portfolio amounting to a total of $6.7 billion. Of this, slightly more than half is to be spent on public transport. Thus, it is claimed that in 2006-7, for the first time, public transport spending will exceed road spending. However, a closer look reveals that about one third of the capital spending 'announced' is for continued spending on two current initiatives: the Rail Clearways and the Epping-Chatswood Rail Line, which while important initiatives are not new investment commitment (Moving On- The RTBU's Public Transport Blueprint for Sydney. Summary Paper. 2005 http://rtbu-nsw.asn.au/campaigns/general/upload/Moving%200n%20Summary%20Paper.pdf
				Despite funding commitment, several projects have been delayed or deferred, including: • North West Rail Link by 2010 • Sydney-Newcastle High Speed Rail by 2010 • Sydney-Wollongong High Speed Rail by 2010
	5 new railway stations and 7 existing stations upgraded.		Sydney Metropolitan Strategy 2005	The Government has given a commitment to complete the North-West Rail Link to Rouse Hill by 2017, a South-West Rail link to Leppington by 2012 and a new Harbour Rail Link by 2017. There have, however, been recent moves by Treasury to downgrade the North West Rail Link to a Bus Transitway and not construct the Harbour Rail Link. The Premier and Minister for Transport have since stated that Rail Links will proceed.
				While funding for public transport has been increased and is heading in a positive direction, it can be argued this funding remains disproportionately low compared to road investments, given, the historical neglect and significant network developments required to achieve a world class public transport system in Sydney. Recent announcements of intentions to expand roadways such as the 3 way road link emphasize this point.
				Project has been split in two with public funding announced for first stage between Epping and Chatswood and an underground bus exchange at Parramatta. No funding for second stage between Epping and Parramatta. Completion of 15.5 km Chatswood-Epping link scheduled for 2008.
				Plans for the Parramatta to Epping rail link have been cancelled, a setback for public transport infrastructure in Parramatta. Decision announced at same time as additional $123m to upgrade Windsor Road to 4 lanes.
				Parramatta-Strathfield Rapid Bus Transitway originally scheduled for completion by 2002, and Parramatta-Blacktown Rapid Bus Transitway have both been delayed.
				In Febuary 2006 the Parramatta Transport Interchange was redeveloped to accommodate for future patronage

Review	Key Agencies	Stated goals	Timelines/$ $$ (where stated)	Related plans/ strategies	Progress to date
		Rosehill-Camelia station to incorporate interchange with Parramatta to Strathfield Rapid Bus Only Transitway. 3-4% Peak hour traffic volume reduction. Reduce passenger VKT by 180M km/yr.			growth, improve passenger facilities, and provide new bus facilities. The new interchange was opened, before schedule, on 19 February 2006. The capacity of the station in the morning peak has been approximately doubled – now accommodating 30,000 people. http://www.raillink.nsw.gov.au/SectionIndex.aspx?PageID=88 In April 2007 the new Epping Station aerial concourse and footbridge were opened to the public. Construction works will continue at Epping Station to complete the underground platforms and transfer concourse for the Epping to Chatswood Rail Line which is expected to be operational in 2008. http://www.raillink.nsw.gov.au/ArticlePage.aspx?PageID=1198
2.3 Consider fast-tracked public transport for the Hoxton Park to Parramatta corridor	DoT	Government to identify most appropriate services for a rapid public transport route on reserved corridor from Hoxton Park to Parramatta			The Liverpool to Parramatta Transitway (T-Way), incorporating Hoxton Park Road, was opened in 2003 and completed in 2004 as part of the new transitway for Western Sydney. It is dedicated exclusively to buses travelling between Liverpool and Parramatta. According to DoT over 5 million have used it since services began. Currently, more than 39,000 people travel on the T-way each week, with patronage increasing steadily. http://www.t-way.nsw.gov.au/lp-home.htm
2.4 Plan for public transport in north-west Sydney	DoT DoP	To link Rouse Hill, Mungerie Park, Blacktown & Parramatta	By Feb. 2000 During 1998		The North-West T-way is a priority under the *Metro Strategy*, and approval was granted in Feb 2004. The T-way consists of two interconnected transitways: 1) Parramatta to Rouse Hill; and 2) Blacktown to Castle Hill/ Parklea Major construction of the North-West T-way commenced in June 2005. Bus services on the Parramatta–Rouse Hill T-way link started in March 2007. Bus services which will operate on the Blacktown–Parklea T-way link also commenced in March 2007 and are currently operating on Sunnyholt Road. These services are expected to s T-way in late 2007. The North West rail link scheduled for completion by 2010 has been delayed. Completion now due 2017.
2.5 Improve bus services in western	DoT			GWS public transport strategy	Funds were secured to acquire the corridor for the North West and South West Rail Links: $26 million was allocated in the 2005-06 budget and a further $129 million was committed for 2006-07 (DoP Annual report 2005-6) Concern has been expressed by the RBTU, these funds are insufficient. Interchange improvements at Merrylands & Railway Square. Interchanges also completed at Liverpool, Campbelltown, Epping, Mascot, Cabarita, Kissing Point and Yurulbin in 1999-2000 and construction began on interchange improvements at Springwood, Bondi Junction and Manly;

Sydney

Action	Progress
Transitway policy	Several planned public transport projects in western Sydney were deferred or delayed, such as: The Parramatta to Blacktown transitway, St. Mary to Penrith transitway and Blacktown Wetherill Park transitway. The planned Parramatta-Strathfield transitway was downgraded to only a cross regional bus service rather than a full Transitway.
Upgrading public transport information	
Road upgrades for bus priority	
Interchange upgrades	In 2006 the new Parramatta bus interchange constructed on Argyle Street opened – providing easier multi-mode travel with the consolidation of bus stops to a dedicated area, adjacent to the station, and includes new bus layovers and turnbacks as well as a bus only underpass beneath the eastern end of the station to improve bus operations. The new bus interchange will be able to accommodate 140 buses per hour in the morning peak. http://www.raillink.nsw.gov.au/SectionIndex.aspx?PageID=88
Develop cross-regional services	7 new cross regional bus services introduced: Parramatta to Sydney City via Gladesville, Castle Hill to Liverpool via Parramatta, Castle Hill to Liverpool via Blacktown, Mt Druitt to Castle Hill via Quakers Hill, Mt Druitt to Parramatta via Quakers Hill, Mona Vale to Macquarie University and Parramatta to Gladesville via Victoria Road.

Performance Assessment Regime (PAR) to ensure best practice standards and service benchmarks are achieved before renewal of private bus contracts still being finalised.

Barrie Unsworth's Review of Bus Services in NSW, published in February 2004 was a positive step towards integrating the NSW bus system. In particular, simplifying the Sydney bus system, from 87 contract zones down to 15.

It also removes the current pricing inequity by raising public bus fares over a 5 year period to match private bus company fares. Pensioner Excursion Tickets will rise from $1.10 to $2.50, but will be valid on a wider range of services including private buses and the outer boundaries of the CityRail network.

Concern has been expressed that the increase in public bus fares may impact on patronage. On balance, however, the equity between public and private fares and integration of services is likely to have a beneficial effect.

The recommendations of the Review, have been largely implemented, actions taken include:
o Amendment to the Passenger Transport Act 1990
o Establishment of Service Planning Guidelines
o Negotiation to Establish New Bus Contracts- reduction in bus contracting areas to 15 within Sydney
o Establishment of Local and Community Transport Division, plus appointment of Regional Coordinators
o Partial progress towards fare and concession harmonisation: On the 4th January 2005 bus operators across Sydney adopted a new fare and concession scale that created some parity between public and private fares.

The NSW Government will spend $74 million to buy 160 new buses for Western Sydney operator Westbus. The new buses will be delivered over the next three years and will provide more capacity and extra comfort for Western Sydney commuters. Funding has already been approved for the immediate purchase of 13 new buses to increase capacity on the popular WestBus city-bound M2 routes.

Review	Key Agencies	Stated goals	Timelines/$ $$ (where stated)	Related plans/ strategies	Progress to date
2.6 Provide public transport to new suburbs	DoT	Introduce public transport at the outset of new development			Release of Urban Greenfield Policy to Commercial Contract Holders completed in May 2000. First competitive tender process commenced in area of Blackbutt, Flinders and Shellcove in the Illawarra in June 2000. North Western Sydney has a history of mass releases of land with very poor access to public transport. In November 2002, Andrew Refshauge, the Minister for Planning, introduced an interim transport levy of $15,000 per lot on new land releases at Elderslie, Spring Farm, Balmoral Road and Second Ponds Creek to help fund essential transport infrastructure upgrade. This is a major step forward for clean air and better public transport. http://www.parliament.nsw.gov.au/prod/lc/lcpaper.nsf/0/6E0C5A0C0A665E0FCA256CCB0004A05B http://www.tec.org.au/member/tec/news/media/20021120_levy.html The *Metro Strategy* also recognises the need for 'developer levies in greenfield areas' (p.13).
A.2 Extend the heavy rail network					State Environmental Planning Policy (Sydney Region Growth Centres) 2006 include provisions for public transport routes and rail infrastructure. This includes street layout to facilitate road based public transport, duplication of Richmond line from Quakers Hill to Vineyard, new North-West Rail Link to Rouse Hill and South-West rail Link to Leppington.
2.7 Complete construction on the new southern railway		Open the new Southern Railway	May 2000 $600m allocated		Airport link opened May 2000. Airport Link Company went into receivership in November 2000 and government was forced to take over. Its fate was blamed on patronage of the line in the first few months being only 25% of expectations[5]. The Government has not released a comprehensive comparison of the predicted and actual passenger figures, but it seems undeniable that patronage to date has been lower than was forecast in the planning stage. Link has now been sold to Westpac. Problems due to high cost of tickets to Airport Link stations, reliability problems, lack of baggage facilities on trains and at airport. A major shortcoming is that the service does not begin operating early enough to suit airport workers. More than half of trains from Cronulla and Waterfall lines do not stop at connecting Wolli Creek Station. Airport Link Stations have insufficient seating. Off-peak services to inner west stations such as Newtown and Stanmore cut back when airport line opened. As of 2006 patronage still around 25% of original forecasts. The price of a train ticket from the city to airport is currently not competitive with the cost and convenience of a taxi, particularly if fare is shared by two or more passengers. In 2006 RailCorp compulsorily acquired land to include it in the Green Square Railway Station lands

Review	Key Agencies	Stated goals	Timelines/$ $$ (where stated)	Related plans/ strategies	Progress to date
2.8 Extend the Eastern suburbs railway line		Link Bondi beach, high density, residential & tourist precinct, to City Rail network			Project abandoned due to rising costs, expected poor patronage levels and environmental issues.
					Funding announced for constructing a turnaround loop at Bondi Junction to speed up turnaround and increase services on Illawarra line instead. This would increase number of trains on Illawarra line from 14 to 18 an hour. This equals an increase in capacity of 6,000 passengers per hour.
					Annual passenger growth rates at Illawarra line stations since 1996 have been three times network wide growth. Annual growth for Sutherland has been 6 times the network-wide growth.
					The Bondi Junction Turnback was commissioned in April 2006, and in conjunction with the new Eastern Suburbs and Illawarra Timetable in May 2006, allowed Rail Corp to introduce a new morning peak service as well as an additional three services from Bondi Junction to the City. (RailCorp Annual Report 2005-6)
2.9 Construct the Homebush Bay rail loop	Make public transport the dominant form of transport to events at Homebush			New rail link	Line completed. Very successful during Olympics and other major events. Restrictions on parking and vehicle access important factor in encouraging public transport use and need to be retained. 2001 Easter Show, provided discounting parking, however, with parking costing as little as $10 per day. A family of four travelling from the suburbs would save $7 by driving rather than purchasing a Showlink ticket (SMH 6/4/01).
				Cross-regional bus services	
				Limited car parking	SOPA still promoting car parking and appears to be becoming dependent on revenue form parking. SOPA has conflicting revenue and public transport requirements with redevelopment.
				Integrated ticketing to events	In 2005 it was reported design, development and planning works were being undertaken for the $31 million new Homebush turnback. Once the project is completed the four services currently operating will no longer have to merge and operate on one line. The Homebush turnback is expected to be completed in 2008.

Review	Key Agencies	Stated goals	Timelines/ $ $$ (where stated)	Related plans/ strategies	Progress to date
A.3 Integrate light rail					
2.10 Integrate light rail		Integrating light rail into transport network		EIS re extension of central- Pyrmont route	Inner West Light Rail extended 3.1km in August 2000 linking Wentworth Park to Lilyfield.
					CBD extension shelved in 1998 due to opposition from retailers and building owners to route along Pitt St and Castlereagh St.
					Patronage on western extension to Lilyfield exceeded target of a million passengers in only the first year of operation.
					Patronage for entire system expected to be 4 million in 2001. Western extension has generated an additional 20,000 passenger trips per week.
					Metro Transport Sydney submitted its proposal to extend the current light rail network from Central Station to Circular Quay to the Department of Infrastructure, Planning and Natural Resources (DIPNR) in May 2004.
					The proposal includes two options for the extension route – one on George Street and one on Castlereagh Street, with Metro Transport Sydney preferring the George Street route. It also includes an interchange between buses and trams at Central Station, as well integrated ticketing with buses and trains.
					Construction would take 18 months and cost approximately $180 million, a combination of private and public investment. Construction was to begin immediately after the opening of the Cross City Tunnel, as it is thought the resultant reduction in traffic across the city will mean minimal inconvenience.
					DIPNR and Sydney City Council investigating CBD light rail options. In 2005 DIPNR employed Connell Wagner Pty Ltd to investigate Central Sydney Light Rail at the cost of $35,000. http://www.metrolightrail.com.au/news.asp#news130904
					State Government continues to resist CBD extension.
					EcoTransit Sydney proposes further extensions of the light rail network. Their 'Baylight West' proposal incorporates more inner western suburbs, including Broadway, Newtown, St Peters, the International Airport Terminal, Rockdale and Caringbah. Their 'Light Rail West' proposal includes Star City Casino, Balmain, Lilyfield, Leichhardt, Ashfield, Abbotsford, Drummoyne and Parramatta.
					EcoTransit's 'Baylight East' proposal for the Eastern suburbs would reduce the heavy reliance on cars and buses in Darlinghurst, Kensington and Randwick, La Perouse, Botany Bay, Kurnell and Cronulla, with an extension to Coogee Beach. http://www.ecotransit.org.au/
					The Parsons Brinckerhoff report, revealed through the freedom of information law, found light rail for a city centre link is practicable and beneficial. However the government continues to discard light rail as a viable option to reducing congestion and traffic on major inner city routes.

Review	Key Agencies	Stated goals	Timelines / $ $$ (where stated)	Related plans/ strategies	Progress to date
A.4 Improve public transport on roads					
2.11 Fund road-based public transport	RTA	To support greater modal share of road trips by public transport	1995-96 to 1998-99 $170m from RTA budget	'Public transport infrastructure improvement program' (PTIIP)	Response to Parry Inquiry and Unsworth Review included a new funding model for bus services as part of contract arrangements. $90 million allocated for period between 2005-06 and 2007-08 for bus priority measures as part of Unsworth reforms. In 2002-03, the RTA investigated and trialled a 'Public Transport Information and Priority System (PTIPS)', a system allowing real-time traffic signal priority for buses. http://www.rta.nsw.gov.au/publicationsstatisticsforms/downloads/rta_annual_report_2003.pdf The system uses roadside antennas (which read electronic tags on board buses) or Global Positioning Systems and radio data communications to detect the location of buses. It can then alter traffic signal timing to give buses priority. The same system may in future be linked to inform passengers at bus stops of the estimated time of arrival of a scheduled bus. This has been trialled on Sydney's Northern Beaches. http://www.rta.nsw.gov.au/trafficinformation/buses/ptips2.html In October 2007 the Minister for Transport announced that the system will be introduced on public buses by 2009 and private buses by 2011, five years after it was first announced. The T-Way network initiative along with the government's funding for the purchase of 505 new buses are positive examples of government funding for road based public transport. Further funding is still needed for essential development and improvement of road based public transport.
2.12 Implement the M2 public transport management plan	RTA DoT				M2 Public Transport Management Plan completed 1997. Included $1.6m upgrade of interchange at Epping Station completed in January 2000. Following review of plan after opening of M2 addition works were completed including: Upgrading of bus stops and shelters. Additional car parking at Barclay Road bus stop. Bus only lanes run along over half of the length of the M2 from Winter Road in Seven Hills to Epping Railway Station.

2.13 Implement the M5-East sub-regional air quality plan	RTA DOP DECC Dept of Health	Reduce 70% of vehicles from residential roads	$0.5m/yr for 5 yrs (RTA)	Transport plan for M5 east

NSW Parliament General Purpose Standing Committee Inquiry into M5 East Ventilation Stack recommended the development of the draft plan be completed by 30/6/00. Work began March 2001 with air pollution survey distributed to 3000 randomly selected households re car use, heating, lawn mowing etc.

RTA deleted consideration of modifications to the current stack that would allow heightening of the plume during worst case conditions and options for treatment of stack emissions from scope of plan.

The *M5-East Sub-regional Air Quality Plan* was published by Sinclair Knight Merz in April 2002. It provided an inventory of air pollutants and found mobile sources (ie mostly vehicles) contributed 89% of air pollution within 2km of the M5 East stack in summer and 63% in winter (due to higher no. of pollutants in winter).

Mobile sources accounted for 17% of total particulate emissions in summer, and 12% in winter in the area. Solid fuel heaters were also found to be significant contributors.

In June 2004, internal RTA documents tabled in NSW Parliament revealed carbon monoxide has been regularly pumped from the portals of the M5 East tunnel instead of its exhaust stack. This is despite approval conditions that vehicle emissions only be emitted from the tunnel's entrances and exits in extreme circumstances – eg. emergencies and major maintenance.

Also in June 2004, a NSW Health Department study claimed there was no evidence of short-term health impacts of particulate matter on residents living near the M5 stack. This is despite evidence a large number of residents are suffering health impacts from air pollution in the area, and recent studies demonstrating a link between particulate matter and heart attack.

The study in the *New England Journal of Medicine* (Oct 2004) showed an association "between exposure to traffic and the onset of a myocardial infarction within one hour afterward. In addition to these extremely short-term effects of particulate air pollution, its deleterious longer term effects on the entire gamut of atherosclerotic triggers cannot be overemphasized. Decades of epidemiologic evidence underscore the cardiovascular morbidity and mortality related to air pollution."

A *Review of Emission Treatment Technologies* for the M5 East freeway by Noel Child was commissioned by the RTA and released in November 2004, 10 months late. The delay had significant implications for both the M5 East and other new tunnels to be constructed without filtration. The report confirms technological solutions to the M5 East's worsening air pollution already exist. "Appropriately designed and installed electrostatic precipitation equipment is considered to have the potential to deliver improved ventilation and environmental performance". Likewise, "denitrification technology has been under development and trial in Japan during recent years. Two Japanese denitrification systems, provided by Matsushita and Kawasaki respectively, have been considered as part of this review."

In June 2006, the Minister for Roads announced a plan to improve air quality in the M5 East tunnel including Australia's first trial of air filtration technology. The air quality improvement plan includes:

12 additional jet fans. Video detection of smoky heavy vehicles. A new ventilation strategy including partial portal emissions. A trial for tunnel filtration technology.

The RTA announced a 'trial' to filter both particulate matter and NO₂ in the tunnel. The filtration trial will include two filtration plants (four times the capacity of the original trial) and is expected to cost $50 million over two financial years. The plants are expected to be operational in 12-15 months. There are concerns that this trial will only cause further delays, and will be costly, ineffective and unnecessary when proven technology already exists, especially given the fact that there is no certainty that it will produce noticeable improvement of in-tunnel air quality or achieve its own objectives.

Many of the above improvements to in-tunnel air quality will be achieved through the use of portal emissions, which have the potential to significantly harm air quality in the residential area around the tunnel portals.

Current data shows concentrations of NO2 are below the air quality goal (MUAP goal = 256 micrograms/m³). However, monitored PM₁₀ average concentration has exceeded the air quality goal on several occasions. There is also no monitoring of finer particles such as PM₂.₅ and PM₁ which have been proven to have adverse health impacts even at low concentrations.

2.14 Implement an extensive bus priority scheme	Develop a CBD bus priority scheme and establish transit lanes	PTIP Sydney CBD bus priority scheme	Transit lane on Victoria Road extended Bus priority works completed in 98/99 along Warringah Freeway/Falcon St, Crows Nest.

Annual package to give priority to buses and other high occupancy vehicles as part of RTA's Road-Based Public Transport Priority Program.

In May 2002 the NSW govt announced $45M funding over 3 years through RTA's Road-Based Public Transport Priority program to improve commuter bus access and encourage more use of public transport:

- RTA working with STA to support their Better Buses services strategies in Sydney and Newcastle.
- Bus priority lanes introduced in both directions for Parramatta Road from Balmain Road in Leichhardt, to Broadway.
- Investigating a new bus station on the Warringah Expressway approach to the Harbour Bridge.
- All bus lanes (excluding M2 Motorway bus lanes) have been coloured red to improve visibility and reduce illegal usage.
- Development of the Public Transport Information and Priority System (PTIPS) for traffic signal priority for buses with a trial underway on STA's Route 400 services (Bondi Junction to Burwood).
- Advertising undertaken to increase driver awareness of bus lanes.

The 75km network of bus lanes currently includes:
- Parramatta Road from Leichhardt to Broadway
- Warringah Freeway, North Sydney
- Military Road, Neutral Bay
- Oxford Street, Darlinghurst
- Moore Park
- M2 Motorway
- Sunnyholt Road, Blacktown
- Holker Street, Homebush Bay
- Elizabeth, George and York Streets, Sydney
- Burnt Bridge Creek Deviation & Manly Road, Balgowlah

43 strategic bus corridors have been identified across Sydney, linking Major Centres and Town Centres across the entire metropolitan area.

$235 million has been allocated for expenditure between 2005 and 2012 to improve bus priority on roads in these corridors. An additional $100 million has been allocated to improve bus time travel on Victoria Road.

Initiatives for increasing priority for buses include:
• bus and bus-only lanes and bus 'B' signals
• colouring all bus lanes red (except M2 motorway and T-ways bus routes)
• installing bus lane cameras to reduce illegal use by private motorists
• introducing more transit lanes, and
• installing a public transport priority traffic signal system that uses satellite technology.

http://www.transport.nsw.gov.au/abouttrans/fact-sheet-bus-priority.pdf

Review	Key Agencies	Stated goals	Timelines/$ $$ (where stated)	Related plans/ strategies	Progress to date
A.5 Improve transport management		Make public transport more attractive to consumers			
2.15 Improve services to the Eastern Suburbs		Implement bus priority plan		Eastern Distributor bus priority plan	Package of works for improved public transport associated with the Eastern Distributor including bus priority plan completed July 2000.

Moore Park Bus Station in Operation since 1999.

In July 2001 the $9 million Bondi Junction bus and rail interchange was completed and is working effectively. 50,000 bus passengers and 42,000 rail patrons use the terminal each weekday. Each bus arrives at a separate air-conditioned area where sliding doors, triggered by a transponder on the bus, allow passengers access.

A new express bus service from North Bondi to the City began operating in 2006, the cashless "Bondi Bendy" bus was a successful trial of 'pre-paid only' bus services. The Minister for Transport, John Watkins, said more than a million passengers had embraced cashless buses since the Bondi 333 service began, saving about 2500 hours at bus stops.

Patronage on the Bondi-to-city bus route, the most popular in Australia, has grown 4 per cent. |
| 2.16 Upgrade the Warringah Peninsula bus system | RTA | Develop a strategy to upgrade the existing bus system on the Warringah Peninsula | 5yr period | | Trial bus passenger information system, to display advice of bus arrival times at key locations, initially between Manly Vale and Mona Vale commissioned Nov 99. Completed works include bus bays on Spit Road.

Warringah 'Park and Ride' pilot trail at Mona Vale, Collaroy and Newport has resulted in increased patronage and services. To be assessed by Shore Regional Organisation of Councils.

'Park and Rides' running successfully.

The City of Cities Transport Strategy lacks detail for improving transport for the Lower North Shore and Warringah Peninsula, despite identifying housing and employment growth within these regions.

Bus reforms identified in the Unsworth Report include strategic route no. 16 Mona Vale to the City, however there are no specific details of funding to meet improved standards for bus stops and ferry wharfs.

The bus system at Warringah remains in need of upgrading to accommodate for increased traffic flow as population increases in the Peninsula. |

Review	Key Agencies	Stated goals	Timelines/ $$ (where stated)	Related plans/ strategies	Progress to date
2.17 Better integrated ticketing, especially in GWS	CityRail State Transit DoT	Improve integrated ticketing		Bus Plus	As mentioned above in 2.5, The Unsworth *Review of Bus Services in NSW*, helps to integrate the bus system in the GMR. Implementation is due to begin in Jan 2005.

The Review removes the current pricing inequity by raising public bus fares over a 5 year period to match private bus company fares. Pensioner Excursion Tickets will be rise from $1.10 to $2.50, but will be valid on a wider range of services including private buses and the outer boundaries of the CityRail network.

The Smartcard/Tcard system was suppose to integrate ticketing on rail, light rail, monorail, private and public buses and ferries and operate in the Sydney, Hunter and Illawarra regions, including Lithgow and Goulburn. The introduction of the card to most of Sydney's transport systems was initially intended in 2002. It was postponed and planned for 2005, with system to be fully operational by 2006. This has been followed by repeated delays and postponements:

- In 2005 Commuters told they would use the card by 2007.
- In 2006 Government renegotiated its contract with ERG.
- In June 2007 John Stott, the chief of the organisation set up to deliver the Tcard, the Public Transport Ticketing Corporation, retired and bus drivers pulled out of trial. Drivers at Kingsgrove depot voted to boycott the only trial of the travel smart card on State Transit buses because of machine failures and resultant distraction to drivers.

RailCorp's chief executive, Vince Graham, has demanded the removal of Tcard software from Ashfield station, the only station in the CityRail network where it has been installed. The request is under consideration by the government. (SMH 22/10/07).

Concerns were also expressed that introduction may require abolition of current multi-use tickets such as Travel Passes and weekly Rail Passes. This may result in significant fare increases. (SMH 11/10/07).

The future of the Tcard project is in doubt due to financial difficulties experienced by ERG the company developing the card. Transport Minister, John Watkins, has taken legal advice on whether the Government could safely terminate its contract with ERG, 4½ years after signing it. He had also issued written warnings to the ticketing corporation to end talks with ERG over proposals to speed up the introduction of the Tcard. (SMH 22/10/07).

ERG stated it had completed 73 per cent of the Sydney project and that commuter trials were "expected to complete in the first quarter of 2008".

As of October 2007 progress on the T-card continues to be slow. The official T-card website and the Government provide no information on when the integrated ticketing system and card will be ready to use. An email was sent asking for more details on the progress of the T-card introduction, however, no new information was given. www.**tcard**.com.au/ |

Review	Key Agencies	Stated goals	Timelines/$$ (where stated)	Related plans/ strategies	Progress to date
2.18 Improve transport information services	Public Transport Authority	Establish a comprehensive centralised phone information system covering all public transport modes, all providers & all Sydney regions			The *Public Transport Directory* only published once, due to lack of funding. The *Transport Infoline* (phone 131 500) and website http://www.131500.com.au/ are informative and useful.
A.6 Implement regional transport planning					*Shaping the Central Coast* released by DUAP (now DoP) in May 2000. Strategy proposes increased reliance on medium density in established centres, particularly in areas with good access to public transport
					As part of development of the *Metropolitan Strategy*, DIPNR, STA and the Australian Greenhouse Office funded a TravelSmart Pilot Project for Sydney and the Central Coast from July to October 2004.
					Households in Ermington and Woy Woy were contacted during the pilot and offered personalised public transport, walking or bike journey plans, and information on local activities and services such as car pooling to reduce reliance on private cars.
					The Pilot was to be evaluated and results were to be published in 2005, however they could not be found in the public domain.
					The Department of Planning Annual report states the TravelSmart voluntary travel behaviour change program was implemented, including finalizing evaluation of the TravelSmart Households Pilot project.
					The NSW Metropolitan Strategy website has a link to the TravelSmart project, as does the Department of Planning. However, both are defunct http://www.metrostrategy.nsw.gov.au/dev/ViewPage.action?siteNodeId=59&languageId=1&contentId=331 www.planning.nsw.gov.au/travelsmart/index.asp
2.21 Develop a settlement strategy for the Central Coast	DOP Local councils	Develop a settlement strategy for the Central Coast integrating land use and transport planning			An evaluation of the TravelSmart project in NSW was conducted by Institute of Transport and Logistics Studies, University of Sydney. The results of the evaluation show the project had a significant effect in decreasing vehicle kilometres of travel (by 18.5 percent in Ermington participating households, and 30 percent in Woy Woy participating households), although it does not appear to have affected significantly either the number of trips made, or public transport ridership.
					There is also no clear evidence of substantial changes in trip-making behaviour as a result of TravelSmart, although there appears to be an increase in walk and bicycle trips in Woy Woy.
					The results were reported to have suffered from the potential problems of seasonal difference, making the conclusions regarding

				the effects TravelSmart has had on people's travel behaviour somewhat unreliable.
				The Central Coast Regional Strategy outlines positive initiatives such as connecting the centres through improved connection of the region's centres via existing train services, improved local bus services, walking and cycling facilities. The strategy also aims to investigate other forms of regional public transport, subject to funding availability. Another welcomed initiative is concentrating more population in existing urban areas, focusing development around key public transport nodes and reducing the percentage of the workforce that commutes to Sydney to help reduce car dependency.
				However, it is essential that these initiatives be supported by detailed funding and implementation strategies. These details are lacking from the Strategy. http://www.planning.nsw.gov.au/plansforaction/pdf/draft_centralcoast_regionalstrategy.pdf
2.22 Develop a long-term strategy for improving transport in the Illawarra	Illawarra sub-committee of the metropolit an strategy committee	Evaluate options for improving transport in the region		Illawarra Subcommittee of the Metropolitan Strategy Committee launched *Illawarra's Action for Transport* March 99. Illawarra Regional Organisation of Councils has employed a Regional Transport Coordination and Development Officer based in Shoalhaven City Council and RTA to assist implementation. The plan contains 6 priority goals with 26 strategies and 130 actions.
				Goals and strategies aimed at increasing public transport use for journeys to work, school, shops, recreational destinations and through journeys as well as improving freight transport. Plan does not provide figures on funding of actions or timeframes. Performance indicators not completed for all strategies. Some strategies include road widening.
				The Regional Strategy for the Illawarra was released in 2006, one of the stated main aims is to: *"Ensure that existing and proposed transport corridors are protected to support freight transport and improve network efficiencies"* but improved public transport is scarcely mentioned. *"Land use planning is to consider transport access implications to minimise the need to travel, and encourage energy and resource efficiency"* However, there are no quantifiable targets, details for funding or implementation strategies to achieve stated objectives.
2.23 Prepare a Newcastle-Sydney corridor study	Dot RTA DOP	Develop an integrated package of land use and employment measures	State Infrastructure Strategy (2006) NSW Metropolitan Strategy (2005)	Sinclair Knight Merz Pty Ltd engaged to conduct study and develop a Central Coast Transport Action Plan. Draft plan was to be released in 2001. Feasibility study for Stage 1 of the Sydney - Newcastle High Speed Rail Link Upgrade has been completed. Stage 1 to Warnervale due to be completed 2007. Stage 2 to Newcastle due to be completed 2010. $19 million have been allocated to the Newcastle Rail Corridor upgrade, fund approved to 2006-2007. Regional Strategies for the Lower Hunter and Central have been developed under the *Metropolitan Strategy*.
2.24 Prepare a Penrith to Orange corridor integrated road and rail strategy	Penrith to Orange Transport Corridor Taskforce			Strategy mostly focussed on road upgrading. *Action for Transport* includes commitments for funding of road widening and overtaking lanes. Rail Access Corporation to improve reliability and on-time running of rail services across the Blue Mountains through track maintenance and enhancements.

Review	Key Agencies	Stated goals	Timelines/$ $$ (where stated)	Related plans/ strategies	Progress to date
Strategy B Provide for cycling and walking					
2.25 Improve government support for safer and more convenient bicycle use	RTA Local councils DoT SRA NSW police	Threefold increase in bicycle use 5% reduction in accidents $8m allocated for programs $12m/yr for design and maintenance of existing & new roads	By 2001 $5.5 m for cycleways program 3m within Sydney	Cycleways program, Bicycle facilities program, Bicycle user support program Bikeplan 2010	BikePlan 2010 lacks targets for increasing cycling.

Some major cycleways of the Sydney Bike Network were completed in 2001 such as the Anzac Bridge Cycleway, Parramatta-Liverpool Trail, Concord to CBD Cycleway and development of the Homebush Bay-Fairfield Cycleway. Local Government cycleways are being funded on a 50/50 basis and cycleway facilities are being included as part of road constructions such as Bexley to Mascot, Elizabeth drive, mimosa Road and the Parramatta-Liverpool Transitway. Cycleway maps for Sydney, Illawarra, Central Coast and Newcastle regions.

Work done to increase cycleways is undermined by continuing loss of cycling access and safety through roadworks unsympathetic to cycling. Requirements are needed that roadwork designs are to be sympathetic to cycling and increase opportunities for safe cycling.

The 2005 Household Travel Survey indicates annual growth over the period 1991-2005 of 1.2% and 4.8% for number of bicycle trips on weekdays and weekends respectively. As a percentage of trips, bicycle has held steady at 0.7% on weekdays and grown from 0.7% to 1.1% on weekends, over the same period.
http://www.transport.nsw.gov.au/tdc/documents/hts-report-2005.pdf

RTA has recently initiated a bicycle planning and implementation survey of all NSW councils, including surveying the Mayor, General Manager and Transport Planner. The survey, coordinated by the Australian Road Research Board (ARRB) will provide a clear picture of councils' achievement's and plans.

Major road projects continue without provisions for cyclists. Still waiting on construction of cycleways promised for M5 East motorway and Cross-city Tunnel. Lane Cove tunnel proceeding without cycleway.

During 2005-6 the RTA provided $3 million funding support to councils on a dollar for dollar basis, to develop and construct local cycleway networks. Ninety-six local bicycle network projects were funded at a total value of over $6 million.
Major cycleways completed were:

- Westlink M7 Motorway – A 40 kilometer long totally grade-separated shared path for cyclists and pedestrians.
- Lawrence Hargrave Drive – 2.5 meter wide shared path along the new Sea Cliff Bridge.
- RTA continued support for community group events that encourage greater use of cycling.

In 2007 shared use pedestrian/cycle paths were constructed on both sides of the M5 East, with a number of underpasses. As part of the Lane Cove Tunnel project and the reduction of car lanes on Epping Road, work has now commenced on the section of shared path along Epping Road between the Lane Cove River and the Pacific Highway. Under the contract this is scheduled for completion by end February 2008. Once this is finished there will a 7.5km path connecting the lower North Shore to the North Ryde area. There has been some opposition from motorists and the media, meaning that its completion is not assured – see http://www.advocacy.bikenorth.org.au/LCT/Epping%20Road.php.
The Anzac Bridge modifications carried out in 2006 maintained the cycleway and added a new shared-use pedestrian/bicycle |

bridge over Victoria Road at the intersection with the Crescent.

Dual travel-modes not encouraged – eg. cyclists still required to purchase a half price ticket for their bike in peak hour. This includes compact folding bikes. There is no space for bikes on the new Millennium trains, and Countrylink has a limit of 3 bikes per train.

The 2 year position of Cycle Strategist at DOP (jointly funded by RTA and DOP) was very effective at engaging with councils and in the development of Bicycle Guidelines. However, the position has recently lapsed and no move has been made to renew the position.

Research published in the *Health Promotion Journal of Australia* in 2004 found walking and cycling commuters "had significantly lower levels of exposure to benzene compared with car commuters and significantly lower levels of NO_2 than bus commuters." (Chertok et al) It is important that findings such as these are used by the government to address misconceptions about air pollutant exposure. There is a perception that travelling in an air-conditioned car means less exposure to pollutants, when in fact walking and cycling have been shown to cause the least exposure.

Other research in the *Health Promotion Journal of Australia* in Dec 2003 indicates a 53% increase in the proportion of Sydney resident commuters cycling for all or part of their journey to work. There was also an 18% rise in JTW by bike in the greater Sydney basin (incorporating Newcastle, Blue Mountains and Illawarra). The research compares 1996 and 2001 journey-to-work data from the ABS.

While the Government's Sydney Metropolitan Strategy promises improved cycling facilities, funding for cycling infrastructure and education has been reduced. This undermines the New South Wales Government's commitment to its Bike Plan 2010 and the outcomes that the community expects from the plan. Decisions such as removing cycle lanes on William Street and the M2 reflect a weak commitment to cycling

RTA counts show a 45% increase in bicycle traffic between 2002 and 2005 in Sydney's central business district. RTA data also shows significant increases in bicycle use on routes where bicycle infrastructure has improved. There is widespread criticism that the current Bike Plan 2010 has been ineffective. The Government needs to update this plan to increase the coverage and density of the regional network, and to ensure that planned cycle routes are based on cyclists' desired routes.

In April 2007 the *City of Sydney Cycle Strategy and Action Plan 2007-2017* was passed unanimously. The strategy aims to achieve an effective and accessible cycle network with major routes less than a five minutes easy ride from every residence. This coordinated network will be backed up by action on local streets to improve cycling safety and convenience, and will complement the RTA's regional routes and recreational routes, such as the Sydney Harbour cycleway and the planned Alexandra Canal path.

The plan includes strategies to increase community awareness about the benefits of cycling, improved network maintenance, better bicycle route signage, separating some cycle lanes from general traffic and new end-of-trip facilities, such as parking, storage, change and shower facilities. The strategy sets a target of increasing current cycle rates from 2 per cent of trips in Sydney to 10 per cent of all trips and 20 per cent of trips between 2 and 20 kilometres in the next 10 years.

The City's current capital works budget includes $1.25M to implement the Strategy, with a further $750,000 each year for the next three years. Additional funding will also be provided for cycling facilities through the City's street upgrade programs.

Full implementation of the strategy depends on the RTA completing regional cycle routes, and the City will be working cooperatively with the State Government to achieve the effective network envisaged by the plan.

Review	Key Agencies	Stated goals	Timelines/$ ($$ where stated)	Related plans/ strategies	Progress to date
2.26 Facilitate walking as a mode of transport	Shaping up Streets & Roads Taskforce, Local councils. RTA	Develop a pedestrian policy Recognising walking as a legitimate form of transport	Pedestrian strategy to be released 1999		Both *Road Safety 2010* and the *Pedestrian Safety Action Plan for 2002-2004* prepared by RTA, require whole-of-government implementation. Both have strong objectives and activities for improving pedestrian safety, but neither include dates for meeting targets. http://www.rta.nsw.gov.au/trafficinformation/downloads/pedestriansafety.pdf There are concerns that pedestrian crossings are being widely replaced with pedestrian refuges. This increases confusion and risk for pedestrians as there is no established norm for their use, and pedestrians no longer have the right of way where they once did. Refuges are often used in place of crossings to speed up traffic flow, especially at roundabouts. This is a big safety risk, particularly for elderly pedestrians and shows that vehicles still take precedence over pedestrian safety. Leichhardt 'Walk to School' or "walking bus" program: • Award-winning Forest Lodge pilot program completed. • Balmain Public School, the Montessori School, Fr John Therry Catholic School and the Annandale Cluster have since joined the program. In May 2006 the NSW Minister for Roads announced the Pedestrian Crossing Upgrade Program. This is a government funded state-wide program to upgrade pedestrian crossings across multi-lane roads to improve pedestrian and motorist safety. The Program will involve the upgrade of 59 pedestrian crossings over three years at a cost of $17 million. The sites were selected following a safety audit of 'zebra' crossings on multi-lane State-Government roads. Ten sites within the Sydney region have been identified for treatment during the 2006-2007 financial year. In 2005–06, the RTA pursued a number of initiatives to improve pedestrian access and safety. Facilities for pedestrians included: Pedestrian bridges at Canterbury and Wiley Park with construction underway at Yagoona and planning well advanced at Blakehurst; New and reconstructed pedestrian traffic signals including Milsons Point, Beverley Park, Gosford, Coffs Harbour, Horsley, Mount Ousley, North Wollongong, Unanderra, and Bathurst. Continued implementation of: Pedestrian crossings and refuges, additional audio-tactile push buttons to help vision-impaired pedestrians, kerb ramps and pedestrian fencing. The RTA helped local councils prepare Pedestrian Access and Mobility Plans (PAMPs). 72 PAMPs have been developed across the State, including seven completed during 2005–06. The RTA also continued supporting councils to implement these plans which enhance safety, convenience and mobility on links between public transport and other key centres of pedestrian movement.
Strategy C Change travel behaviour through education		Bring about a shift in community understanding of the health and environmental consequences of individual travel			

2.27 Continue to promote school and community education programs		choices			
	NRMA Clean Air 2000 Taskforce Nature Conservati on Council			Airwatch for schools City Savers resource kit Smogbusters Travel Smart Day	Public Transport Day held in 2000
					Some government support for Smogbusters day in March 2001.
					Travel Smart Day held annually.
					Clean Air 2000 defunct.
					SmogBusters is now defunct due to a withdrawal of Federal government funding
					Support provided for Bicycle NSW National Ride to Work Day.
	RTA				The RTA continued to reinforce safe pedestrian behaviour amongst parents, teachers and children through ongoing support of the Pedestrian Council of Australia initiative *Walk Safely to School Day*. The council held its annual event in April 2006, which the RTA funded $30,000.
					The RTA ran a number of ad campaigns encouraging drivers and pedestrians to 'watch out', and a number of educational campaigns to educate all road users regarding the correct use of pedestrian traffic control signals and pedestrian refuges.
					The STAYSAFE Committee established to investigate and report on road safety matters in New South Wales, including a review of countermeasures to reduce the incidence and severity of road crashes, and the monitoring of actions taken to address the social and economic consequences of road trauma. The last inquiry into Pedestrian Safety was conducted in 1999. The most recent inquiry into implementation of *Road Safety 2010* has some mention of pedestrian safety. It states the introduction of 50 km/h urban speed zones has resulted in up to a 20 per cent reduction in crashes on the relevant urban roads. "In 2006 so far there have been 14 fewer pedestrians killed for the same period last year".
					However, there is no report available on the effects of the campaigns.

OBJECTIVE 3 (see Table 3)

Objective 3 of *Action for Air* seeks to reduce exhaust and evaporative emissions for new and in-service cars, trucks and buses. Three strategies are provided to achieve this objective:

- Strategy A - Reduce car emissions,
- Strategy B – Reduce diesel vehicle emissions,
- Strategy C – promote cleaner fuels.

With emissions from cars responsible for about half of Sydney's air pollution in summer, Strategy A, to reduce emissions from cars, has the potential to deliver major air quality improvements, particularly if coupled with reductions in VKT. Detailed analysis of progress is presented in Table 3.

Strategy A – reduce car emissions

Since *Action for Air* was introduced development of emission standards for new cars (Action 3.1) has been addressed on a national basis with cooperation between the Commonwealth, State and Territory governments. There has been good progress in setting tighter emission standards for new cars and heavy vehicles. However, the turnover of vehicles in Australia is traditionally slow, limiting the realisation of benefits from cleaner vehicle technology. To encourage the sale and purchase of cleaner vehicles, the NSW government introduced the Cleaner Vehicles Action Plan in 2002, a five-point plan, which was only partially implemented. A key feature of this plan which has not been implemented is the introduction of stamp duty incentives to favour the purchase of vehicles with better environmental performance. This initiative was announced by Premier Bob Carr at the 2002 Clean Air Forum.

Augmentation of the smoky vehicle enforcement program (Action 3.2) appears to have been successful in reducing the number of smoky vehicles, as evidenced by a reduction in complaints and EPA survey work. The success of this program, however, is overshadowed by the abject failure to implement an inspection and maintenance program to identify and require repair of high polluting in-service vehicles as promised in Action 3.3. So far only the first phase of expanding testing facilities at Botany and Penrith has been completed. Phase 2, a network of twenty privately operated facilities was due to be introduced in 2000 to test passenger and light commercial vehicles in the Sydney region. As yet no sites have been selected or tenders called for these stations and the program appears to have been abandoned.

There has been good progress in reducing the volatility of petrol over summer (Action 3.4). As fuel evaporates more readily in hot weather, reductions in volatility as measured by Reid Vapour Pressure (RVP) are only necessary over summer. Progress in reducing the volatility of petrol over summer (from 75 kPa to 70 kPa in 98-99 and 67 kPa in 99-00) is estimated to have reduced hydrocarbon emissions by 35 tonnes per day in the summer of 98-99 and a further 7 tonnes per day in the summer of 99-00. The limit has now been set at 62 kPa for unblended fuel. This limit was achieved in 2004-5. While progress has generally been good it is behind the schedule outlined in *Action for Air* which foreshadowed reaching this level in 2000-01. The original MoU between the EPA and industry also foreshadowed a limit of 57 kPa.

Reducing the sulfur content of petrol (Action 3.5) is now covered under national strategies through the Fuel Quality Standards Act 2000. This has set clear goals for reducing sulfur content in petrol. Progress to date has been on schedule.

Diesel vehicles make a disproportionate contribution to emissions of fine particles and NO_x. Despite accounting for only 15% of VKT in Sydney, diesel vehicles produce up to 80% of total suspended particulate (TSP) emissions from vehicles. Inhalation of fine particles (those under 10μm or less in diameter, referred to as PM_{10}) has been closely associated with health effects. These include increased mortality from cardiovascular and respiratory diseases, increased hospital admissions for chronic obstructive pulmonary disease and heart disease, reduced lung function in asthmatic children and increased respiratory symptoms in school children.

The disproportionate contribution of diesel vehicles to fine particle and NO_x emissions is set to increase in the future. In 1995 diesel vehicles comprised 8.3% of the national vehicle fleet. This is expected to grow to at least 15% by 2015. Distance travelled by the Australian diesel fleet is expected to increase 134% nationally and at least 146% in metropolitan areas so that in 2015 diesels will constitute 22% of total VKT.

Result - good

Strategy B – reduce diesel vehicle emissions

Reducing diesel vehicle emissions as set out in Strategy B is thus a high priority for improving air quality.

Development of tighter national emission standards for heavy duty diesel vehicles (Action 3.6) has proceeded through Australian Design Rules (ADRs). This has seen the adoption of Euro 4 standards as of 2007, with Euro 5 standards to take effect by 2010.

Development of a diesel NEPM (Action 3.7) has occurred at a federal level through the National Environment Protection Council (NEPC) which includes state governments. The diesel NEPM was introduced in 2001. It includes in-service standards and strategies to meet those standards. The value of the proposed measure has been diminished, however, by the decision of the NEPC to exclude fuel standards from the proposed measure. Improving fuel standards is an essential element in reducing emissions from diesel vehicles as changes to fuel composition are needed to maximise the effectiveness of emission control technology.

A review of the NEPM has identified the need to improve monitoring and reporting on compliance and evaluation techniques.

Development of a diesel inspection and maintenance program (Action 3.8) has been supplanted by the diesel NEPM. This has included research into aspects of in service diesel emission testing.

Good progress has been made on reducing emissions from the State bus fleet through the application of new technology (Action 3.9); however this has not been without a brief setback. Prior to the Olympics more than 250 Compressed Natural Gas (CNG) fuelled buses were purchased. CNG powered vehicles produce lower emissions of particulates and other smog precursors than diesels. They also produce less CO_2.

In June 2004 NSW State Transit ended its commitment to purchase CNG buses and returned to purchasing diesel engines as they were marginally cheaper to run due to federal changes in fuel excise.

This was a significant step backwards which - in the first stage of its implementation - was likely to cost the community at least $4.4 million in health costs from particulate matter alone, with oxides of nitrogen costing an additional $1.3 million.

However this decision has since been reversed with State Transit again purchasing CNG buses. This will involve the purchase of 255 CNG buses. In addition, 250 Euro 5 buses will be purchased for use in areas which lack CNG refueling facilities. It is also proposed to retrofit existing diesel buses to reduce emissions.

There has been modest progress on research to identify effective emission control technology (Action 3.10). A project funded by the EPA, RTA and Sydney Buses examined a range of options for reducing emissions. The results of this project were published in a 1999 report. This program is now being pursued with local councils and has included trials of biodiesel vehicles by Camden and Newcastle Councils. It is not clear, however, to what extent the results of this research have been applied to reducing emissions from in service diesel vehicles on a wider scale.

Result - good

Strategy C – promote cleaner fuels

Implementation of Strategy C, to promote cleaner fuels, appears to have progressed relatively well.

State Government participation in the Western Sydney Natural Gas Vehicle project has assisted Liverpool Council with conversion to CNG vehicles. Liverpool Council was the first Australian fleet to commit to100% CNG. The Western Sydney Regional Organisation of Councils established a CNG group to expand the trial beyond Liverpool. Blacktown and Parramatta Councils have participated in this trial.

The Western Sydney Natural Gas Vehicle Taskforce is also working to establish refuelling infrastructure for CNG vehicles in Western Sydney. A CNG station has opened at Moorebank with others under development at Arndell Park and Granville. Another station is proposed for Blacktown.

At present the main barrier to increased CNG use is the lack of refuelling facilities, however, the development of these facilities is dependent on government assistance and increased commitment to CNG vehicles by local government. Promoting increased use of CNG by local government would assist in the development of such facilities. This would make use of CNG vehicles more attractive for private sector operators.

Result - good

Recommendations

1. Provide an immediate commitment to implement phase 2 of the inspection and maintenance program for in-service vehicles promised in Action 3.3. Issue a call for tenders and select sites for the network of twenty privately run testing facilities. Provide a clear timetable for the commissioning of these facilities and progression to phase 3, expansion to lower Hunter and Wollongong.

. Continue progress in reducing petrol volatility in summer toward reaching target of 57kPa for unblended fuel.

3. Press for inclusion of fuel standards in diesel NEPM. Support amendment of the NEPM to improve monitoring and reporting.

4. Fast track development and implementation of an inspection and maintenance program for in-service diesel vehicles.

5. Promote increased use of CNG vehicles by local government. Provide funding and insistence for development of more CNG refuelling infrastructure.

Objective 3. Make cars, trucks and buses cleaner

"Objective: To reduce exhaust and evaporative emissions from new and in-service cars, trucks and busses".

TEC Action for Air Review Table 3

Review	Key Agencies	Stated goals	Timelines/ $$$ (where stated)	Related plans/ strategies	progress to date
Strategy A. Reduce car emissions					
3.1 Advocate tighter national emission standards for new cars	National Working Group reviewing Australian Design Rule (ADR) 37/01 DECC	Further reductions in CO, ROCs, NOx & greenhouse gases (GGs) Implementation of California Low Emission Vehicle Standards	New standards to come into effect from 2003, if agreed to nationally.		In 2001 Commonwealth began review of Australian design standards for new vehicles. NSW sought Australian standards similar to overseas standards. New standards for Petrol vehicles as set by Commonwealth: • Euro 2 standard in 2003/04 • Euro 3 standard in 2005/06 New standards and cleaner fuels (for petrol and diesel vehicles) are expected to reduce emissions of hydrocarbons by 26-27%, CO by 75- 77%, NO_x by 71% and PM_{10} between 2000 and 2020. Lead and sulfur emissions are forecast to fall by 93% and 84% respectively in the same period. Emissions of air toxics (eg benzene) are expected to fall by 50-70%. At 2001 the fuel efficiency of Australian vehicle fleet was at bottom of the list for OECD countries with national average fuel consumption of 8.9L/100km. With virtually no improvement in vehicle fuel efficiency over the previous 7 years. Good progress has been made with the Commonwealth government's implementation of national emissions standards under the *Motor Vehicle Standards Act*: • ADR 30/01 Smoke Emission Control for Diesel Vehicles applied to all new diesel vehicles from 2002 and all models from 2003 • ADR 79/00 Emission Control for Light Vehicles (3.5 tonnes or less) implements the 'Euro 2' exhaust and evaporative emissions standards for light vehicles. Applied to all new diesel models from 2002 and all models from 2003. Applied to all new petrol, LPG and natural gas vehicles from 2003 and all vehicles from 2004. ADR 79/01 Emission Control for Light Vehicles (3.5 tonnes or less) Implements the 'Euro 3' and 'Euro 4' exhaust and evaporative emissions standards for light vehicles. Will apply 'Euro 4' standards to all new diesel models on 1 Jan 2006 and all models from 2007. Will apply the 'Euro 3' standard to all new petrol, LPG and natural gas vehicles from 2005 and all vehicles from 2006. http://www.dotars.gov.au/mve/new_adrs.htm However, the turnover of vehicles in Australia is traditionally slow, and has limited the realisation of benefits from cleaner vehicle technology. To encourage the sale and purchase of cleaner vehicles, the NSW government introduced the Cleaner Vehicles Action Plan in 2002, a five-point plan, which was only partially implemented and includes: Clean Car Benchmarks Environmental performance standards for new light vehicles to identify the cleanest cars available – released in May 2003

Stamp duty as an environmental incentive

New vehicles to be assessed on their environmental performance and pay stamp duty accordingly. This initiative was announced by the former Premier Bob Carr at the 2001 Clean Air Forum, however it has not been implemented. The stamp duty incentive scheme is central to the plan as it provides an economic advantage to less polluting vehicles, failure to implement it is a serious set back to the success of Cleaner Vehicles Action Plan.

Greener NSW Government fleet program

Government agencies are required to establish fleet improvement plans with targets for reductions in greenhouse gas emissions and fuel consumption. The Auditor General's Report asserts these targets have not been met, although some agencies have made progress, and that compliance and reporting by government agencies could be improved.

Voluntary clean fleet program

Encourages voluntary maintenance programs and the purchase of cleaner vehicles for large fleets. The implementation of an emission testing and maintenance program for light petrol powered vehicles has not progressed. The RTA however offers free voluntary emission testing at its Botany and Penrith facilities.

Consumer Green Guide

A green vehicle guide, covering cars and light trucks has been developed.

DOTARS provides the information on purchasing cleaner vehicles with the *Green Vehicle Guide*. It rates the environmental performance of new vehicles sold in Australia, including comparisons of greenhouse and air pollution emissions. It is made available at http://www.greenvehicleguide.gov.au, as well as on the Dept of Environment and Conservation (NSW) website: http://www.epa.nsw.gov.au/air/gvgscores.htm

With regard to cleaner fuels, the Commonwealth government enacted the *Fuel Quality Standards Act 2000* and established environmental standards for petrol and diesel (see also 3.5 below). Significant emission reductions are expected as a result. In Sydney from 2002 to 2020, emissions of VOCs from motor vehicles are expected to decrease by 46%, NOx by 67%, CO by 75% and PM₁₀ by 40%.

http://www.ephc.gov.au/pdf/Air_Quality_NEPM/Monitoring2002/nsw_2002_air_nepm_report.pdf

Two revised ADRs have come into recent effect:

- ADR 79/01 for new model light vehicles commenced in 2005.
- ADR 80/00 emission control for heavy vehicles commenced January 2003.
- ADR79/00 sets Euro 2 emissions standards for light duty diesel vehicles (from 2003 these standards applied for petrol, Liquefied Petroleum Gas (LPG) and Natural Gas (NG) vehicles).
- ADR 80/00 sets Euro 3 emissions standards, for diesel, LPG and NG medium and heavy diesel vehicles.

More stringent emission control standards followed:

- ADR 79/01 for all light vehicles commenced in 2006.
- ADR 80/01 for heavy vehicles commenced in 2006

Despite the phasing in of stricter standards and significant emission reductions, greenhouse gas emissions from road transport will continue to grow ; PM₂.₅ (particulate matter smaller than 2.5 micrometer diameter) will remain a serious health concern; and concentrations of ozone will not comply with national goals (NSW Auditor General's report 2005)

Review	Key Agencies	Stated goals	Timelines/$$$ (where stated)	Related plans/strat egies	Progress to date
3.2 Augment the smoky vehicle enforcement program	DECC RTA	Identify smoky vehicles as a priority target for Inspection Maintenance Program (1/M)		Smoky Vehicle Enforcement Program	In 1998-99 over 1000 reports from the public on smoky vehicles received by EPA (now DECC) pollution line each month. EPA issued 2,916 warning letters to private vehicle owners and 2,838 infringement notices to private and commercial vehicle owners in1998-99. Drop in complaints resulted in 20% decrease in warning letters issued during 1998-99. EPA survey work confirms a drop in number of smoky vehicles.

RTA vehicle inspectors trained in 1997-98 to observe and report smoky vehicles.

In 2001–02, the EPA received 7,171 notifications about smoky vehicles from the public and over 2,050 penalty infringement notices (PINs) and 2,940 warning letters were issued.

http://www.environment.nsw.gov.au/soe2003/chapter2/print_chp_2.4.htm

As of 2006 DEC (now DECC) Environment Line receiving about 400 smoky vehicle reports per month with approx 1000 Penalty Infringement Notices issued each year.

Therefore the number of complaints and infringement notices has been declining since 1998-99, however it is not possible to determine whether the number of smoky vehicles actually declined, or reporting itself has declined (or both).

Diesel vehicles made up a large proportion of smoky vehicles reported in 2001-02, with 1,896 of the infringement notices issued to diesel vehicle owners.

http://www.ephc.gov.au/pdf/Air_Quality_NEPM/Monitoring2002/nsw_2002_air_nepm_report.pdf

In NSW, the Protection of the Environment Operations (Clean Air) Regulation 2002 provides the regulatory basis for action to address emissions from the in-service diesel fleet. Specifically, the Regulation prohibits excessive visible smoke emissions from vehicles and tampering with emission control equipment.

NSW RTA has successfully trialed the use of remote sensing in conjunction with cameras in a road tunnel to identify smoky vehicles. This allowed follow up action to seek repair to the vehicles and also improved the local air quality within the tunnel.

In the review of the NEPM (Diesel vehicle emissions), Schedule A (1) Guideline on Smoky Vehicle Programs was assessed, it was concluded that the [program is effective however, it would benefit from further research and its reporting could be improved through specifying particular information to be annually reported by governments. It is also noted that these programs are most effective when supported by legislation and should target older vehicles or the light commercial segment.

http://www.ephc.gov.au/pdf/diesel/Review_Report_DieselNEPM_April2007.pdf |

3.3 Implement an inspection and maintenance program for in-service vehicles	RTA	Implement I/M program to reduce emissions from high polluting vehicles	Begin 1998	Phase 1 (target high polluting vehicles eg modified and smoky vehicles in Sydney region by expanding 2 RTA testing facilities and random inspections) launched in 1998 with facilities at Botany and Penrith.
		Phase 1 (target high polluting vehicles eg modified and smoky vehicles in Sydney region by expanding 2 RTA testing facilities and random inspections) to begin mid-1998		Phase 2 and 3 not implemented. *Action for Air 2006 Update* claims cost would not justify benefits, however no figures provided on expected cost or potential emission reductions.
		Phase 2 (testing of passenger and light commercial vehicles in Sydney region through network of 20 privately operated testing facilities) during 2000		
		Phase 3 (extend testing program to lower Hunter and Wollongong) in 2004		
3.4 Reduce petrol volatility in summer		Lower emissions from vehicles, lawn mowers, fuel storage facilities & service stations by reducing Reid Vapour Pressure (RVP)	Reduce volatility to 70 kPa 98-99, 67 kPa 99-00 and 62kPa 00-01	Annual review program	Reductions in volatility reduced hydrocarbon emissions by 35 tonnes per day in 1998-99 (due to reduction in RVP from 75.5 kPa to 67.5 kPa) and a further 7 tonnes per day in 1999-00. 98% of Petrol sold in GMR complying with agreed lower volatility limits.

Between 15th November & 15th March from 1997-98 to 2003

Memo of Understanding (MoU) with oil industry

Phased reductions in RVP

Unannounced audits of petrol stations examined complied with requirements for fuel vapour recovery.

During the summers of 2002-03, the EPA analysed petrol sampled at Sydney service stations. Of the samples taken in Dec 2002, 60% met the target agreed in the previous year's MoU. In February 2003, over 70% of samples met that limit. http://www.environment.nsw.gov.au/resources/ar03review1.pdf

However, oil industry support for the introduction of legislation meant the MoU was replaced in June 2004 by the *Protection of the Environment Operations (Clean Air) Amendment Regulation 2004*, aimed at reducing petrol volatility over the summer period (15th November to 15th March).

The regulation requires specified petrol suppliers to report on, and keep records of, the benzene content of petrol supplied in NSW from 1 July 2004.

It also requires these petrol suppliers to comply with limits on the volatility of petrol supplied in the Sydney, Lower Hunter and Illawarra regions during the summer period, and to keep records and make reports to the EPA regarding petrol volatility.

Limits on volatility are:
Prescribed blended petrol
- 72 kPa for petrol supplied in summer 2004; or
- 71 kPa for petrol supplied in any subsequent summer

Any other petrol
- 65 kPa for petrol supplied in summer 2004; or

Review	Key Agencies	Stated goals	Timelines/$$$ (where stated)	Related plans/strategies	Progress to date
3.5 Investigate merits of reducing sulfur content in petrol	DECC/ Oil Industry Technical Committee	Evaluate environmental benefits compared to economic impacts & feasibility for Australian Oil refineries			http://www.ephc.gov.au/pdf/diesel/Review_Report_DieselNEPM_April2007.pdf http://www.environment.gov.au/atmosphere/fuelquality/standards/petrol/index.html 50 mg/kg by 1 Jan 2008 150 mg/kg by 1 Jan 2005 500 mg/kg by 31 Dec 2002 Fuel Standard (Petrol) Determination commenced on 1 Jan 2002 limits sulfur content to: permissible sulfur limit further decreased to 50 ppm. A final step to just 10 ppm is expected in 2009. Progress has been on time; In 2002, sulfur in diesel was capped at 500 parts per million (ppm). In January 2006, the http://www.deh.gov.au/atmosphere/cleaner-fuels/petrol-diesel/index.html 10 mg/kg by 1 Jan 2009 50 mg/kg by 1 Jan 2006 500 mg/kg by 31 Dec 2002 Under the Act, the Fuel Standard (Diesel) Determination 2001 commenced on 1 Jan 2002 and limits sulfur content to: The standards regulate the quality of petrol and diesel fuels sold in Australia to control vehicle emissions. The *Fuel Quality Standards Act 2000* commenced in December 2001, with the first standards made under the Act in force on 1 Jan 2002. Mechanisms for implementation of new fuel standards being established at the national level under the Fuel Quality Standards Act 2000 (commenced Dec 01). Adoption of Euro 2, 3 and 4 standards established a diesel standard for road transport fuel with a sulfur content limit of 500ppm by end 2002 and 50ppm by 2006. Petrol standards equivalent to Euro 3 due 2005 and limit sulfur in petrol to 150ppm. Original MoU between EPA and industry foreshadowed target of 57 kPa. lower limit will be examined. of any Australian urban air shed). The regulatory requirement was to be reviewed again in 2007, when the possibility of a Petrol volatility for the Greater Metropolitan Region from the 2004–05 summer was set at a limit of 62 kilopascals (the lowest These reductions in volatility were important improvements yet remained behind the schedule outlined in *Action for Air* – i.e. to reduce volatility to 62kPa in 2000–01. http://www.environment.nsw.gov.au/legal/whatsnew.htm - 64 kPa for petrol supplied in any subsequent summer

Strategy B. Reduce diesel vehicle emissions	Review	Key Agencies	Stated goals	Timelines/$$$ (where stated)	Related plans/strategies	Progress to date
Reduce emissions from diesel vehicles	3.6 Advocate tighter national emission standards for heavy-duty diesel vehicles	National Environment Protection Council (NEPC) DECC/ Oil Industry Technical Committee EPA/Oil Industry Technical Committee to investigate feasibility, cost and effectiveness of low-sulphur diesel fuel	Support national review through Australian Design Rule (ADR) 70 of the Euro II standards	Euro 2 standards to be phased in from 2000, if agreed to nationally		In 2001 Commonwealth began review of Australian design standards for new vehicles. NSW sought Australian standards similar to overseas standards. New diesel vehicle standards as set by Commonwealth: 2002/3 Adoption of Euro 2 for light duty diesels and Euro 3 for medium and heavy duty diesels. 2006/07 Euro 4 for all diesels. New standards and cleaner fuels (for petrol and diesel vehicles) are expected to reduce emissions of hydrocarbons by 26-27%, CO by 75-77%, NO_x by 71% and PM_{10} between 2000 and 2020. Lead and sulfur emissions are forecast to fall by 93% and 84% respectively in the same period. Emissions of air toxics are expected to fall by 50-70%. Prior to being supplied to Australian market new diesel vehicles are certified as complying with Australian Design Rule (ADR) 70/00. Tests used to determine emission performance in accordance with ADR 70/00 are unsuitable for measuring performance in real world conditions. Australia is lagging behind international standards in regulating heavy-duty diesel vehicles. 2001 standards were equivalent to 1991 USA standards, 1992 European Standards and 1993 Japanese standards. Slow turnover of diesel fleet in Australia means that there will be a considerable time lag before new standards deliver air quality benefits. The National Environment Protection Council (NEPC) introduced the *National Environment Protection (Diesel Vehicle Emissions) Measure* on 29 June 2001. The Measure aims to manage emissions from in-service diesel vehicles and provides guidance for jurisdictions in developing programs for inspection and maintenance, retrofits and the problems of smoky vehicles. Diesel vehicle emission standards are also addressed in ADR 30/01 - Smoke Emission Control for Diesel Vehicles, which applied to all new diesel vehicles from 1 Jan 2002 and all models from 2003. However, analysis indicates diesel vehicles are increasing as a proportion of the total Australian vehicle fleet, with older vehicles (up to 16years) significantly contributing to total VKT in metropolitan areas. In March 2003, diesel vehicles accounted for 8.86% of the fleet and this is expected to increase to 15% by 2015. Over this time diesel vehicle travel in metropolitan areas is also expected to increase by 146%. http://www.ephc.gov.au/nepms/diesel/diesel_intro.html The use of diesel vehicles is forecast to double by 2020. From 2007, Euro 5 will become the minimum standard, with Euro 5 taking effect from 2010. Comparable US and Japanese standards are also accepted under these ADRs. There have been similar changes for light diesel vehicles, with ADR79/00 adopting Euro 2 for diesels from 2002, and ADR79/01 adopting Euro 4 for diesels from 2006. The introduction of ADR79/00, ADR80/00 and later standards will significantly reduce the emission levels from diesel vehicles over the longer term

Review	Key Agencies	Stated goals	Timelines/$$$ (where stated)	Related plans/strategies	Progress to date
3.7 Develop a national diesel environment protection measure	NEPC	Develop a comprehensive national diesel measure			NEPC decided in 19/9/00 to initiate drafting of National Environment Protection Measure (NEPM) for diesel vehicle emissions. Discussion paper scope and content of proposed measure released November 2000. Proposed measure included In-service Standards and In-service Strategies to meet standards. NEPC decided in Dec 2000 to exclude fuel standards from the proposed NEPM. This will reduce effectiveness of NEPM as changes to composition of diesel fuel are needed to ensure effectiveness of control technology. NEPC agreed to make the *Environment Protection (Diesel Vehicle Emissions) Measure 29 June 2001*. June 2006, the NEPC initiated a review of the National Environment Protection (Diesel Vehicle Emissions) Measure In June 2007, NEPC accepted the Report on the Review of the Diesel NEPM and its recommendations. Several recommendations were made that indicate implementation has had mixed success. There is a need to improve the performance of monitoring and reporting on compliance and evaluation techniques. NEPC has requested that a proposal for the scope, timeline and budget for varying the NEPM be prepared for its meeting in late 2007. If NEPC adopts the proposal, the formal process for varying a NEPM will begin. This process will include seeking public comment on a draft variation. Importance of the diesel NEPM is demonstrated by the fact that diesel vehicles are making an increasing contribution to overall vehicle emissions. Diesel vehicles comprised 8.3% of total national vehicle fleet in 1995. This is predicted to grow to at least 15% by 2015. Distance travelled by the Aust diesel fleet expected to increase by at least 134% nationally and by at least 146% in metropolitan areas by 2015 when it will constitute 22% of the distance travelled by all vehicles. Older Vehicles up to 16 years of age continue to contribute significantly to the total distance travelled in metropolitan areas. Diesel vehicles make a disproportionate contribution to emissions of fine particles and NOx. In Sydney diesels produce up to 80% of Total Suspended Particulates (TSP) emissions but account for only 15% of VKT.
3.8 Design an inspection and maintenance program for diesels		Develop an I/M program for diesel vehicles		Smoky Vehicle Enforcement Program	No program in place at state level. Has been supplanted by Diesel NEPM. Development of the NEPM by the NEPC included a research program relating to aspects of in-service diesel emissions over the last two years as part of development of Diesel Vehicles Emission NEPM. Test method identified and trialled to determine cost benefit of repairs to high polluting vehicles. National Road Transport Commission developing in-service diesel standard to which NEPM relates. Australian Transport Council to make decision on standards for in-service diesels by mid August. In 2002 the RTA developed an *Audited Maintenance Program* for diesel vehicles. The DT80 test was developed to test opacity, particulate matter and oxides of nitrogen in diesel emissions. RTA tested emissions from 2,000 trucks and buses in a voluntary program with private and government fleets. Vehicles with the worst performance were repaired and retested showing an average exhaust emission reduction of 25%. This identified maintenance practices for reducing emissions, showing regular vehicle maintenance to be the most cost-effective. Maintenance guidelines were developed and are now being tested on volunteer fleets. The RTA also worked with TAFE NSW to develop a diesel emissions training course, to be made available electronically

Review	Key Agencies	Stated goals	Timelines/$$$ (where stated)	Related plans/strategies	Progress to date
					during 2004. A CD-ROM is being developed to enable the information to be distributed more broadly. http://www.rta.nsw.gov.au/environment/airquality/vehicleemissions/reducingdieselemissions.html The Environmental Protection and Heritage Council's (EPHC) 2007 review of the Diesel NEPM found that Schedule A (2) Guideline on Diesel Vehicle Emission Testing and Repair Programs has been effective, but changes are required to keep the program up to date, such as: Standards for DT80 test need review Test equipment and procedures need to be updated A simplified test to quickly identify poor performing vehicles is required In assessing the effectiveness of Schedule A (3) Audited Maintenance Programs for Diesel Vehicles, the review team concluded the schedule is effective.
3.9 **Ensure cutting edge emission technology for the state bus fleet**	STA	Ensure the State bus fleet is as clean as possible	Phase 1 from 1997 Phase 2 over the next 5 yrs	Phase 1. New diesel buses meet the Euro II standards Phase 2. Purchase an additional 300 natural gas-fuelled buses	104 compressed natural gas (CNG) buses in STA in early 2000. 150 more added prior to Olympics. In June 2004 NSW State Transit ended its commitment to purchase CNG buses and returned to purchasing diesel engines as they were marginally cheaper to run due to federal changes in fuel excise. This was a significant step backwards which - in the first stage of its implementation - was likely to cost the community at least $4.4 million in health costs from particulate matter alone, with oxides of nitrogen costing an additional $1.3 million. However this decision has since been reversed with State Transit again purchasing CNG buses. In April 2006, State Transit signed a $250 million contract with Custom Coaches to replace more than a quarter of its bus fleet over the next five years. The 505 new buses will include a 250/255 split of Euro 5 Volvo diesel buses and CNG Mercedes buses. New diesel buses are required on some routes as some depots lack CNG refuelling facilities. Also announced retrofit program for existing diesel buses to reduce emissions. At 30 June 2006, State Transit's bus fleet of 1927 comprised of: • 404 CNG powered buses (21% of the fleet), • 190 buses with Euro 3 diesel engines (10% of the fleet), and • 594 buses that comply with the Euro 3 emission standard (31% of the fleet). In the 2005/06 financial year 77 new buses were added to the State Transit fleet (STA, 2006) http://www.sta.nsw.gov.au/commonpdfs/report/2006/2006_annual_report.pdf

	Agencies	(where stated)	plans/strategies	
Strategy C. Promote cleaner fuels				
3.10 Support research to identify effective emission control strategies	DECC RTA Sydney Buses Local councils Fleet owners	Reduce emissions from existing buses & other heavy-duty diesel vehicles		EPA (now DECC), RTA and STA contributed funding and resources to investigate options to reduce emissions from buses and heavy-duty vehicles. Study considered engine servicing, catalytic converters, Euro 2 design, low sulfur diesel, and CNG. Report released June 1999 and available from EPA library. *Action for Air 2006 Update* states this is now being pursued through partnerships with councils and cites example of trial of biodiesel vehicles by Camden and Newcastle Councils. Progress thus appears relatively modest and limited to pilot programs. RTA convened Future Vehicle Roundtable 26 June 2007 to discuss developments in vehicle technology.
3.11 Participate in western Sydney natural gas vehicle project	Western Sydney Natural Gas Vehicle Taskforce consisting of: Liverpool Council NRMA Clean Air 2000 Planet Ark Australian Natural Gas Vehicles Council WSROC University of Western Sydney Australian Greenhouse Office	Promote the benefits of a regional compressed natural gas infrastructure		Liverpool City Council first Australian fleet to commit to 100% use of CNG. Also requires CNG to be used as fuel by major contractors eg garbage collection. RTA contributed total of $75,000 over 3 years to assist Liverpool Council. Also provided project manager for the Western Sydney Natural Gas Vehicle Project. CNG service station opened in Moorebank in 1998. Further refuelling stations being developed at Arndell Park and Granville. It is proposed to establish new station in Blacktown. WSROC established Local Government CNG group to expand CNG trial beyond Liverpool Council. Blacktown and Parramatta Councils have begun trial. Blacktown Council acquiring 9 CNG garbage trucks. Main barrier to increased CNG vehicle use is lack of supporting infrastructure i.e. refuelling. However there is resistance to developing infrastructure without greater commitment to expand CNG fleets. Government has role in promoting infrastructure. Liverpool Council is committed to implementing CNG in its fleet but has run into difficulties. A stakeholder group was formed to analyse and overcome the barriers faced in the use of CNG from 1998 to 2003. Stakeholders include: Liverpool, Blacktown and Waverley Councils, AGL, a consultant, 2 compression equipment suppliers, STA and RTA. Barriers to CNG use were identified as: • Difficulty in getting CNG on-site and lack of public refuelling infrastructure. • Lack of public refuelling infrastructure means vehicles have no re-sale value at the end of their life in council. • Lack of interest from vehicle manufacturers. • Only 16 trucks currently in Australia – of which 6 are undergoing controlled trials with the manufacturer (Isuzu) • Car manufactures do not show any interest in CNG here in Australia • Use of CNG in trucks is feasible with dedicated engines, but duel fuel cars are overloaded when carrying 4 passengers and fitted with a second fuel tank so are not practical. • Limited fuel excise and government grants are crucial to getting CNG and the appropriate infrastructure off the ground. Progress has been made in trying to overcome these barriers, with the aim to convert the fleet by 2010 wherever possible.

Review	Key Agencies	Stated goals	Timelines/$$$ (where stated)	Related plans/strategies	Progress to date
3.12 Develop a cleaner transport fuels and technology strategy	Premier's Dept AGL Australian Natural Gas Vehicles Council NRMA CSIRO	Develop a strategic framework for the adoption of cleaner fuels & technologies	By July 1998	Southern Sydney Regional Organisation of Councils Greenhouse Strategy NSW Cleaner Vehicles Action Plan	The NSW 'Cleaner Vehicles Action Plan' announced by the Premier in 2001 and additional measures announced in 2004. The plan includes a package of initiatives which aim to improve air quality in NSW and reduce fuel consumption, oil dependence and greenhouse gas emissions by developing the market for cleaner new motor vehicles (See Action 3.1). In June 2007 *Biofuel (Ethanol Content) Bill 2007* was passed. The object of this Bill is to mandate a minimum 2% ethanol content for total petrol sales in NSW by requiring primary wholesalers of petrol to ensure that ethanol comprises at least 2% of the volume of all petrol sold by them.
					Action for Air 2006 Update states project completed. There thus appears to be no further impetus to increasing use of CNG vehicle or overcoming barriers identified in project.
					Manufacturers are now interested in using the methodology developed by the stakeholder group. Plans are underway for importing/delivering more vehicles for trial in Gosford and Waverley Council.

OBJECTIVE 4 (see Table 4)

Objective 4 of *Action for Air* targets emissions from both major industrial sources and smaller commercial premises.

Strategy A – reduce industrial emissions

Strategy A targets reduction of emissions from major industrial sources. In 1992 these sources were responsible for 11% of ROCs, 14% of NO_x and 33% of particles in the Sydney Region. It was concluded that reduction strategies in the 1980s had been successful in controlling emissions of ROCs from large industrial sources. The potential for worsening smog as a result of substantial growth in NO_x emissions from new industry in Western Sydney, however, was identified as a major concern. Consequently Strategy A concentrates most heavily on reducing emissions of NO_x from industrial sources.

In general the regulatory and administrative actions in Strategy A of Objective 4 have been implemented. These include the revised clean air regulation, load based licensing and protection of the environment operations legislation (Actions 4.1, 4.2 & 4.4). Each of these Actions has been completed although some of the measures were introduced one year later than the mid 1998 timetable specified in *Action for Air*. Load Based Licensing fees have recently been doubled for large polluters, addressing the fact that fees were initially too low to encourage substantial NO_x emission reductions (Ancey & Betz, 2006).

The Cleaner Industry Unit of the EPA (now DECC) promised in Action 4.3 was established in 1997 and completed the Cleaner Production Strategy as well as a number of partnership projects with industry and local councils. The Government provided $5M extra funding to Cleaner Production Program to strengthen compliance programs, promote waste and pollution reduction, fund research and provide grants to individual companies.

Other aspects of Strategy A have not been implemented as successfully. The development of a NO_x trading scheme (Action 4.5) which was due to commence in the 1999-2000 financial year is no longer being pursued. It is claimed that the benefits of developing a NO_x trading scheme are outweighed by the costs (DECC, 2006a), however, this claim has not been adequately justified.

There has been some progress on the enhancement of leak detection and repair programs at petrochemical facilities (Action 4.6) with an 11% reduction in fugitive emissions from Quenos at Botany Industrial Park. Caltex has also undertaken work to identify and address fugitive emissions. Further reductions are a matter for licence conditions.

Progress on Action 4.7 to negotiate reductions in ROCs emissions from major industry sources through licence conditions has been limited. Seventy eight industries were identified where programs may result in ROCs emissions reductions. There does not, however, appear to have been any action taken to introduce such programs. However changes to load based licensing may assist in this respect.

Result - average

Strategy B – develop cost effective approaches for small businesses

Strategy B seeks to achieve reductions in ROCs emissions from small commercial premises in the most cost effective manner.

There appears to have been some progress on implementing this strategy, however, effectiveness is difficult to assess. A major problem is the lack of any figures on actual reductions in ROCs emissions as a result of these initiatives. *Action for Air* claimed that a code of practice for printing premises (Action 4.8) could reduce emissions by over 2,800 tonnes per year. This code of practice has not been produced. Instead the Cleaner Industry Unit has produced an environmental guideline and is participating in the development of a national code of practice. In November 2006 an Environmental Action Plan for the printing industry was released. This action plan was part of a series of guides prepared by the DECC and aims to provide information for businesses on improving their environmental performance.

Improved housekeeping practices for auto repair workshops and surface-coating facilities (Action 4.9) were touted as having the potential to reduce ROC emissions in the GMR by over 4,000 tonnes per year. Guidelines have been produced under the small business solutions to pollution program, however, their effectiveness is unclear. In 2006 the DECC developed a Local Government Air Quality Toolkit, which aims to provide councils with the means to better assess and control potential air pollution sources in their local region. Part of that is 'Visual guide: Inspecting a suburban auto repair shop', which assist councils to identify air pollution sources within local Auto repair shops.

A petrol-vapour recovery unit has been installed at the Parramatta Rail Gantry as promised in Action 4.10. It was estimated that this would reduce ROCs emissions by 310 tonnes, however no figures are available on the success of the unit in recovering vapour.

A major new initiative, not originally included in *Action for Air*, is the recently announced plan for introducing Stage 2 vapour recovery controls at metropolitan petrol stations. In July 2007 DECC announced a proposal to extend VR1 to all petrol stations in metropolitan Newcastle, Wollongong, Central Coast and Sydney with a throughput of 600,000 litres or more per year. Full implementation is due by 2010. VR2 is to be required for existing petrol stations in the Sydney metropolitan area with a throughput of 3 million litres or more per year and new/refurbished stations with throughput of 500,000 litres or more per year. Implementation is to be staged from 2010 to 2016. VR2 will be required at service stations with throughput in excess of 12 million litres/year by 2010, at service stations with throughput of between 6 and 12 million litres/year by 2013 and at service stations with throughput of

between 3 and 6 million litres by 2016. New and refurbished stations with throughput greater than 500,000 litres/year are to comply from 2008.

This will represent a major contribution to reducing VOC emissions, however, not extending VR2 requirements outside the Sydney metropolitan region and exempting smaller service stations reduces effectiveness.

Result - average

Recommendations

1. Finalise framework for NO_x emissions trading scheme, complete consultation and introduce scheme. Provide regular reports on progress of the scheme.

2. Provide figures on reductions in ROC emissions achieved so far as a result of Actions 4.8 - 4.10.

3. Extend Stage 2 vapour recovery requirements to areas outside the Sydney metropolitan region and to smaller service stations.

Objective 4. Promote cleaner business

"Objective: To improve the regulation of industrial emissions that contribute to air pollution".

TEC Action for Air Review Table 4

Review	Key Agencies	Stated goals	Timelines/$$ (where stated)	Related plans/ strategies	Progress to date
Strategy A. Reduce industrial emissions		Control of NOx emissions from industry			
4.1 Implement revised clean air regulation 1997	DECC; National Health and Medical Research Council	Implement performance based (load based (LBL)) licensing system	During 1998	Trading schemes	Implemented in 1997 and replaced by the Protection of the Environment Operations (Clean Air) Regulation in 2002. Reviewed in 2004-05 and amendments incorporated into Protection of the Environment Operations (Clean Air) Regulation.
					Applies to emitters of scheduled pollutants.
					Same regulations throughout all regions of NSW.
					Self-monitoring by industry plus DECC auditors.
4.2 Implement load-based licensing (LBL)	DECC	LBL system	Mid-1998 begins phased implementation		Came into effect July 1999.
					Licence specific limit; fee is deterrent, cannot increase load through extra payment Assessment from July 1999 to June 2000. Fees commence middle of 2001. Fees in two parts: a) Administration and is dependent on size of operation b) load calculation protocol
					Program of offsets; fee can be reduced through reuse of emissions or improved practices. The system was introduced gradually, and the "pollutant fee unit value" was incrementally increased every year from zero in 2000 to $35 in 2003.
					Results from analysis conducted and published in 2006 using econometric methods suggests that overall, the fee rates were set too low to warrant substantial reduction in NOx emissions. (Ancev, T. and Betz, R. Load-Based Licensing: Getting the rates right, at the 35th Australian Conference of Economics (ACE) 25th-27th September 2006, Perth, WA. [pdf] 2006).
					In June 2007 the minister for the environment announced a doubling of the annual load based licensing fees for companies considered to be large polluters.
					Greenhouse gas emission reduction benchmarks for NSW electricity retailers introduced 1 January 2003. Targets set for abating greenhouse gas emissions from electricity generation and use for period 2003-1012. Penalty of $10.50 per tonne CO_2 applies to emissions above the benchmark.
					While this scheme is a positive step there are also serious flaws that need to be addressed. It does not measure absolute emissions so even though reductions are claimed actual emissions are still rising.

Review	Key Agencies	Stated goals	Timelines/$$ (where stated)	Related plans/ strategies	Progress to date
					On 11 June 2005 the NSW Government announced targets for reductions in carbon emission to year 2000 levels by 2025 and a 60% reduction by 2050. These targets are, however, aspirational only and lack interim goals and timelines.
4.3 Establish a cleaner industry unit in the EPA	DECC	Industry to put in place environmental management systems		State Cleaner Production Strategy	Cleaner Industry Unit established 1997, consolidated 1998. Unit produced State Cleaner Production Strategy called *Future with Cleaner Production*. Guide for industry on how to adopt cleaner production.
					Between November 1998 and March 2001, partnership projects with industry and local councils have generated a series of 13 information packages for small business.
					CIU facilitated project with Printing Industries Association of Australia to research products containing reduced or no ROCs. Also worked with Furnishing Industry Association of Australia to reduce solvent use.
					The Cleaner Production Industry Partnership Program provided $5 million for businesses and industry associations to develop cleaner production initiatives which: - minimise waste and pollution; and - minimise the use of raw materials, water and energy.
					There is no new information. Program seems to have been completed but the informational resources for businesses remain available.
4.4 Implement the protection of the environment operations legislation	DECC Local councils	Protection of the Environment Operations Act 1997	July 1998		Act came into effect 1 July 1999.
					Prosecutions to be listed in EPA annual report.
					EPA (now DECC) conducted survey of 177 Councils and 200 Industry licenses to determine effectiveness of communicating requirements to stakeholders.40% of Councils and 60% of licenses responded. Industry and Councils generally understand new requirements.
					Protection of the Environment Operations (Clean Air) Regulation 2002
					The Protection of the Environment Operations Amendment Act 2005 ('Amendment Act') was passed by Parliament and assented to on 24 November 2005.
4.5 Develop a framework to control NOx emissions in the GMR	DECC	Progressively reduce emissions to achieve a long-term cap at 1998 licensing levels	Begins 1999-2000 financial year	Capping total NOx emissions and setting up a trading scheme within a cap National Greenhouse Strategy	Assessment of NOx levels & movement within the air-shed during 1998 with a view to devising a cap level for implementation in 2003.
					Long term cap of NOx at 1998 levels no longer being pursued. New approach is to manage emissions of NOx and VOCs from licensed sources within the Sydney, Hunter and Illawarra air sheds. DECC claims this will achieve more at lower cost.

Review	Key Agencies	Stated goals	Timelines/$$ (where stated)	Related plans/ strategies	Progress to date
4.6 Enhance leak-detection and repair programs at petrochemical facilities	DECC	A program to reduce emissions of ROCs by improving leak-detection and repair			Pollution reductions Programs in EPA (now DECC) license conditions for Basell, Shell, Caltex and Qenos required them to report to EPA on mechanisms put in place to recapture fugitive emissions. EPA advised in 2001 that Caltex had commenced assessing components (eg valves & flanges) and emissions to prioritise sources and a program for each leakage source. Shell identified most sources of fugitive emissions within refinery and commenced studies to reduce them. Qenos identified emissions and implemented specific programs. Since 1998, fugitive emissions from Botany Industrial Park were reduced by approx 11%, while production increased 7%. Further reductions in fugitive emissions covered by licence conditions.
4.7 Negotiate reductions in ROCs emissions from major industry sources through licence conditions	DECC			Improved storage tank operations / Improved waste water treatment / Technical process modifications	78 industries were identified, where programs may result in gains in ROC emissions reductions. EPA (now DECC) developed survey to assess industries' baseline performance and establish priorities. "Subsequent negotiations with individual premises may result in the introduction of pollution reduction programs to encourage cleaner product design". No figures of any negotiated reductions provided.
Strategy B. Develop cost-effective approaches for small business		Reduce ROC emissions in the most cost effective manner		Improved transfer efficiency and use of waterborne coatings	Now covered by load based licensing and pollution reduction programs.
4.8 Implement staged code of practice for commercial printing premises	DECC Printing Assoc of Australia Australian Flexographic Technical Association of Local councils	Code of practice adopting low ROC's or ROC free coatings for premises emitting 35 t/yr of ROC's	Phase 1 begins 2000 Phase 2 begins 2003 Phase 3 Begins 2006	Small Business Solutions to Pollution Program Phase 1. Improved housekeeping measures Phase 2. Installation of incineration devices and some conversion to water based adhesives Phase 3. Installation of control equipment	Code of practice not developed. Printing Industry promoting VOC reduction scheme embodied in European Commission directive of 11 Mar1999 to apply nationally. Commonwealth Department of Environment and Heritage (DEH) commenced work to develop a national code of practice. EPA (now DECC) chose to participate in this process. Draft National Code of Practice abandoned due to lack of support from Victoria which has its own licencing scheme. Cleaner Industries Unit (CIU) of the EPA (now DECC) facilitated project with Printing Industries Assoc of Australia to research products containing reduced or no ROCs. Environmental guideline developed with Reducing Solvent use in the Printing Industry released in 1999. In November 2006 an Environmental action plan for the printing industry was released. This action plan was part of a series of guides prepared by the DECC and aims to provide information for businesses on improving their environmental performance. Priority actions suggested to reduce VOCs and improve air quality include: changing printing process to one that uses fewer or no solvents, such as waterless printing • using low VOC ink, such as soy-based or water-based ink • Using solvents efficiently – training staff to use the least amount • installing efficient blanket washing systems that use the least amount of blanket wash • using a solvent recycling system However, these are only recommendations and lack regulatory backing.

Review	Key Agencies	Stated goals	Timelines/$$ (where stated)	Related plans/ strategies	Progress to date
4.9 Improve housekeeping practices in auto repair shops and surface-coating premises	EPA Local council	Implement guidelines & information campaign to improve practices	In 1998	Small Business Solutions to Pollution Program	Small business solutions to pollution program has resulted in guidelines for individual business areas e.g. Auto repair, released in 1998. Available by phone or from the internet (PDF) Includes the following documents: 'Solutions to Pollution for Auto Servicing and Mechanical Repairers', an 'Air Quality Management' Information sheet etc. http://www.environment.nsw.gov.au/small_business/autoservicing.htm Information campaign by peak industry bodies in each sector. In 2006 the DECC developed a Local Government Air Quality Toolkit, which aims to provide councils with the means to better assess and control potential air pollution sources in their local region. Part of that is Visual guide: Inspecting a suburban auto repair shop', which assist councils to identify air pollution sources within local Auto repair shops. http://www.environment.nsw.gov.au/resources/vgauto07268.pdf
4.10 Install petrol vapour recovery units at rail-loading gantries	DECC	Install activated carbon vapour recovery unit on the Parramatta Rail Gantry	In 1998		Vapour recovery unit installed at Parramatta rail loading gantry but no extension to other areas.
New Initiative: Install Stage 2 Vapour recover controls at metropolitan petrol stations	DECC				Stage 1 Vapour recovery (VR1) units were introduced in Sydney in 1985. In 2002 vehicle refuelling accounted for 3% of total anthropogenic VOC emissions, growth in VOC emissions are expected to increase by 1.5% per annum to 2020. Installation of stage 2 vapour recovery would reduce VOC emissions from petrol stations by 90%. Stage 2 vapour recovery (VR2) controls were trialled at selected petrol dispensing sites in Blacktown and Gosford Council areas for a one year period. The trial was funded by the NSW Environment Trust and DECC (NSW). It is estimated adoption of stage 2 Vapour Recovery across the Sydney region would reduce emissions of VOGs by approximately 4KT per year, which represents a significant reduction in emissions of ozone precursors. Economic analysis suggests Stage 2 vapour recovery would deliver a net benefit to society through avoided ozone related health cost. http://www.environment.nsw.gov.au/resources/stage2vrtpaper.pdf Stage two vapour recovery is compulsory in most US states and throughout the European Union. Australia is more than a decade being the rest of the developed nations in controlling VOC emissions from petrol stations. In July 2007 DECC announced proposal to extend VR1 to all petrol stations in metropolitan Newcastle, Wollongong, Central Coast and Sydney with a throughput of 600,000 litres or more per year. Full implementation due by 2010. VR2 to be required for existing petrol stations in the Sydney metropolitan area with a throughput of 3 million litres or more per year and new/refurbished stations with throughput of 500,000 litres or more per year. Implementation to be staged from 2010 to 2016.

VR2 required at service stations with throughput in excess of 12 million litres/year by 2010, at service stations with throughput of between 6 and 12 million litres/year by 2013 and at service stations with throughput of between 3 and 6 million litres by 2016. New and refurbished stations with throughput greater than 500,000 litres/year to comply from 2008.

This will represent a major contribution to reducing VOC emissions, however, not extending VR2 requirements outside the Sydney metropolitan region and exempting smaller service stations reduces effectiveness.

OBJECTIVE 5 (see table 5)

Objective 5 of *Action for Air* is divided into two separate strategies: reducing emissions from solid fuel heaters (Strategy A) and improving the energy efficiency of homes (Strategy B).

Strategy A – reduce emissions from solid-fuel heaters

Action for Air acknowledges that domestic solid fuel heaters are a significant source of fine-particle pollution as well as carbon monoxide, semi-volatile organic compounds (including carcinogenic polycyclic aromatic hydrocarbons), oxides of nitrogen and reactive organic compounds (i.e. benzene, aldehydes, phenols and organic acids).

There has been solid progress on some aspects of reducing emissions from solid fuel heaters (Table 5), however, much more needs to be done to fully implement *Action for Air* commitments and achieve greater improvements in winter air quality.

The effectiveness of requirements that new heaters meet more stringent emission standards (Action 5.1) and education campaigns to improve the installation and operation of solid fuel heaters (Actions 5.2 - 5.4) is limited by the continued operation of old, inefficient wood heaters in many homes. This is reflected by the results of the 2004 National Wood Heater Audit Program which showed significant levels of non-compliance with Australian standards.

An incentive scheme for owners of old heaters to convert to certified wood heaters or gas or electricity has the potential to produce substantial improvements in air quality. The Clean Air Fund was a 3 year program established in 2001 to reduce air pollution from small commercial/industrial and domestic sources. The Wood smoke Reduction Program introduced in 2002 was extended in 2003 to include three extra regional councils. The program incorporated education, enforcement and cash incentives for residents of nine regional towns to replace old wood heaters and open fireplaces with cleaner alternatives.

Councils involved were: Armidale, Orange, Cooma, Tumut, Lithgow, Blue Mountains, Goulburn, Wagga Wagga and Wingecarribee. A total of 1,209 wood heaters were removed and/or replaced by June 2003.

A woodsmoke reduction program conducted over winters of 2002-2004 provided financial assistance to councils for education and enforcement.

Result - average

Strategy B – improve energy efficiency of homes

Strategy B, to improve the energy efficiency of homes, appears to have been the most successfully implemented component of *Action for Air*. The Sustainable Energy Development Authority's (SEDA) implementation of the "Energy Smart Homes" program (Action 5.5) has resulted in 60 councils (accounting for 72.9% of residential development applications) agreeing to implement the program. SEDA has since been absorbed into the Department of Water and Energy and the Energy Smart Homes Program has been superseded by the introduction of BASIX - the Building Sustainability Index in July 2004.

BASIX is a web-based planning tool for assessing the performance of new homes against a range of proposed sustainability indices: Landscape, Stormwater, Water, Thermal Comfort and Energy.

The first stage of BASIX focussed on reducing Water and Energy use. New residential development in nominated local government areas must be designed and built to use 40% less drinking-quality water, and 40% less greenhouse gas emissions (except for higher density which is 25% for greenhouse). It is estimated that by 2014/15 BASIX will save 800,000 tonnes of carbon emissions each year.

A recent addition is the inclusion of all renovations and improvements over $50,000 in the BASIX scheme. This helps address the problem of existing housing stock having poor energy efficiency. This has also been assisted by the availability of rebates for solar hot water systems and certain appliances.

An area that requires attention is emissions from small engines such as lawn mowers, outboard motors and hand held equipment. These are a significant and growing source of emissions. The EPA (now DECC) formed a Small Engines Working Group to examine options for addressing this problem. Two discussion papers were released for comment regarding:

- lawn mowers and garden 'tractors'
- hand held equipment eg string trimmers, leaf blowers and chainsaws
- outboard engines and jet skis.

This is now being pursued on a national basis and a Small Engine Working Party is chaired by the Commonwealth and includes NSW, Victoria, WA and

QLD environment agency representatives.

The EPHC Standing Committee has agreed that a cost benefit analysis be conducted of national regulatory approaches to manage emissions from petrol lawn mowers, handheld power equipment and outboard engines. It is anticipated that the project will be completed by March 2008.

The outboard engine industry has launched a Voluntary Emissions Labelling Scheme; however, this approach has been largely ineffective.

Result - good

Recommendations:

1. Continue efforts to replace old wood burning heaters with cleaner options

2. Develop guidelines for wood suppliers including requirements to provide information on wood sources and ensure that wood is properly seasoned and dried.

3. Urgently pursue the development of national emission standards for small petrol engines.

Objective 5. Promote cleaner homes

"Objective: To maximise home energy efficiency and reduce emissions of fine particles and ROCs from domestic fuel consumption."

TEC Action for Air Review Table 5

Review	Key Agencies	Stated goals	Timelines/SSS (where stated)	Related plans/ strategies	Progress to date
Strategy A. Reduce emissions from solid-fuel heaters	DECC	Reducing emissions from solid fuel heaters		Air pollution from solid fuel heaters	
5.1 Ensure compliance with the clean air regulations	DECC	Ensure new solid fuel heaters comply with emission standards			Amendments to the Clean Air (Domestic Solid Fuel Heaters) Regulation 1997 required that new wood heaters sold from July 2001 meet emission standards that are 25% more stringent than previous standards.

For the last row (5.1), the Progress to date column continues:

Australian Home Heating Association (AHHA) supplies certified heaters to approximately 80% of the market.

The Clean Air (Domestic Solid Fuel Heaters) Regulation 1997 was replaced by Part 2 of the *Protection of the Environment Operations (Clean Air) Regulation 2002*, stipulating as before that slow combustion domestic solid fuel heaters sold in NSW must meet 'Australian Standard AS/NZS 4013:1999: Domestic solid fuel burning appliances - method for determination of flue gas emission.'

Each heater must have a certificate of compliance certifying that the heater model has been tested in accordance with the Australian Standard and each heater must be marked accordingly.
http://www.environment.nsw.gov.au/woodsmoke/poeoca.htm

This emission standard remains 25% more efficient than previous standards. (i.e. the maximum allowed emission from new wood heaters is 4.0 grams of particulate matter for each kilogram of wood burnt.)
http://www.deh.gov.au/atmosphere/airquality/woodsmoke/standards.html

In 2004, **National Wood heater Audit Program** tested for emissions performance under AS/NZS 4013 conditions of popular Australian models were purchased from retailers, compared with their certified emissions values.

Results from the Program showed that the extent of non-compliance was significant:
- 58% (7 out of 12) of wood heaters failed to meet AS/NZ 4013 particle emission limits
- 55% (26 out of 47) of wood heaters had one or more serious design faults that could affect performance
- 72% (34 out of 47) of wood heaters had one or more labelling faults that could affect emissions performance

Governments and the wood heater industry agreed on the National Wood heater Audit Program Action Plan with the aim of significantly improving compliance. Key elements of the Action Plan are:
- improvements to AS/NZS certification test procedures;
- a follow-up audit program to test all certified wood heater models; and
- anti-tampering provisions to discourage modifications to wood heaters being made.

Review	Key Agencies	Stated goals	Timelines/SSS (where stated)	Related plans/strategies	Progress to date
5.2 Develop a code of practice for installation of heaters	DECC Local councils Australian Home Heating Assoc (AHHA)	Development of a comprehensive industry code of practice	Early 98	Environmental Guidelines: Selecting, Installing and Operating Domestic Solid Fuel Heaters	EPA (now DECC) released *Environmental Guidelines: Selecting, installing and Operating Domestic Solid Fuel Heaters* in August 1999 but AHHA advises code of practice not finalised. A new Australian Standard for the installation of wood heaters (AS/NZS 2918(2001)): Domestic solid fuel burning appliances - Installation) has been developed to advise on the proper siting and installation of wood heaters. A wood heater resource handbook (HB 170(2002)): Wood Heating Resource Handbook Guide to the Selection, Installation and Operation of Wood Heaters) has been published to support the implementation of this Standard.
5.3 Conduct a community education program on using wood heaters	DECC Local councils	Guidelines for wood suppliers Regulatory action by councils Incentives to upgrade to certified wood heaters, gas or electricity		Guideline Selecting, Installing and Operating Solid Fuel Heaters *Is your wood going up in smoke?* brochure	EPA (now DECC) published Environmental Guideline *Selecting, Installing and Operating Solid Fuel Heaters*, in August 1999 and brochure *Is your wood going up in smoke?* Brochure explains ways of minimising smoke emissions. The *Clean Air Fund* was a 3 year program established in 2001 to reduce air pollution from small commercial/industrial and domestic sources. The *Wood smoke Reduction Program* introduced in 2002 was extended in 2003 to include three extra regional towns to replace old wood heaters and open fireplaces with cleaner alternatives. Councils involved were: Armidale, Orange, Cooma, Tumut, Lithgow, Blue Mountains, Goulburn, Wagga Wagga and Wingecarribee. 1,209 wood heaters were removed and/or replaced by June 2003. Woodsmoke reduction program conducted over winters of 2002-2004 provided financial assistance to councils for education and enforcement. Local councils have power under the *Protection of the Environment Operations Act* to take action against excessive smoke from wood heaters. They can also limit or ban the installation of wood heaters in new homes under NSW planning legislation. http://www.ephc.gov.au/pdf/annrep_02_03/127_133_App_6_AAQ_NSW.pdf
5.4 Continue voluntary don't light tonight campaign	DECC Local councils	Reduce wood smoke emissions on cold and still nights			Voluntary *Don't Light Tonight* Campaign continuing with education warning of poor weather conditions for solid fuel heaters eg temperature inversions conducted until 2002. Replaced by Woodsmoke Reduction Program. *No Burn* notices and *Don't Light Tonight Unless Your Heaters Right* alerts are still issued from time to time during the winter months, as part of the Regional Pollution Index on the DEC NSW website: http://www.epa.nsw.gov.au/airqual/aqupd.asp.

Review	Key Agencies	Stated goals	Timelines/SSS (where stated)	Related plans/ strategies	Progress to date
Strategy B. Improve energy efficiency of homes		Reduce emissions from pollutants			
		Minimise burning of fossil fuels			
		Encourage renewable sources of energy			
		Reduce GHG emissions		Minimum energy performance standards (MEPS) conducted by DoE post 1999	
5.5 Implement the energy smart homes program (ESHP)	DECC DWE Local council	60% building approvals (BA's) granted for new homes to have 'minimum' Energy Performance Rating (EPR)	Mid-1997 to 2002	Energy Smart Homes program	65 signed MoUs with SEDA to implement ESHP, this amounted to 76% of residential development approvals (DAs).
					DUAP introduced SEPP 60 for Exempt and Complying Development (Gazetted 3 March 2000). SEPP 60 required 3.5 Star NatHERS rating for complying residential development.
		90% of new homes & 70% of retrofits with a BA will have an 'improved' EPR	6m over 3 yrs	Green Power Scheme	SEDA no longer exists, and has been absorbed into the Department of Water and Energy. Energy Smart Homes Program has been superseded by the introduction of *BASIX - the Building Sustainability Index* in July 2004.
				Energy Smart Homes Make-Over	BASIX is a web-based planning tool for assessing the performance of new homes against a range of sustainability indices: Landscape, Stormwater, Water, Thermal Comfort and Energy.
		Introduce an energy efficiency housing policy into 50 local councils covering 80% of new homes & alterations			The first stage of BASIX focussed on reducing Water and Energy use. New residential development in nominated local government areas must be designed and built to use 40% less drinking-quality water and produce 25% less greenhouse gas emissions (40% by 2006) than average NSW homes of the same type.
					From July 2006, the next stage of BASIX scheme came into affect. New development applications for freestanding homes are required to meet a new 40 per cent energy reduction target.
					It is estimated that by 2014/15 BASIX will save 800,000 tones of carbon emissions each year. Another addition is the inclusion of all renovations and improvements over $50,000 in the BASIX scheme.
					Rebates for solar hot water build on efforts to improve the energy efficiency of existing housing stock.

New initiative: Small Engines Working Group	Reduce emissions from small engines, particularly conventional two stroke engines	DEC NSW formed a Small Engines Working Group to encourage the uptake of cleaner small engines (two and four stroke cycle) in NSW. Two discussion papers were released for comment regarding: - lawn mowers and garden 'tractors' - hand held equipment eg string trimmers, leaf blowers and chainsaws - outboard engines and jet skis A Working Party has been established to consider management options to reduce emissions from small engines. This project, initiated by NSW, has been taken up at a national level. The Small Engine Working Party is chaired by the Commonwealth and includes NSW, Victoria, WA and Qld environment agency representatives. The EPHC Standing Committee has agreed that a cost benefit analysis be conducted of national regulatory approaches to manage emissions from petrol lawn mowers, handheld power equipment and outboard engines. The outboard engine industry has launched a Voluntary Emissions Labelling Scheme. This Scheme is be enhanced through a Memorandum of Understanding with industry. However, this approach has been largely ineffective. It is anticipated that the project will be completed by March 2008.

OBJECTIVE 6 (see Table 6)

Strategy A – manage the impact of open burning

As noted in *Action for Air*, the introduction of the Clean Air (Control of Burning) Regulation 1995, prohibiting backyard burning in the Sydney and Wollongong metropolitan regions, has seen major reductions in pollution from open burning in recent years. This was enhanced with the introduction of the Protection of the Environment Operations (Control of Burning) Regulation 2000, which replaced the 1995 regulation on 1 September 2000. A total of 93 councils are now listed in Schedule 1 of the regulation, prohibiting or tightly restricting all open burning.

Educating the community on the effect of these restrictions is an essential part of reducing the impact of open burning. In recognition of this, Objective 6 calls for the release of a guide to open burning restrictions (Action 6.1) and an information package for distribution through local councils, Bush Fire Brigade (now Rural Fire Service) depots, fire stations and the EPA pollution line (Action 6.3). Both of these actions were completed within the timelines set out in *Action for Air.*

While restrictions have been successful in reducing pollution from open burning, *Action for Air* notes that bushfire hazard reduction and forestry management burning remains an important issue for Sydney air quality.

It was proposed in Action 6.2 that the impact of such burning be reduced by developing smoke management guidelines by June 1998. These guidelines were to ensure the implementation of best practice smoke minimisation principles into bushfire risk management and prescribed burning training programs.

Policy No. 3/01 Bushfire Smoke Management was adopted by the Bushfire Coordinating Committee of the Rural Fire Service on 18 October 2001. It states that the monitoring requirements of bushfire risk management plans will include smoke management performance measures.

Result – good

Objective 6. Manage the impact of open burning

"Objective: To implement effective smoke management programs, recognising the importance of hazard reduction burning in controlling bushfire".

TEC Action for Air Review Table 6

Review	Key Agencies	Stated goals	Timelines/$$ (where stated)	Related plans/ strategies	Progress to date
Strategy A. Manage the impact of open burning	NSW Rural Fire Service			Bushfire risk management plans & operational plans Rural Fires Act 1997	
6.1 Release a users' guide to open burning restrictions (March 1998)	DECC Dept of Rural Fire Services (RFS) Councils NSW Fire Brigade State Forests	Those responsible for hazard reduction and other open burning understand the statutory requirements concerning clean air & open burning management	March 1998	Clean Air & Rural Fires Act	*Regulation of Open Burning* guide released explaining restrictions on open burning released in 1998. *Regulation of Open Burning in NSW* guide now available on DECC NSW website: http://www.environment.nsw.gov.au/air/roob/index.htm The guide was jointly prepared by EPA (now DECC) and RFS and gives local councils and fire management authorities an outline of burning requirements under the Protection of the Environment Operations Act 1997 and the Rural Fires Act 1997. The Protection of the Environment Operations (Control of Burning) Regulation 2000 and the Rural Fires Regulation 2002 now build on these measures also and are covered in the guide. Updatedversion issued in 2003.
6.2 Develop smoke management guidelines for open burning (June 1998)	DECC RFS State Forests Bushfire Coordination Committee	Develop smoke management guidelines Integrated into bushfire risk management and prescribed burning training programs	Early 1998 Following 2 years		Policy No. 3/01 *Bushfire Smoke Management* was adopted by the Bushfire Coordinating Committee of the Rural Fire Service on 18 October 2001. It states that the monitoring requirements of bushfire risk management plans will include smoke management performance measures.
6.3 Educate the community on open burning restrictions	DECC Local councils Dept of Bush Fire Services Fire Brigades	Make available community info packages regarding burning restrictions	Early 1998		Information package released in 1998 and updated in 2003. Publications available from DECC pollution line 131 500 or internet. New Protection of the Environment Operations (Control of Burning) Regulation 2000 commenced 1 Sept 2000, replacing Clean Air (Control of Burning) Regulation 1995. 93 Councils now listed in Schedule 1 in which some or all burning is restricted.

Under new regulations high-rise domestic incinerators were phased out by September 2001.

Policy No. 3/01 Bushfire Smoke Management states that smoke management principles, policies and procedures will be incorporated within fire management training curriculum adopted by fire fighting authorities.

The policy also states the Bush Fire Coordinating Committee member agencies and organisations will advise the EPA (now DECC) on smoke management for incorporation in appropriate air quality educational materials.

In November 2004 the NSW Bush Fire Coordinating Committee adopted the Bush Fire Communications & Education Strategy 2004-2010 This strategy addresses a range of identified issues and provides for the legislative obligations and recommendations made by the Parliamentary Joint Select Committee (JSC) on NSW Bush Fires 2001-2002.

OBJECTIVE 7 (see Table 7)

Strategy A – monitor, report, review

The aim of Objective 7 is to monitor, report on and review air quality. If each of the actions in this objective were fully implemented they would provide a means of assessing the effectiveness of *Action for Air* in improving Sydney's air quality. They would also allow the Air Quality Management Plan to be adapted as new information and research comes to light.

Performance on Objective 7 has been mixed with some actions fully implemented but others not implemented as originally proposed by *Action for Air.*

Daily air quality (Regional Pollution Index) figures are available on the internet as promised in Action 7.1 and quarterly reports are also available. Daily figures indicate the cause of each reading (i.e. ozone, particles or NO_2).

There are, however, deficiencies with the monitoring procedures. In October 2004 it was revealed that monitoring stations at Earlwood and George Street in the CBD have been closed. The station at Earlwood was crucial for monitoring pollution from the M5 East tunnel stack. The closure of the Blacktown station in 2004 is of particular concern, given that ozone exceedances had been recorded from this station in all but 2 years between 1996 and 2004 with a peak of 8 exceedances in 2001 (DEC, 2006c).

Pollutant monitoring has also stopped at Rozelle, St Marys, Newcastle and Illawarra.

In 2004, the metropolitan air quality network dropped its sampling levels from 1500 to 450.

Closure of stations and cutbacks on monitoring significantly compromises the collection of long-term scientific data sets, and the capacity of the DECC to monitor and improve air quality. It may also limit their capacity to bring about a successful prosecution due to limited evidence.

The air quality data collected is based on a monitoring network which does not represent the true nature of the distribution of the population or of actual pollutant exposure due to work place or transport exposure. For example, central Sydney, high rise and medium density residential areas are underrepresented.

Advisory committees and groups have not been set up in accordance with *Action for Air* criteria. The air quality monitoring/interest advisory group (Action 7.2) lacks community, industry and university representation. Discussions that were to be undertaken via EPA (now DECC)/industry technical committees (Action 7.4) appear to have been left to the national level and the committee itself meets only irregularly. Although there is considerable merit in taking a national approach, these committees could provide a valuable forum for identifying opportunities for environmental improvements and promoting change. The Metropolitan Strategy Committee (Action 7.5) appears to be defunct and has been superseded by interagency forums.

The Air Toxics Pilot Study was released in 1998 and the Ambient Air Quality Research Report was released in 2002 (Action 7.3). A National Environment Protection (Air Toxics) Measure was introduced in 2004. Implementation of the NEPM is reported annually.

The air quality forum promised in Action 7.6 has been held every three years and provides an opportunity for the community, environment groups and industry to provide feedback on the success, or otherwise, of the Air Quality Management Plan and set priorities for the future.

Result - average

Recommendations:

1. Expand air quality monitoring network to restore closed sites to operation and install new stations to allow better assessment of population exposure.

2. Improve community and expert representation on advisory groups.

Objective 7. Monitor, report and review air quality

"Objective: to provide for the ongoing monitoring and future development of the NSW Air Quality management Plan, based on new scientific, economic and social information, wide collaboration and open consultation".

TEC Action for Air Review Table 7

Review	Key Agencies	Stated Goals	Timelines/$$ (where stated)	Related Plans/Strategies	Progress to date
7.1 Provide internet access to air quality data by mid-1998	DECC	Provide internet access to daily & quarterly reports	mid-1998		Daily reports of Regional Pollution Index (RPI) available on internet. Breakdown of individual pollutants available only in quarterly reports (available online). The report is also sent to electronic media and published in newspapers serving Sydney, the lower Hunter and Illawarra. DECC NSW also provides a 24-hour recorded telephone message information service. The RPI is categorised as LOW, MEDIUM or HIGH, with HIGH indicating the determining pollutant levels have reached or exceeded the relevant standard or goal. In Oct 2004 it was revealed that monitoring stations at Earlwood and George Street in the CBD have been closed. The station at Earlwood was crucial for monitoring pollution from the M5 East tunnel stack. Pollutant monitoring has also stopped at Rozelle, St Marys, Newcastle and Illawarra. In 2004, the metropolitan air quality network dropped its sampling levels from 1500 to 450. Closure of stations and cutbacks on monitoring significantly compromises the collection of long-term scientific data sets, and the capacity of the DECC to monitor and improve air quality. It may also limit their capacity to bring about a successful prosecution due to limited evidence. The air quality data collected is based on a monitoring network which does not represent the true nature of the distribution of the population or of actual pollutant exposure due to work place or transport exposure. For example, Central urban, high rise and medium density residential areas are underrepresented. Furthermore, the use of PM_{10} as a measure is outdated and deemed by the World Health Organisation as providing little or no useful information about harmful impacts. Furthermore, the WHO assert there us no threshold under which adverse health impacts do not occur. http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf Given the growing body of evidence pointing to the multitude and severity of the health impacts of air pollutants and in particular, the significance of finer particles such as $PM_{2.5}$ and PM_1, there is need for new research and specific measurements more finetuned than the broad category of PM_{10}, as well as distribution of monitoring stations in a representative manner.
7.2 Set up an air quality monitoring interest/advisory group	DECC	Provide a forum to identify priorities for future modelling		Metropolitan Air Quality Study (MAQS)	Group not as defined in *Action for Air*; no community, industry or university input; more narrowly defined. DECC involved with other jurisdictions in Peer Review Committee to ensure its air quality monitoring network meets requirements of Ambient Air NEPM. Committee consists of technical specialists from each jurisdiction and representatives of Australian Conservation Foundation, Environment Victoria, Holmes Air Science and GHD.

Review	Key Agencies	Stated Goals	Timelines/($$ (where stated)	Related Plans/ Strategies	Progress to date
					DECC/CSIRO group established to develop air quality forecasting system based on emissions and meteorological information. The Air Quality Working Group's role is to advise EPH Standing Committee on (and, as directed, facilitate EPHC projects related to) the following: • strategic and emerging air quality issues • air quality research priorities • collaborative work on air quality projects, such as the development of inventories, modeling, and monitoring techniques, approaches to monitoring infrastructure/equipment and options for addressing emission risks • developing closer cooperation with sectors and agencies with an interest in air quality issues NEPC directed the Air Quality Working Group to establish working groups to address the following issues which emerged from the public consultation on the draft Air Toxics NEPM and Impact Statement: • concern about other air toxics not subject to this NEPM • the need for NEPC to establish a database and retain monitoring data for reviews • The process for developing standards following the review of the NEPM within eight years.
7.3 Report on the results of the air toxics study	DECC	Results of pilot study investigating levels of air toxics in the GMR	Early-1998		Pilot Study released May 1998. Ambient Air Quality Research Report released 2002. The National Environment Protection (Air Toxics) Measure was introduced in 2004. Implementation of the NEPM is reported annually. The 2005-2006 report states: • NSW completed a three-year air toxics monitoring program which resulted in a comprehensive report on air toxics • NSW has played a significant role in the development of an agreed desktop analysis methodology to identify Stage 1 and Stage 2 sites. • As of 30 June 2006, NSW applied the desktop analysis methodology to identify Stage 1 sites and potential Stage 2 sites. Planning for an air toxics monitoring campaign has commenced but the details have not yet been finalised. It is expected that the air toxics monitoring campaign will commence, subject to funding, in early 2007." http://www.ephc.gov.au/pdf/annrep_05_06/AR_Jur_AT_NSW_05-06.pdf
7.4 Reconvene key technical committees with industry groups	DECC/ Industry Technical Committee	Investigate responses to unresolved issues			DECC/Industry Technical Committee meets irregularly. Convenes when an issue or problem arises and a technical solution is required. Discussions with oil industry on engine design and fuel quality now occurring at national rather than state level.
7.5 Metropolitan Strategy Committee to review environmental matters	Metropolitan Strategy Committee	Review achievement of air quality goals	Annually		Metropolitan Strategy Committee formed under DUAP but disbanded. Some sub-committees for more specific issues (eg land and housing supply) have survived. DEC (now DECC) response in Action for Air 2006 Update is that committee has been superseded by other interagency forums. A Metropolitan Strategy Discussion Paper was released by DIPNR in September 2004. It is the basis for developing a

Review	Key Agencies	Stated Goals	Timelines/$$ (where stated)	Related Plans/ Strategies	Progress to date
					Metropolitan Strategy for Sydney over the next 30 years.
					The Discussion Paper is based on the feedback received at the Sydney Futures Forum in May and the Local Government Forum in June 2004, and will also be considered at discussion groups in October and November, with submissions closing on 30 November.
					The Metropolitan Strategy for Sydney was released in December 2005.
7.6 Convene a public forum to report regularly to government	DECC	Convene a public forum to review air quality status and strategies	6 months after release of each State of the Environment Report SOE)	Action Plan NSW SoE reports	Forums held in November 2001 and November 2004. Next forum to be held November 2007.

02

Part 1 of this report reviewed progress on existing *Action for Air* strategies and provided recommendations for improving performance. With *Action for Air* approaching its tenth year it is appropriate to review the program itself and consider what changes and new initiatives are required in order to meet air quality goals and address new challenges.

As noted above vehicle emissions and rising VKT remain major problems in managing air quality within the greater metropolitan region. It is clear that a major effort is needed to improve public transport to provide a viable alternative to private vehicle use. Continued growth of VKT is undermining gains from cleaner fuels and vehicles as well as strategies to reduce emissions from fixed sources such as homes and industry. Unless this problem is addressed it is unlikely that air quality goals will be achieved. A number of key public transport initiatives and travel demand management measures are discussed in this section of the report.

While there has been considerable progress toward reducing vehicle emissions through better technology and cleaner fuels, these efforts need to be continued. A variety of strategies for reducing per VKT emissions are presented below.

Adding impetus to the need to curb VKT and reduce per VKT emissions is the challenge of reducing greenhouse gas emissions. Reducing vehicle use will have clear advantages in reducing greenhouse gas emissions. Where possible these reductions have been identified and quantified.

It is also necessary to re-examine air quality monitoring and reporting regimes in order to improve our understanding of the problem. Current approaches focus on compliance with standards

but do not address population exposure, ecosystem impacts or amenity impacts. A review of the Ambient Air Quality NEPM is currently considering these issues. TEC has contributed to this review and our proposals are reproduced here.

Indoor air quality has emerged as an important issue that was not addressed in *Action for Air*. TEC and the National Toxics Network have previously produced a major review of indoor air quality issues and initiatives needed to address existing problems (Immig, 2005). We again present the key findings of this review here.

Finally, it is clear that *Action for Air* has evolved and grown over the course of the last nine years. Some strategies have been completed and new initiatives, not included in the original strategy have been launched. There exists a need to issue a new edition of *Action for Air* that takes into account these changes and consolidates new initiatives in a single document.

CURBING VKT AND REDUCING VEHICLE EMISSIONS

As noted in part 1 of this review, the failure to meet *Action for Air* targets for curbing VKT is a major factor in the failure to meet air quality targets for ozone and NO_x. This failure is negating gains made in other areas such as cleaner vehicles and fuels and reducing emissions from industry. It is clear that meeting these VKT targets is critical to the success or failure of *Action for Air*. It is essential therefore, that these targets be maintained and a major effort made to halt VKT growth.

This will require both demand management initiatives and additional investment in public transport (beyond existing commitments) to provide a viable alternative to vehicle use.

It is also important that efforts continue to reduce vehicle emissions through tighter emission standards and cleaner fuels combined with new initiatives to reduce per VKT emissions. The global warming crisis adds extra urgency to the pursuit of new policies.

Measures to achieve these objectives are discussed below.

Road Supply Management

Small improvements can be achieved by making more efficient use of existing road capacity, co-ordinating road works, and taking into account temporal variations in traffic flow and direction, for example:

- tidal flow lanes
- intelligent traffic management systems
- high Occupancy Vehicle priority lanes

Building additional road capacity is not a long-term solution to congestion, due to the resultant 'induced demand effect'; whereby improved travel conditions generate additional traffic, eroding the original benefits to existing travellers and leading to an increase in overall emissions.

Congestion results in significant costs to the economy from extra travel time, increased unreliability, higher vehicle operating costs (especially fuel use), poorer air quality and increased greenhouse gas emissions. A report by the Competition and Regulation Group prepared for the Council of Australian Governments (2006) estimates the avoidable costs of congestion for Sydney in 2005 were $3.5 billion, and are projected to reach $7.8 billion by 2020. This is a conservative estimate, other reports estimate the costs at $12 billion in 2005 and $16.5 billion in 2020 (CIE, 2005).

To some extent, many of the actions outlined in *Action for Air* objectives 1 & 2 (Integrate air quality goals and urban transport planning & Provide more and better transport choices) - if successfully acted upon - will serve to reduce congestion, firstly by reducing overall travel demand and, secondly, by encouraging drivers to switch to other modes.

However, in order to target congestion specifically, initiatives are required to reduce overall VKT during peak travel times, in particular by:

(a) encouraging drivers to travel outside the peak

(b) encouraging drivers to switch to other modes during the peak

Demand management initiatives

Congestion charging/road pricing

International experience has demonstrated that the most effective way to achieve these aims is to require motorists to pay a financial premium to travel during the peak (CSIRO, 2006). It is essential, however, that road use charging measures are designed as a component of an integrated package of policy measures, specifically improving the public transport system in order to enable a modal switch to occur. Congestion charging or road pricing offers a funding source to support the development of additional public transport capacity.

The use of congestion charges or road pricing is a demand management mechanism that has thus far been ignored by governments in Australia. Examination of the use of congestion charges in other parts of the world, however, reveals that such measures could play a significant role is reducing demand for vehicle travel in the GMR as well as easing congestion, air pollution and greenhouse gas emissions. With the widespread use of electronic tolling on Sydney toll roads, introduction of electronically based congestion charging could be relatively straight forward.

International initiatives

The following schemes in London, Singapore, and Stockholm are examples of successful congestion management measures which had primarily economic efficiency and congestion reduction objectives. All three significantly reduced congestion in most of the situations (routes, time periods) where it was particularly severe – principally on radial routes approaching the inner city area (COAG, 2006).

1. London

The London Congestion Charge was introduced in 2003. Under the scheme, drivers pay an £8 ($19) charge to enter the Central London 'congestion zone' between 7am and 6:30pm on weekdays, with exemptions for residents.

As at 2006, the scheme has proved to be remarkably successful (TFL, 2007):

- 21% reduction in total number of vehicles (four or more wheels) entering charging zone during hours of operation
- 19% reduction in VKT (four or more wheels) within the zone during hours of operation
- 8% reduction in congestion (measured in terms

of minutes of delay per kilometre (compared to night-time travel times, assumed to be delay-free)) during hours of operation. (In the year following scheme introduction, congestion was 30% lower other background changes, such as roadworks, have affected the 2006 level.)

- emission reductions (on top of reductions due to improved vehicle technology):
  - NO_x reduced by 8%
  - PM_{10} reduced by 7%
  - CO_2 reduced by 16%
- no significant overall impact on Central London's economy
- between 40 and 70 fewer personal injury accidents per year.

It should be noted however that in the London Congestion Charging scheme, the 'stick' of road pricing was accompanied by the 'carrot' of enhanced bus services, the combination of which resulted in substantial and sustained reductions in congestion levels (COAG, 2006). The COAG (2006) concludes that it would not be practical to implement the 'stick' of road charging until the 'carrot' of improved public transport has sufficient capacity to cater for the anticipated diversions.

2. Singapore

Introduced in 1998, the Electronic Road Pricing scheme charges motorists for using CBD roads between 7.30am and 7pm, or expressways between 7.30am and 9.30am.

3. Stockholm

A seven month trial of a congestion charge was conducted in 2006. Results included reduced traffic volumes crossing and within the cordon by in the order of 20%. Traffic delays have been reduced by 30%-50%, and overall travel times by around half this proportion. Following a referendum, the government decided to adopt the charge on a permanent basis (Stockholm Congestion Charging Secretariat, 2006 cited in COAG, 2006)

Australian initiatives

It is clear from this that congestion charging is growing in acceptance as a means for reducing congestion and air pollution in cities around the world. Despite this, there has been little progress toward its adoption in Australia. This is largely due to political reluctance to introduce what is seen as a potentially controversial measure.

A report on the country's future oil supply, published

in February 2007 by the Senate's Rural and Regional Affairs and Transport committee, however, recommended that 'Australian governments investigate the advantages and disadvantages of congestion charges, noting that the idea may be more politically acceptable if revenue is hypothecated to public transport improvements' (Australian Parliament, 2007).

Ambient air quality benefits of congestion charging

As noted above, introduction of congestion charging in London has provided direct air quality benefits by reducing emissions of NO_x 8%, PM_{10} by 7% and CO_2 by 16%. These reductions are in addition to those due to improved vehicle technology.

The reductions are not solely due to a decrease in the number of vehicles being used in peak periods. Reducing congestion will also reduce emissions from vehicles that remain on the road. This is because vehicles can potentially double their consumption and emissions in congested traffic (due to lower travel speeds and stop-start driving). As an example, in Central London, increased vehicle speeds due to the congestion charge have led to reductions of per-VKT CO_2, NO_x and PM_{10} emissions of 9.5%, 7.9% and 8.5% respectively (Beevers & Carslaw, 2005).

Thus, congestion charging acts in two ways to reduce emissions. Reducing VKT and reducing per VKT emissions.

Greenhouse benefits

Congestion results in reduced average vehicle speeds, greater idling times, and more stop-start driving. As a consequence, a journey made in congested conditions can result in significantly more fuel consumption, and therefore greater CO_2 emissions, than an identical journey made in non-congested conditions. Measures to reduce congestion in Central London have led to increased average vehicle speeds and a consequent 9.5% reduction in per-VKT CO_2 emissions (Beevors & Carslaw, 2005).

The Bureau of Transport Economics (BTE) has estimated that traffic delays and interruptions to traffic flows in 1995 generated an extra 13 million tonnes of greenhouse gas emissions per year. This represented 17 per cent of annual greenhouse gas emissions due to the transport sector and approximately three per cent of Australia's total greenhouse gas emissions (BTE 2000).

In Sydney, it is estimated that the current CO_2 emissions associated with VKT alone are over 10 million tonnes (Buchanan, 2007). This highlights the importance of reducing VKT to greenhouse abatement and the potential of congestion charging to play an important role in greenhouse strategies.

Co-benefits

Reducing vehicle congestion has a number of co-benefits:

- shorter and more predictable journey times for travellers
- reduced user costs (time, fuel, vehicle wear)
- reduced impact on other transport modes that share the road space with private vehicles (buses, light rail, bicycles)
- additional revenue (depending on policy instrument) which can be used to supplement investment in public transport.
- fewer road accidents
- reduced fuel use in a climate of increasing concerns over fuel supply.

It should be clear from the above that congestion charging/road charging has the potential to offer substantial benefits if adopted in Sydney. The adoption of this measure should form a major plank of a revamped *Action for Air* program.

Parking pricing/ supply policies

Parking policies are used both as a carrot or stick to manipulate traffic flows.

Parking restrictions have been used in recent years as a key element of transport policy in many countries, and are regarded by some as one of the most powerful tools to reduce car–based travel in the short term (Main Roads WA, 1998) e.g. legislation in Britain has been changed recently to permit local authorities to increase parking charges to target traffic congestion and pollution.

It has been argued that parking charges higher than market based value are very poor substitutes for congestion charges, and represent a very indirect way of pursuing goals such as congestion reduction, because they:

- target stationary rather than moving traffic. Since parking charges target only those that park, the road space released by discouraged parkers may be taken up by through–traffic
- do not vary significantly with different levels of congestion

- can create increased VKT, as drivers search for parking places
- do not apply to commercial vehicles or company cars with private parking spaces (BTRE, 2002).

An alternative approach to increasing charges is to remove the factors that reduce the cost of parking, in particular, the tax breaks associated with the use of private vehicles.

In most cities, a significant share of parking spaces (other than on–street parking) is in private hands. A great deal of this is employer–provided parking. Removing tax deductions for employer–provided parking to increase the cost of parking is regarded as a potential policy option for Sydney.

In Canada, it was estimated that if employees faced the full cost of parking (rather than having it provided 'free' by the employer) a reduction of 40% in single occupant vehicle (SOV) use could be expected (TTNCCP, 1998).

Access to the option to 'cash out' employer-provided parking spaces, appears to offer more certain efficiency gains than other parking measures because it removes the distortion of a remuneration packaging that favors driving over other forms of commuting (BTRE,2002).

The Californian parking 'cash out' program appears to have had a favourable environmental impact. Legislation was implemented in 1992, whereby employers of more than 50 employees who subsidise employee parking must offer a parking cashing-out program. Under a cashing–out program, employees may opt for the cash equivalent of the parking space. The Californian law also allows the options of replacing the parking subsidy with a general commuting allowance and the provision of a parking subsidy only for carpools. Cashing out allows an employer to offer free parking, yet offer all commuters the same subsidy, regardless of how they commute (Shoup, 1997).

A study of eight Californian firms (covering almost 1,700 employees) that implemented a parking cashing–out program showed that it:

- reduced the number of solo drivers to work by 17%
- increased the number of carpoolers by 64%
- increased the number of transit riders by 50%
- increased the number who walk or bicycle to work by 39% (Shoup 1997).

It was estimated that vehicle emissions (local and

global emissions) attributable to the firms studied declined by 12% as a result of the program (Shoup, 1997).

An increasing number of employers in firms across the US are allowing employees to 'cash out' their parking space.

NSW should investigate the use of parking-cash out policies as part of an overhaul of metropolitan parking policies. Adoption of such policies would assist companies to become carbon neutral and reduce their environmental footprint.

Non-price demand management

In addition to congestion pricing, a range of non-price demand management initiatives are available to reduce VKT.

Travel Behaviour Change

Personalised travel planning schemes (such as Travel Smart) involve advice to households on ways to change their travel patterns to reduce car usage and encourage a mode shift to public transport.

Evaluated trials in Australia reported outcomes of 0-17% reduction in VKT. These trials and others have found that, where a gap exists between perceived and actual quality of public and other alternative transport, the effect of travel planning is greatest. In addition, where improvements to public transport services and infrastructure are made in parallel the effect is also more significant.

Workplace and school Travel Plans (WTP and STP) have been more widely implemented outside Australia. In the UK such plans have been introduced as part of government transport and planning policy.

The use of initiatives such as Travel Smart, Workplace Travel Plans and School Travel Plans should be linked to public transport improvements, particularly as new public transport projects such as bus transitways, and rail links commence service. This would assist in maximising the benefits of these projects.

Car sharing/ride sharing

Such arrangements are less common in Australia than overseas (N. America and Europe), though, there too they only form a small percentage of overall trips.

Car sharing appears to result in a significant reduction in vehicle kilometres travelled; though the congestion impacts are likely to be somewhat smaller.

Vanpools are a distinctive feature of ridesharing operations. Vanpools are generally formed from a group of people living and working in the same geographic area, and may be employer–operated, leased, individually or even publicly owned. Vanpools are promoted as being lower cost and offering greater flexibility than some of the more standard forms of commuting.

In California, it has been reported that ridesharing services led to estimated reductions of:

- 419 million vehicle miles traveled
- 20 million gallons of fuel consumed
- 7,000 tons of pollutants (Hirten and Beroldo 1997).

While the Sydney CBD is well serviced in terms of public transport, other economic centers such as Parramatta are not; and for people working in Parramatta and commuting from other suburbs a Vanpool could be a viable and efficient mode of transport, e.g. it currently takes 55-63 minutes to commute from Campbeltown to Parramatta during peak hour, while a vanpool could make the journey in 40 minutes, and even less if there were High Occupancy Vehicle Lanes. The question of economic efficiency needs to be investigated, as it could depend on other measures such as funding from government, employer subsidies and taxation benefit polices which would impacton the cost.

Administrative measures

Trip reduction ordinances (TROs) are regulatory mechanisms that require developers and/or employers to develop specific plans and programs to manage trip demand. Transport Management Associations (TMAs) are essentially voluntary organisations that provide transport services in a particular area, e.g. a commercial centre.

TMAs and TROs are used in North America and Europe to a small degree, but not at all in Australia. TMAs and TROs have the potential to reduce commuter car trips by 10% or more amongst those participating in the schemes (COAG, 2006). However, some caution needs to be applied, as the number of projects remains quite small, and there is little in the way of evaluation studies. By way of example of potential benefits, a 10% reduction rate applied to 10,000 participants would on average reduce GHG emissions by 24,000 Tonnes of CO_2 annually.

TMAs and TROs are not currently found in Australia, and should be investigated under local government capacities as a means of tackling localised transport deficiencies in a manner that will provide high levels of convenience and flexibility with little capital investment and bureaucratic delay, for example, Vanpool transport for staff at shopping centres, office buildings or universities.

Public transport fare incentives

A US program 'Unlimited Access' allows students from colleges and universities to have fare free access to public transport in return for an annual lump sum payment from the university to the public transport agency of around US$30. This arrangement is essentially analogous to the student transport subsidy scheme currently applied to school student travel in NSW, however, tertiary institution students would be required to meet a proportion of the total travel cost through their student fees.

Unlimited Access has been credited with increasing student public transport use between 71% and 200% during the first year and between 2% and 10% per year in subsequent years (Brown et al. 2001). This has reduced operating cost per rider for public transport operators, facilitating improvements in operating frequency. With universities, TAFE colleges etc being major trip generators, there are clear opportunities for such a scheme to reduce private vehicle use in NSW.

The development of such a scheme for universities and TAFE colleges in NSW should be investigated as a matter of priority.

Enhancing walking and cycling

Data from Sydney suggest that a large proportion of trips involve short travel distances; more than 25% are 2km or less, and of those 45% are by car. A further 25% are between 2-5km, of those 73% are by car (Dept of Planning, 2005). A cold car pollutes more than a vehicle at normal operating temperature, especially when equipped with a catalytic converter as it can take three miles or more before pollution control devices such as catalytic converters start to become effective (PSRC, 1995).

The effect of this is that short trips in cars are the most environmentally damaging. These short trips are also the most attractive for walking and bicycling.

This points to the important contribution that promoting walking and cycling can make to improving air quality and reducing greenhouse gas emissions. In order to make walking and cycling more attractive to people, these modes need to be seen as safe and convenient. This requires not only improvements in infrastructure, but also a degree of social marketing and advertising, promoting the use of these modes of transport.

For example, the Netherlands encourages use of bicycles through a range of policies including:

- spending 10% of their road budgets on bicycle ways over the last 22 years
- aiming for two bicycle routes for every destination, one of which is safe for the more vulnerable members of society
- ensuring that cyclists, along with pedestrians, have priority in most Dutch cities
- spending US$1.2billion on the Dutch Master Bicycle Plan which involved upgrading existing bicycle ways, building new ones and providing secure bicycle parking at railways stations. (BTRE, 2002)

An interesting initiative was taken to increase use of bicycles in Paris. The local authority in Paris deposited 20,000 heavy-duty bicycles in 750 or so special racks around the city, available free of charge (for 1st half hour) to anyone, by simply swiping his or her ordinary travel card. The bike does not have to be returned to the same pick-up point and is designed for short distance commutes within the city. The council also launched a major campaign on bike safety, distributing leaflets with safety advice to all scheme users. There have also been big efforts over the last few years to create cycle routes around the city.

Sydney requires significant development of cycling infrastructure in order to increase the attractiveness of this mode of transport. Already there has been growth in bicycle use in the city over the last few years - RTA Bicycle count data shows a 45% increase in bicycle traffic between 2002 and 2005 into Sydney CBD. Surveys show there are many more people who would opt for cycling if it was a safer option. The improvement of pedestrian and cycling facilities should be made a priority as a means of reducing short trips by car. The adaptation of schemes such as those used in the Netherlands and Paris to increase cycling should be investigated.

Improving public transport infrastructure and services

Demand management measures such as those described above will only be successful in reducing VKT if coupled to major improvements in public transport infrastructure. As noted elsewhere in this review, a major cause of the failure to achieve *Action for Air* targets for VKT and air quality has been the failure to deliver key public transport commitments promised in Action for Transport 2010, particularly in relation to new rail infrastructure. It is particularly telling that road links proposed in Action for Transport 2010 such as the Eastern Distributor, M5 East, Cross City Tunnel, M2 to Gore Hill and Western Sydney Orbital were all completed on or close to schedule.

It should also be noted that while a new road may relieve congestion; this is only temporary and more fundamental infrastructure changes are required.

The new rail links proposed in Action for Transport 2010 were identified as offering major benefits in improving access to public transport and achieving *Action for Air* VKT Targets. With VKT continuing to rise, it is clear that these rail links remain essential.

Achieving the aim of stopping per capita VKT growth by 2011 and total VKT growth by 2021 will obviously be extremely challenging. While the proposed North-West, South-West and Harbour Rail links will make a major contribution to improving the capacity of the system it is unlikely that these links alone will be enough to arrest rising VKT. It should be obvious that more must be done in a shorter period of time than is currently envisaged.

The NSW Government should commit to fast tracking the North-West, South-West and Harbour Rail links and to delivering by 2015 the following rail links originally proposed in Action for Transport 2010:

- Parramatta to Epping section of Parramatta Chatswood Rail Link
- Hurstville to Strathfield Rail Link
- Liverpool Y link.

A high priority should be attached to completing the Hornsby to Newcastle High Speed Rail Link, particularly in view of major population growth proposed in the Central Coast and Hunter Regional Strategies. Action for Transport 2010 proposed completion of Stage 1 to Warnervale by 2007 and to commence stage 2 to Newcastle by 2010. It is particularly concerning that while there has been no

progress on this initiative, the F3 freeway has been widened to three lanes between the Hawkesbury River and Mount White.

The section of railway line between Hornsby and Gosford is currently the most congested line in Australia (Laird, pers comm.). Improving services to the Hunter and Central Coast will obviously require that this problem be addressed. In view of this, Stage 1 should be completed by 2012.

The Sutherland to Wollongong High Speed Rail proposed for 2010 would also offer significant improvements in terms of enhancing passenger services and freight capacity. This is particularly important with moves to relocate shipping freight (such as car deliveries) from Sydney Harbour to Port Kembla. This link project should also be completed by 2012.

Other projects that should also be advanced are a proposed high speed rail link between Penrith and metro rail link between Malabar and West Ryde.

Greenhouse benefits of encouraging mode shift from vehicles to public transport could be maximised by converting CityRail's electric train operations to Greenpower. Progressively converting to 100% Greenpower over the next four years would reduce NSW greenhouse gas emissions by approximately 500,000 tonnes by 2011 (Glazebrook, 2007). The costs of this switch would be modest at around $7M in 2007/8, rising to around $28M by 2011/12. This is approximately 1% of the current CityRail budget (Glazebrook, 2007). It is also important to recognise that introduction of carbon trading or carbon taxes (which would increase the cost of coal fired electricity) would significantly reduce the net cost of switching to Greenpower.

Reducing/offsetting per VKT emissions

Reductions in per VKT emissions can be achieved by reducing congestion, making vehicles more fuel-efficient, and changing driving styles and behaviour.

Reducing congestion

Vehicle emissions and fuel consumption are significantly increased in congested traffic (due to lower travel speeds and stop-start driving). Measures such as congestion charging and road capacity enhancement have been discussed above. Considerable emission reductions could be achieved by reducing congestion, using the measures discussed.

Increasing Vehicle Efficiency

Another approach to reducing per VKT emissions is to increase vehicle fuel efficiency.

In Australia, the vehicle fleet has actually become less efficient in recent years (ABS 2006). For example, passenger vehicles, responsible for the largest proportion of transport emissions, consumed more fuel per kilometre in 2005 than they did in 2001, despite efficiency improving technology which became available in that period.

The lack of federal or state regulations for vehicle fuel efficiency, and lack of tax incentives for purchasers of fuel-efficient vehicles, contributes to this alarming trend. Perversely, the tariff for large and typically inefficient 4WD vehicles (such as Toyota Land Cruiser) is currently only 5%, compared to 10% for other passenger vehicles (such as Toyota Prius), although equalization at 5% is due in 2010.

The EPA's Cleaner Vehicles Action Plan promised in 2000 that "Cleaner cars will be cheaper to buy. New vehicles will be assessed on their environmental performance and will pay stamp duty accordingly". At the November 2001 NSW Clean Air Fourm, the then NSW premier Bob Carr announced a plan for lower stamp duty on cleaner new vehicles. However, the proposal never materialised. Seven years later, stamp duty is still calculated only on purchase price. Positive action in these areas is essential to incentivise business to change-over their vehicle fleets and reduce their carbon footprint.

International initiatives

United States

In California the Assembly Bill 1493 sets CO_2 standards for vehicles from 2009 and beyond. The standards will apply to vehicle manufacturers' fleet averages, rather than each individual vehicle, and carmakers will be able to partially achieve the standards by reducing pollution from non-vehicle sources, including automobile factories. The legislation has been adopted by other states such as Florida and Maryland.

In the US Senate a bill was introduced that would require vehicle manufacturers to reduce new vehicle greenhouse gas emissions by 30% below 2002 levels by 2016. This would nationalise California's motor vehicle greenhouse gas reduction standard. The US EPA would be required to tighten the reductions every five years (GovTrack, 2007)

United Kingdom

For cars registered after 1 March 2001, annual vehicle tax is based on rated CO_2 emissions. The tax ranges from £0 for vehicles with CO_2 emission figures less than 100 g/km, to £300 (A$720) for vehicles over 225 g/km (e.g. Toyota Land Cruiser). Currently, the lowest rated vehicle available in the UK is Volkswagen Polo diesel (99g/km). A Toyota Prius Hybrid is rated at 104 g/km, for which the tax is £35 (A$80).

The following approach is recommended to increase vehicle efficiency. First set a target of 30% increase in efficiency on average for the Australian vehicle fleet; aiming to reach an average of 9.8 litres per 100 kilometres in 2020, from the current 14 litres per 100 kilometres (ABS, 2006). Secondly to meet this target the following measures can be used to increase the prevalence of more efficient vehicles:

- apply differential sales taxes (stamp duty) for vehicles with different fuel efficiency ratings
- implement a graduated registration fee system in which registration fees would be a function of CO2-e emissions per passenger kilometre
- regulations that restrict the sale of less fuel efficient vehicles
- restrictions on the procurement of public service vehicles with poor fuel efficiency
- high levels of fuel excise would encourage some drivers to purchase more fuel-efficient vehicles

Change driving style and behaviour

Uneconomical driving style can increase emissions by up to 95%.(Holmen & Niemeier, 1998). Driver behaviours that lead to increased emissions include:

- excessive idling
- accelerating toward red traffic signals
- use of roof-bars; maintaining incorrect tyre pressure

International initiatives

Europe

Several European Union governments have partnered in the Ecodriving campaign (www.ecodrive.org), which aims to promote driving behaviours that reduce fuel consumption and emissions by 5-10% on average. It is envisaged that by 2010 the scheme will have saved 0.5 M tons of CO_2 emissions, as well as significant reductions in other emissions.

Canada

A government-sponsored community-based social marketing (CBSM) program, Turn it Off, aims to reduce engine idling outside schools and other target locations. Engine idling behaviour is considered to be far more amenable to being altered than, say, mode choice.

The pilot program in Toronto involved staff approaching motorists waiting at schools and speaking with them about the importance of turning off their engines. Approached motorists were provided with an information card, and in addition signs reminding motorists to turn off their engines were put up. As part of the conversation, the motorist was asked to make a commitment to turn off their engine when parked. The result was a 32% reduction in idling and over a 70% reduction in the duration of idling (McKenzie-Mohr Associates & Lura Consulting 2001). With the support of the Canadian Government, this pilot project is now being implemented across two Canadian cities: Mississauga and Sudbury.

Note that an initiative such as Turn it Off, if implemented in NSW, would be unlikely to lead to a measurable improvement in ambient air quality as currently measured using widely dispersed monitoring stations. However, there would be localised improvements in the exposure of schoolchildren to harmful emissions.

Offsetting emissions

Reducing emissions should always be the first step taken, however, carbon offsetting could be used as the final step that individuals take in seeking to reduce their carbon footprint.

TEC has commented on the recently proposed NSW RTA voluntary offset scheme in August 2007, making the following recommendations:

- an 'opt-out' approach to offsetting vehicle emissions is preferable. This would mean that the default option for passengers is to accept the offset. Thus drivers would have to make the conscious choice not to offset vehicle emissions rather than making the conscious decision to offset vehicle emissions. Offset purchasing could be done upon renewal of registration.

- emissions should be calculated using life cycle analysis, which includes emissions associated with the production and delivery of the car, and the emissions associated with the production and use of the fuel.

- tree plantation offsets should be avoided as they cannot be adequately guaranteed over a long period and represent an easy 'out' for those who do not wish to change.

AIR QUALITY MONITORING AND REPORTING

As noted in Part 1 of this report there are shortcomings in current air quality monitoring and reporting procedures. In addition to the need to increase the number of monitoring stations (and particularly restore stations closed in 2004) there are significant changes required to the monitoring and reporting regimes themselves.

The current review of the Ambient Air Quality NEPM provides an ideal opportunity to improve current procedures. The NSW government should strongly advocate for this reform through the NEPC.

Current reporting requirements of the Ambient Air Quality NEPM focus on compliance, or exceedence of standards and do not provide an overall picture of health and environmental impacts.

Focusing on number of exceedences does not provide complete information about trends in air pollution as peak events can be influenced by natural events such as bushfires, drought, dust storms and meteorology. Consideration of percentile and annual average values provides a better indication of underlying distribution of air quality to assess trends (NEPC, 2007). Nevertheless, reporting of number of exceedences is crucial in assessing the progress of air quality programs in meeting air quality goals. Furthermore, reporting of exceedences is critical to informing the public of incidences of air quality goals not being met and in pressing jurisdictions to take further steps to prevent exceedences.

Reporting of percentage and annual average values would provide important information on air pollution trends. The NEPM should be revised to require reporting of these values in addition to information on number of exceedences.

NEPM standards are based on highly uncertain and inconclusive scientific data (often based on dose-response models in non-humans). Also, they do not take into account:

- synergistic health effects of multiple airborne pollutants acting together, or with other chemical pollutants to which people are exposed in their daily lives (so-called cocktail effects)

- impacts on amenity (sight, smell, airway irritation)

- impacts on ecosystems.

A further shortcoming of procedures under the current NEPM is the failure to adequately consider population exposure in addition to compliance with air quality standards.

It has been acknowledged that this is inconsistent with international best practice (NEPC, 2007). Measuring ambient pollution levels is not always an accurate guide to actual population exposure. For example, a child in a pushchair (at ground level) alongside a busy road would be exposed to a higher concentration of pollutants than that which is measured by a monitoring station several metres away (due to natural dispersion of airborne pollutants). Amendment of the NEPM is needed to require that assessment of population exposure is a key factor in the selection of monitoring sites and to ensure that efforts are made to reduce population exposure. Research is currently underway to develop methods for assessing population exposure. At CSIRO researchers are measuring 'individual exposure' to pollutants; that is, a measure of the actual exposure that people have to air pollutants during their daily routines, rather than measures of pollution at fixed locations (Holper and Noonan, 2006).

CSIRO regularly uses personal air pollution detectors, which monitor concentrations of pollutants that people breathe. The inexpensive samplers offer scientists, environmentalists, engineers and others a simple but accurate way of measuring selected pollutants in air. The sampler, based on a Swedish design, is small and requires no electricity so is ideal for remote use. Nitrogen dioxide, sulfur dioxide, ammonia and other gases can be measured with the device. This research should be used in developing standards for assessing population exposure in the NEPM (Holper and Noonan, 2006).

An obvious deficiency of current approaches is the lack of any compliance standard for very fine particles under 2.5 microns ($PM_{2.5}$). While there is currently a reporting standard for $PM_{2.5}$ no compliance standard has been developed. It is now recognised that these very fine particles are the most dangerous to human health, while adverse health effects are also associated with the coarser fraction $PM_{10-2.5}$. In view of this, it should be clear that a compliance standard needs to be introduced for $PM_{2.5}$ in addition to the standard for PM_{10}.

Exceedences of PM standards may occur as a result of events such as bushfires and dust storms. Such exceedences are thus not representative of general air quality management within an airshed. It would, therefore, be of value to report the causes of exceedances, where these are known. This would remove confusion and prevent all exceedences being dismissed as simply due to natural events.

A further shortcoming of current approaches is the failure to consider broader environmental impacts of air pollution and the need to protect vulnerable ecoystems. It is now recognised that some ecosystems are more sensitive than human health to some air pollutants (NEPC, 2007). The NEPC has also noted that it would be possible to develop Australian air quality standards for the protection of ecological values. Efforts in this regard have been made by the World Health Organisation, United States agencies and the European Union. These approaches should be used as a guide in developing Australian standards.

There is also scope for assessing the amenity impacts of air pollution. Physical monitoring of ambient levels of individual pollutants does not tell the whole story about air pollution. Amenity impacts (e.g. visual, smell, airway irritation) are also important to the community. However, as people's perceptions and levels of concern about air pollution differ because of socio-economic and other factors (Bickerstaff & Walker, 2001), the best way to measure these is through subjective community feedback, e.g. questionnaires and interviews.

In Sheffield (UK), the public is included in air quality assessment – community perceptions are overlaid on physical monitoring data in a so-called 'GIS for Participation' (GIS-P) model, which it is claimed provides a more complete picture of local air quality (Bailey et al, 1999). There seems little reason why these approaches could not be adopted in Australia to provide a more comprehensive picture of air quality and the impacts of air pollution.

INDOOR AIR QUALITY

Indoor air quality is an issue that has gained increasing prominence since *Action for Air* was released in 1998. It is now recognised that indoor air pollution can have significant health effects, particularly amongst children who are more vulnerable to harmful effects. Some chemicals have been shown to be dangerous at extremely low levels and contribute to diseases such as asthma and other respiratory complaints, allergies, cancers and birth defects.

TEC in partnership with the National Toxics Network

developed Working together to clear the air (Immig, 2005), a detailed report on protecting human health from the risk of indoor air pollutants. The report is available at www.tec.org.au .

The report identifies Persistent Organic Pollutants (POPs) and Persistent bio-accumulative toxins (PBTs) as being of particular concern. PBTs include perflouroalkyl sulfonamides (PFASs) which are used in household products such as surface treatments for fabric, upholstery, carpet, paper and leather.

Volatile Organic Compounds (VOCs) including formaldehyde were identified as significant indoor pollutants because they occur in a wide range of building products and paint.

The major economic costs associated with indoor air pollution are direct medical

costs for: people whose health is affected by poor indoor air quality and who receive treatment; lost productivity from absence due to illness; decreased efficiency on the job; and, materials and equipment damages due to exposure to indoor air pollutants (www.epa.gov/iaq/pubs.targeting.html). In Australia, the CSIRO estimates the economic cost of indoor air pollution to be as high as $12 billion a year in ill health and lost productivity (www.cmit.csiro.au/innovation/2002-01/greenlabel.htm).

A central problem is the 'permissive' nature of the chemical regulatory regime, which assumes there are 'safe levels' of toxic chemicals that we can all be exposed to. Children's unique vulnerability has never been adequately factored into health standards.

In new houses, or homes with unflued gas heating, health-based environmental exposure goals are regularly exceeded by significant margins, particularly for VOCs, formaldehyde, carbon monoxide and nitrogen dioxide.

The National Health and Medical Research Council (NHMRC) has recommended interim

national indoor air quality goals for a number of common indoor air pollutants. These are carbon monoxide, formaldehyde, lead, ozone, radon, sulfates, sulfur dioxides, total suspended particulates and total volatile organic compounds (Environment Australia, 2004).

To address these problems the following issues and programs are identified:

1. Introduce child-centred environmental health policy and regulation

In Australia, virtually no government policy or regulation focuses specifically on children's environmental health, particularly in relation to indoor air pollution.

Specific steps:

■ Introduce Commonwealth legislation, with State enabling powers, for a Children's Environmental Health Protection Act (in the absence of prompt national action, states should act independently);

■ Establish a national level specialist office for Children's Environmental Health;

■ Establish a Children's Environmental Health Network; and,

■ Review the processes for setting environmental and health standards to ensure they fully take into account children's unique vulnerability to chemical hazards.

2. Adopt a new regulatory framework for chemicals in Australia

The current 'permissive' regulatory framework for chemical management is not adequately protecting children's health because it allows purportedly 'safe levels' of known toxic chemicals to be in our air, water and food. There are no safe levels of bio-accumulative chemicals.

Draft European legislation is establishing a new framework for chemical regulation. The Environment Protection and Heritage Council National Chemicals Taskforce has identified that one of the greatest challenges in relation to chemical regulation is ensuring the various systems are linked by common principles and coordination mechanisms.

Specific steps:

■ Harmonise the Australian regulatory framework for chemicals in line with EU direction for safer chemicals;

■ Apply the precautionary principle to existing chemicals which constitute a danger to children's health by adopting programs with requirements and deadlines to achieve the elimination of all persistent and bio-accumulative chemicals and chemical products which are recognised as irreversibly dangerous to children's health; and,

■ Apply the substitution principle to ensure where safer chemicals are available, toxic ones are no longer permitted.

3. Sponsor and promote prevention-orientated research

There are a few examples of industry-driven initiatives to reduce hazardous chemical components in products. This piecemeal approach however will not go anywhere near solving the problem of indoor chemical pollution.

Control or elimination of pollutant emissions at the source material is considered the best strategy because it prevents pollution from occurring in the first instance. This approach is preferable to relying on ventilation systems and their increased energy requirements. Labelling schemes allow low emission products to be identified in the marketplace. Without drivers however, it is unlikely this will happen in any systematic way.

Specific steps:

- Establish an assessment and labelling scheme so that low emission products can be easily identified and promoted in the marketplace;
- Adopt a comprehensive set of enforceable indoor air quality goals across all indoor environments for all chemical pollutants; and,
- Undertake collaborative research projects with health professionals to further examine the impact of chemical pollution indoors on children's health.

4. Undertake extensive community education campaigns

Indoor chemical pollution and its effects on children's health is a complex issue which has not fully entered the consciousness of regulators and the broader community. While awareness is growing and the issue is being reported on more frequently, there is still a long way to go.

Specific steps:

- Undertake targeted education campaigns for the public, health professionals, child-care workers and policy-makers around the preventable nature of environmentally-induced diseases in children; and,
- Undertake targeted education campaigns offering practical, effective and affordable solutions to chemical pollution indoors.

REVISING *ACTION FOR AIR*

Action for Air was first released 1998. Since that time there have been two updates issued following the 2001 and 2004 Clean Air Forums. A number of initiatives have been completed while new initiatives have been launched to complement previous actions.

Such changes are to be expected over the life of a 25 year strategy, particularly one that needs to evolve to meet emerging challenges and incorporate improved knowledge and technological change. The result, however, is that there is no longer a single document that sets out the approach to air quality management in the Greater Metropolitan Region. This problem was identified by the Auditor General in the 2005 performance audit on air quality management (Audit Office, 2005).

In view of this it is strongly recommended that DECC issue a revised *Action for Air* that incorporates initiatives commenced since 1998 and notes those projects that have been completed or absorbed into national strategies. A revised *Action for Air* should also address the associated greenhouse gas emission benefits and tackle indoor air quality.

03

While *Action for Air* is clearly directed at managing air quality in the GMR, the general approach adopted offers a basis for developing a national template for air quality management in Australian cities. In fact, several of the initiatives proposed in *Action for Air*, such as tightening vehicle emission and fuel standards have been absorbed into national strategies. Some capital cities already have relevant strategies, but these and other necessary features should be brought together into single, comprehensive city plans.

The key features required in a national template for air quality management are outlined below:

Setting air quality targets

NEPM and WHO targets for air quality provide important standards for the protection of human health. They provide and important driver for air quality improvements programs and a yardstick to measure the success of these programs. NEPM targets for ambient air quality have been adopted by each Australian jurisdiction. As noted in this report, however, these targets are insufficient on their own.

Focusing on exceedances ignores the need to reduce population exposure to harmful pollutants. A national approach to air quality management should include targets for reducing population exposure. Targets are also needed for maintaining urban amenity and protection of sensitive ecosystems.

It is also clear that ambitious targets are needed for reducing greenhouse gas emissions and metropolitan air quality strategies can assist in their achievement.

Setting VKT targets

This report highlights the failure to address rising VKT in the NSW GMR as a key factor in the failure to achieve air quality targets for ozone and fine particles. It is clear that any air quality management program must include ambitious targets for curbing VKT and provide detailed measures for achieving them. VKT targets are a critical driver for the development of public transport improvements that are an essential feature of reducing air pollution.

Integrating planning and public transport

A major contributor to air quality problems in Australian cities has been the decades long pattern of urban sprawl development. In the absence of adequate public transport development of the urban fringes has created patterns of entrenched car dependence.

In order to reduce air pollution and greenhouse gas emissions from vehicles urban planning should seek to consolidate development around public transport nodes and ensure that adequate public transport is provided to service new development.

This requires both the development of long term urban planning strategies and detailed long term plans and funding for new public transport infrastructure and services.

Reducing demand for vehicle use

Integration of land use planning and public transport development offers substantial demand reduction benefits. These should be coupled to other demand management initiatives outlined in Part 2 of this report. In particular, congestion charging offers major congestion reduction and air quality benefits and should be adopted by Australian cities as a matter of priority.

Reducing vehicle emissions

While considerable progress has been made in reducing vehicle emissions through tighter national

standards for engines and fuels there is still considerable scope for further reductions. Measures to reduce emissions are outlined in Part 2 of this report.

Some measures, such as introducing standards for fuel efficiency and efficiency targets will clearly require a national approach. Others, such as providing stamp duty relief for cleaner, more efficient vehicles can easily be pursued by individual jurisdictions.

Reducing point source emissions

A major success of *Action for Air* has been the identification of fixed emissions such as industry, homes and businesses and the development of programs to reduce these emissions.

A key strategy for tackling point source emissions in NSW has been the introduction of load based licensing. The effect of this scheme has been to provide an incentive for polluters to switch to cleaner production techniques. This scheme provides a model for other jurisdictions to adopt.

The precise nature of emissions from businesses will vary from city to city, as will the types of programs required to address them. The general approach of identifying the major business sources and developing programs to reduce their emissions has broad applicability for each Australian jurisdiction. This approach should form part of any air quality management program.

While programs required for reducing emissions from commercial premises will vary from city to city, introduction of stage 2 vapour recovery systems is an example of a program applicable on a national scale. The benefits of this technology have been clearly demonstrated overseas and in trials of the technology in Sydney. Introduction of stage 2 vapour recovery requirements for petrol stations in the Sydney metropolitan region should provide a catalyst for other states to introduce this long overdue technology.

BASIX in NSW has provided a major driver for improving the energy efficiency of new housing stock and, more recently, for improving older housing stock through standards for major renovations. Introduction of similar schemes in other Australian states would have major air quality and greenhouse gas benefits.

Monitoring and reporting

Monitoring and reporting programs are crucial in providing high quality data as the basis for making air quality decisions. As noted in Part 2 of this report the current review of the Air Quality NEPM provides an opportunity for improving this aspect of air quality throughout the country. Key features that need to be addressed are ensuring that monitoring and reporting programs assess population exposure and amenity impacts. Monitoring of environmental impacts should also be a feature of any national approach to air quality monitoring and reporting.

Indoor air quality

Managing indoor air quality should be part of any air quality management programs.

The recommendations provided in Part 2 of this report for addressing indoor air quality issues require both national and state based approaches. Regulatory approaches recommended will be more effective if a national approach is adopted. This should not, however, be seen as a barrier to states taking action. In particular, education programs such as the promotion of safe alternatives to potentially harmful products should be viewed as a major priority.

REFERENCES

ABS (2006) 'Survey of motor vehicle use, Australia, 01 Nov 2004 to 31 Oct 2005', Australian Bureau of Statistics.

Ancev, T. and Betz, R (2006). Load-Based Licensing: Getting the rates right, at the 35th Australian Conference of Economics (ACE) 25th-27th September 2006

Australian Parliament. Senate (2007) "Inquiry into Australia's future oil supply and alternative transport fuels", Senate Rural and Regional Affairs and Transport Committee

Audit Office of NSW (2005) "Auditor General's Report Performance Audit. Managing Air Quality Department of Environmant and Conservation", Audit Office.

Bailey, P., Yearley, S. & Forrester, J. (1999) "Involving the public in local air pollution assessment: a citizen participation case study", International Journal of Environment and Pollution, vol. 11, iss. 3, pp. 290-303.

Beevers, S. D. & Carslaw, D. C. (2005), 'The impact of congestion charging on vehicle emissions in London', Atmospheric Environment, Vol. 39, Iss. 1, pp. 1-5

Bickerstaff, K. & Walker, G. (2001) "Public understandings of air pollution: the 'localisation' of environmental risk", Global Environmental Change, vol. 11, no. 2, pp. 133-45, City of New York 2007.

Brown, J. Hess, D. & Shoup, D (2001) Unlimited Access, Transportation, vol. 28, no. 3: pp. 233–267.

Buchanan, N (2007) Transport Activity and Transport Based Emissions in Sydney. GHD consultancy report.

Bureau of Transport and Regional Economics (2002) "Greenhouse Policy Options for Transport",

Department of Transport and Regional Services.

Bureau Transport Economics (2000), Urban Congestion—The Implications for Greenhouse Gas Emissions, Information Sheet 16

Carr, B. (2001) 'Keynote address: Innovative State initiatives' in Proceedings of the NSW Clean Air Forum, EPA.

Centre for International Economics (2005) "Sydney's transport infrastructure. The real economics", CIE.

Climate Risk (2007) "Towards a High-Bandwidth, Low-Carbon Future: Telecommunications-based Opportunities to Reduce Greenhouse Gas Emissions", Telstra.

COAG (2006), 'Review Of Urban Congestion Trends, Impacts And Solutions', COAG.

Department of Environment and Conservation (2006a) "*Action for Air* – 2006 Update", DECC.

Department of Environment and Conservation (2006b) "2006 New South Wales State of the Environment", DECC.

Department of Environment and Conservation (2006c) "National Environment Protection (Ambient Air Quality) Measure New South Wales Annual Compliance Report 2005", DECC.

Department of Environment and Climate Change www.environment.nsw.gov.au

Department of Environment and Heritage website www.deh.gov.au

Department of Planning (2005) "City of Cities. A Plan for Sydney's Future. NSW Government's Metropolitan Strategy". Dept of Planning.

Department of Planning Website www.planning.nsw.gov.au

Department of Transport and Regional Services website www.ministers.dotars.gov.au

Ecodrive website www.ecodrive.org

EcoTransit website www.ecotransit.org.au

Environment Australia (2004) "State of Knowledege report: Air Toxics and Indoor Quality in Australia", Environment Australia.

Environment Protection and Heritage Council website www.ephc.gov.au

Environment Protection Authority (2000) 'Clean cars for NSW', Environment Protection Authority NSW.

Glazebrook, G. (2001) "Community Values in Transport", Technology Business Review April/May 2001, pp19-21.

Glazebrook (2007) "Greenpower for CityRail", Correspondence to NSW Premier Morris Iemma 23/4/07.

GovTrack (2007) 'S. 1073—110th Congress: A bill to amend the Clean Air Act to promote the use of fuels with low lifecycle', GovTrack.US

Hirten, J. and Beroldo. S. (1997), Ridesharing Programs Cost Little, Do a Lot,

Transportation Quarterly, vol. 51, no. 2, spring, pp. 9–13.

Holmen, B. & Niemeier, D. (1998), Characterizing the effects of driver variability on real-world vehicle emissions, Institute of Transportation Studies, University of California.

Holper, P. & Noonan, J. (2006) "Urban and regional air pollution information sheet", CSIRO.

Immig, J. (2005) "Working together to clear the air", Total Environment Centre and National Toxics Network.

Laird, P. University of Wollongong, Personal communication.

Macintosh, A. (2007) "Climate Change and Australian Coastal Shipping", Australia Institute.

McKenzie-Mohr Associates & Lura Consulting 2001, "Turn it off: Reducing vehicle engine idling".

Main Roads WA 1998, Future Directions for TDM, Roadscan on-line, March.

Metro Light Rail website www.metrolightrail.com.au/news.asp#news130904

National Environment Protection Council (2007) "Review of the National Environment Protection (Ambient Air Quality) Measure - Discussion Paper", NEPC.

New South Wales Department of Transport website www.transport.nsw.gov.au

New South Wales Government (2006a) "Urban Transport Statement. Responding to the Challenges of Travel and Transport within and across Sydney", NSW Government.

New South Wales Government (2006b) "A new direction for NSW. State Plan", NSW Government. D

NSW Roads and Traffic Authority website www.rta.nsw.gov.au

NSW Parliament website www.parliament.nsw.gov.au/prod/lc/lcpaper.nsf/0/6E0C5A0C0A665E0FCA256CCB0004A05B

Puget Sound Regional Council (US) (1995) VISION 2020 : Growth Management, Economic and Transportation Strategy for the Central Puget Sound Region, PSRC.

Rail Tram and Bus Union (2005) "Moving On – The RTBU's Public Transport Blueprint for Sydney", RTBU.

REFERENCES

Shoup, D.(1997) "Evaluating the Effects of Parking Cash Out: Eight Case Studies", Sacramento: California Environmental Protection Agency,

State Transit Authority (2006) "State Transit Authority of NSW Annual Report 2005-2006", STA.

Stockholm Congestion Charging Secretariat (2006) Evaluation of the Effects of the Stockholm Trial on Road Traffic, The Secretariat, Stockholm

Sydney Morning Herald 4/6/02 "New colossus at Rhodes".

Sydney Morning Herald 11/10/07 "Cruel Tcard twist to hit commuters".

Sydney Morning Herald 22/10/07 "Tcard company acts to stave off collapse".

Sydney Morning Herald 25/10/07 "CityRail trips leap by 10 million".

Tcard website www.tcard.com.au

TFL (2007), 'Impacts Monitoring - Fifth Annual Report', Transport for London.

Transport Info website www.131500.com

Transport Infrastructure Development Corporation Parramatta Interchange website www.raillink.nsw.gov.au/SectionIndex.aspx?PageID=88

Transport Data Centre website www.transport.nsw.gov.au/tdc

T-Way website www.t-way.nsw.gov.au

TTNCCP (1998) Foundation Paper on Climate Change – Transportation Sector, Ottowa.

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