



# Action for Air

2009 Update

Department of  
**Environment, Climate Change and Water** NSW



Front cover left: View of North Sydney and Sydney (courtesy of Hamilton Lund / Tourism NSW)

**Published by:**

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ISBN 978 1 74122 931 8

DECCW 2009/712

November 2009

Printed on recycled paper

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## Executive summary

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*Action for Air*, the NSW Government's 25-year air quality management plan for Sydney, Wollongong and the Lower Hunter has now been in place for ten years.

Air quality has improved over the past 10 years – many of the most dangerous pollutants are down by 30% and we consistently meet national air quality standards for four of six major air pollutants (lead, carbon monoxide, sulfur dioxide and nitrogen dioxide). These reductions are a significant achievement, particularly as over the past 20 years Sydney's population has grown by 21% and the number of passenger vehicles, the main contributor of several significant air pollutants, has increased by 58%.

However, we still face major challenges with ozone and particle pollution, and these are likely to be exacerbated by climate change. National standards for ozone are exceeded in Sydney as are particle standards in some regional areas. These exceedances generally occur between two and 20 days per year. Current and projected ozone and particle levels are a concern in view of growing evidence of the health impacts of air pollution.

The NSW State Plan makes cleaner air a priority, and sets a target requiring NSW to meet national air quality goals identified in the National Environment Protection Measure for Ambient Air Quality (the 'Air NEPM'). This review of *Action for Air* has been informed by the State Plan process, the comprehensive NSW air emissions inventory completed in 2007, and feedback from the community via stakeholder workshops and the 2007 Clean Air, Cool Climate Forum. It introduces an approach to air quality management that recognises the key issues of climate change, health and liveability which are also strong themes in the State Plan.

*Action for Air* also contains measures to reduce emissions from major industry and small businesses, and for making our homes and local environments even cleaner, healthier and more liveable. Recognising the whole community has a role in improving air quality, *Action for Air* includes a number of actions relating to communication and education about air quality, to help inform the public about pollutant sources and their impacts, and ways of reducing emissions.

Necessarily, there is a substantial focus on reducing motor vehicle emissions as these make a large contribution to ozone (photochemical smog) formation in Sydney. Projected growth in vehicle travel is also significant, particularly in road freight. Emission reduction strategies for this sector cover cleaner fuels, vehicles and fleets, reduced vehicle use through land-use changes, and sustainable transport initiatives including public and active transport.

While *Action for Air's* primary focus remains reducing air pollutants, it also identifies air quality programs that reduce greenhouse gas emissions as a co-benefit. It aims to reduce the population's exposure to harmful air pollutants and to minimise the health impacts of air pollution, while making our communities cleaner, safer, healthier and more sustainable places to live. Combating air pollution and greenhouse gas emissions involves employing a variety of strategies across all sectors. For ozone in particular, the Department of Environment, Climate Change and Water NSW (DECCW) modelling results suggest that targeting a single source sector or single pollutant will not be sufficient to meet the Air NEPM standards. *Action for Air* therefore contains a range of measures to tackle air pollution from different sources.

In 2008 DECCW launched a new website which combines air quality monitoring data, weather forecasting and an air pollution alert system, giving the community up-to-date air quality information. The new website includes new statewide maps which provide hourly local air quality levels based on hourly monitoring of the six key pollutants, a new colour chart that provides a visual indication of air quality, a sign up function for Short Message Service (SMS) or email alerts for high pollution days and links to NSW Health for information on what to do on high pollution days.

*Action for Air* is a roadmap to achieve our air quality goals. It is a dynamic plan that is revised and adapted as new information and issues emerge.

## Introduction

Clean air is fundamental to all people's health, with air quality particularly affecting the health of children and older people. It also affects the natural environment and the liveability of the communities in which we work and reside.

There have been significant improvements in air quality in NSW since the 1980s with initiatives to reduce air pollution implemented across industry, business, homes and motor vehicles. Concentrations of many of the most dangerous air pollutants have been reduced by nearly 30%. Concentrations of carbon monoxide, lead, nitrogen dioxide and sulfur dioxide now consistently meet national air quality standards.

Our air quality is considered good by world standards, but air pollution is sometimes still at levels that can harm human health and the environment, and the health costs of this pollution to the community are substantial.

Because of increases in population, motor vehicles and economic activity, ground-level ozone (photochemical smog or summertime white haze) and particle pollution (brown haze in cooler months) have shown no overall decline since the mid 1990s and currently exceed national air quality standards on a number of days each year. Climate change is expected to further exacerbate summertime smog as the number of days above 30°C increases.

Parts of regional NSW face considerable challenges meeting the particle standards. Bushfires, stubble burning, dust storms and woodheaters are the major emission sources in these regional areas. New approaches may be needed to reduce the community's exposure to pollution from local-level sources and natural events.

As well as being a ground-level air pollutant, ozone is the third most important greenhouse gas after carbon dioxide and methane, although it is not covered by the Kyoto Protocol due to its relatively short-term nature. It is important that we recognise the greenhouse benefits of reducing ozone formation along with the benefits for human health.

### NSW State Plan

The NSW State Plan identifies cleaner air and progress on greenhouse gas reductions as priorities. It sets ambitious goals based in large part on broad-ranging community consultation and includes the following environmental targets:

- We will meet national air quality goals as identified in the Air NEPM.
- We will achieve a 60% cut in greenhouse gas emissions by 2050.



*Photo: courtesy Hamilton Lund/Tourism NSW*

NSW has agreed, through the Council of Australian Governments (COAG), to review all measures for greenhouse gas reduction to ensure they are complementary to the Commonwealth Pollution Reduction Scheme. The NSW Climate Change Action Plan (to replace the NSW Greenhouse Plan in 2009) will provide a strategic framework for assessing and dealing with the impacts of climate change. It will also reflect the realignment of State and Commonwealth roles in the context of the introduction of the Carbon Pollution Reduction Scheme.

At the same time, NSW air quality has the potential to benefit from programs that have a co-benefit in reducing greenhouse gases as well as conventional air pollutants like ozone and particles. A number of related priorities and targets in the State Plan are linked with air quality. They include:

- locating jobs closer to home – increasing the percentage of the population living within 30 minutes by public transport of a strategic centre in the Greater Metropolitan Region
- increasing the share of peak hour journeys on safe and reliable public transport
- improving the efficiency of the road network
- ensuring a reliable electricity supply with increased use of renewable energy and increased energy efficiency
- reducing avoidable hospital admissions
- improving health by reducing obesity, smoking, illicit drug use and risky drinking, and
- increasing the mode share of bicycle trips made in the Greater Sydney Region.

*Action for Air* is a key strategy for implementing the State Plan's cleaner air goals.

## About Action for Air

*Action for Air* is the NSW Government's 25-year plan for managing air quality in Sydney, the Illawarra and the Lower Hunter. It began in 1998 and is a whole-of-government strategy covering the full array of sources that contribute to air pollution, from how we plan our cities, roads and public transport, to cleaner vehicles and fuel, and industrial and household emissions. DECCW leads the implementation of the State Plan cleaner air targets and *Action for Air*, in consultation with other agencies.

*Action for Air* is reviewed publicly every three years through a Clean Air Forum and updated to take into account changing circumstances and information. Clean Air Forums were held in 2001, 2004 and 2007, with updates following in 2002 and 2006.

*Action for Air: 2006 Update* (see [www.environment.nsw.gov.au/resources/air/actionforair/actionforair06465.pdf](http://www.environment.nsw.gov.au/resources/air/actionforair/actionforair06465.pdf)) provides a comprehensive summary of the actions that have been taken and those underway to reduce emissions. The Update included around 140 individual actions which will continue to deliver air quality gains across NSW.

## Background

### Action for Air's aims

The aims of *Action for Air* are two-fold:

- reducing emissions so that we comply with the State Plan's cleaner air targets, that is, meeting the national air quality standards for six pollutants as identified in the Air NEPM, and
- reducing the population's exposure to air pollution, and the associated health costs.

*Action for Air* seeks to provide long-term ongoing emission reductions. It does not target acute and extreme exceedences from events such as bushfires.

### The evidence base

#### Air quality data

The State Plan emphasises the importance of analysing the evidence base for new and existing policies, and being able to provide reliable data about our performance in regard to the cleaner air targets. This is partly achieved through the extensive NSW air monitoring program. It provides high quality data which can be used to measure progress against the targets and to assess the impact of pollution abatement programs.

In addition to the monitoring program, DECCW undertakes air pollution modelling. Most regional modelling of air pollution in NSW focuses on assessing how changes to emission sources affect ozone levels in Sydney. The chemistry of air pollution is very complex and the level of pollution depends on meteorology. DECCW is working with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to develop modelling capacity to forecast further into the future and take account of the impacts of climate change. Our ability to set long-term trajectories for particle pollution is being developed.

Results from DECCW's monitoring and modelling work are summarised in a technical report titled *Current and Projected Air Quality in NSW*, (see [www.environment.nsw.gov.au/resources/air/07529cpairqual.pdf](http://www.environment.nsw.gov.au/resources/air/07529cpairqual.pdf)) released in November 2007. It summarises ambient air quality trends from 1994 to 2006 and details recent airshed computer modelling of possible emission reduction scenarios for meeting the standards for photochemical smog (as ozone) in Sydney.

DECC (now DECCW) finalised a new inventory of air emissions in 2007. The *2007 Air Emissions Inventory for the Greater Metropolitan Region in NSW* (see [www.environment.nsw.gov.au/air/airinventory.htm](http://www.environment.nsw.gov.au/air/airinventory.htm)) is the most comprehensive and up-to-date of its kind in Australia. It took three years to prepare and is considerably more detailed than the 1992 inventory. It identifies over 90 different pollutants and covers emissions from all source sectors, including vehicles, industrial, commercial and domestic sectors and natural sources.

The inventory is the foundation of a database which is linked to the latest air pollution models developed in Australia and overseas. The inventory and future linked applications represent a significant step forward in enabling NSW to tackle air quality. Emissions data can be obtained at a regional as well as a local level. The database can also forecast emissions up to the year 2031 and model the impact of policy scenarios. The 2007 inventory is a fundamental component of the evidence base for identifying and targeting key areas for pollution reduction programs.

#### Social research

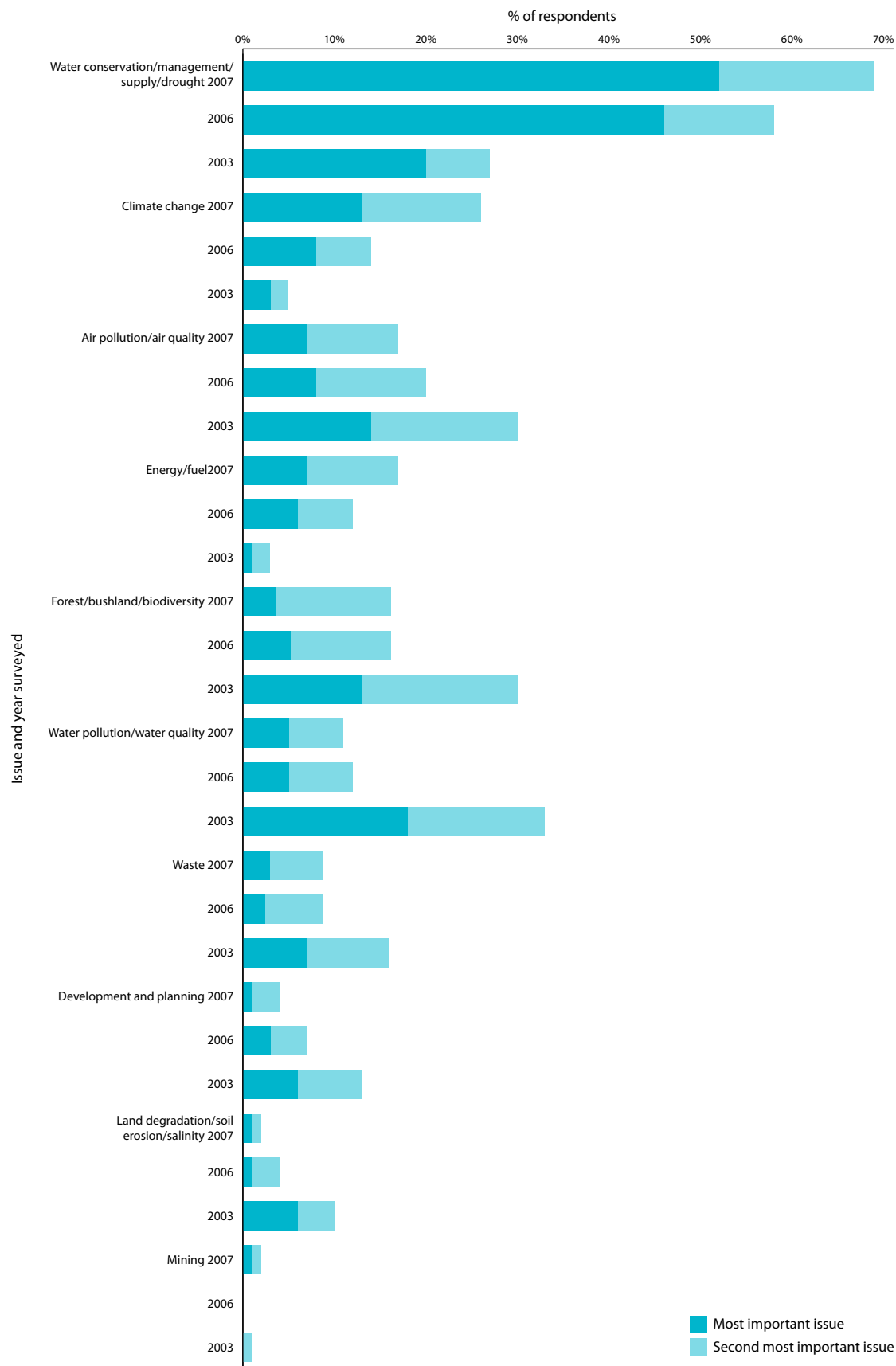
*Who Cares about the Environment?* is DECCW's triennial social research series that tracks the environmental knowledge, attitudes and behaviour of the people of NSW through surveys and focus groups. This research has been conducted every three years since 1994. The 2006 survey included a representative cross-section of 1724 NSW residents aged 15 or over, and focus group discussions with groups of people identified by their level of interest in the environment.

*Who Cares about Water and Climate Change in 2007?* is a follow-up survey to the 2006 main *Who Cares?* survey, with 825 of the respondents in the 2006 main survey (Figure 1). This follow-up survey was designed to assess whether public attitudes and priorities had shifted in the 12 months since the 2006 survey as a result of the substantial increase in public and media attention given to drought, water resources and climate change, and to assess views on climate change in a series of new questions.

#### Key findings and changes across the two surveys in terms of air quality

- In 2006 (as in 2003), people valued the environment highly as part of their lives and almost 90% were concerned about environmental problems.
- In both 2006 and 2007 air quality was not mentioned as a general priority issue for state government attention. However, climate change appeared in 2007 for the first time since the survey began, with 7% rating it one of the two top issues for NSW Government attention.
- In 2007 public transport became the equal top issue for NSW Government attention with health on 37%. Public transport had grown steadily as one of the top two issues, from 9% in 1997 to the third top issue, mentioned by 21%, in 2006.
- Air quality was the second most important environmental issue in 2006 (mentioned by 20%) and third in 2007 (17%). It has fallen steadily in the number of people who nominate it as the most important or second most important environmental issue from 32% in 1997.
- Residents of Sydney in 2006 were much more likely to see air pollution as one of the two most important environmental issues compared to all other areas (24% compared to 9–14%), and in 2007 residents of Sydney, Hunter/Illawarra and large towns were more likely than those in rural areas to see air pollution as an important issue (19–17% compared to 7% of residents in rural areas).
- In 2007 climate change was the second most important issue (after water conservation, supply and management/drought on 67%), doubling those nominating this issue from 13% in 2006 to 26% in 2007. Younger people (15–24) were more likely to nominate climate change (49% compared to 18–30% of other age groups).
- In 2007, air quality initiatives were nominated by 5% as the most important for the NSW Government to protect the environment. A further 14% identified energy and greenhouse, and 9% identified public transport initiatives as the most important.
- In 2006 perceptions of air quality measures were more negative than in previous years. Since 2003, those seeing deterioration in air quality, dealing with industrial emissions and encouraging alternatives to motor vehicles, increased by 7–11%. Those who most frequently engaged in a range of pro-environmental behaviours were most likely to think that air quality measures had deteriorated.
- The number of people often taking active steps to reduce fuel consumption/vehicle air pollution increased by 10% from 2003 to 2006 (from 38% to 48%) but declined slightly in 2007 to 44%. 17–18% said they never do this.
- In both 2006 and 2007 the most important reason for reducing fuel consumption (given by about 50%) was cost. However, those mentioning education/media or general environmental knowledge and awareness more than tripled from 6 to 20%.

Figure 1: Two most important environmental issues



Source: DECC 2007 *Who Cares about Water and Climate Change in 2007?*

## Economic analysis

The State Plan also emphasises the need for detailed consideration of the cost and benefits when developing new approaches and strategies. DECCW has published a study of the health costs of air pollution which is currently being updated (see 'Key issues, Health implications'). Air pollution abatement costs of certain new programs have been considered as part of this review of *Action for Air*. This is discussed further under 'Appendix 1: Economic analysis'.

The review of air quality strategies has also been informed by overseas best practice and, where appropriate, advice from overseas experts.

## Other supporting strategies

*Action for Air* is supported by a number of other linked strategies and statements by NSW Government agencies responsible for urban planning and development, transport planning, public transport network management, traffic management, energy, emissions controls and health. These include:

- *NSW Greenhouse Plan* – released in 2005 (to be replaced by the Climate Change Action Plan in 2009)
- *City of Cities: A plan for Sydney's future* (the 'Metropolitan Strategy') – released in 2005 (due for review in 2010)
- Draft Subregional Strategies under the Metropolitan Strategy – released in 2007–08
- *State Infrastructure Strategy New South Wales 2008–09 to 2017–18* – released in 2008
- *Towards 2030: Planning for our changing population* – released in 2008
- NSW Regional Strategies – released between 2006 and 2009.

The actions already underway under each of these strategies will continue to contribute towards air quality improvements across NSW. In addition a Transport Blueprint, a major strategy for transport planning and delivery will be released towards the end of 2009.



Photo: courtesy Hamilton Lund/Tourism NSW

## Action for Air: 2009 Update

NSW has made significant gains in air quality over the past 10 years. At the same time there is a gap between what has been achieved so far and meeting the State Plan's target of achieving national air quality goals in the future for two of the six air pollutants. Currently we meet all the goals except those for ozone in Sydney and Wollongong, and particles in parts of regional NSW. These remaining challenges are significant.

*Action for Air: 2009 Update* looks at the current emissions profile for the Greater Metropolitan Region and the key sources of concern, based on DECCW's 2007 emissions inventory. It recognises that tackling transport-related air pollution remains a priority due to Sydney's growing population and increasing economic activity. The review analyses the emission reductions required to bring NSW into compliance with the air quality goals.

*Action for Air* remains a dynamic plan that can be adapted as new information and issues emerge, such as the changing global price of oil. It consists of actions that are currently being implemented in addition to those under development and evaluation. It is a process used to address air quality needs now and into the future.

*Action for Air: 2006 Update* identified the existing range of programs across government to reduce emissions from all sectors. This document does not seek to duplicate that task.

A Parliamentary Inquiry into the Health Impact of Air Pollution in the Sydney Basin was established in March 2006. DECCW, in consultation with other agencies, prepared the NSW submission, referring extensively to the *Action for Air: 2006 Update*.

Progress in developing further strategies and actions will be reported at the next Clean Air Forum, scheduled for 2010. Some potential new research areas are discussed in 'Future directions for air quality management' at the end of this report.

## Community feedback on air quality

Consultation with stakeholders has been an important part of identifying the issues to address in the *Action for Air* review and in informing the further development of strategies to address these issues.

The State Plan priorities and targets were themselves developed after extensive community consultation across the State. Thirty-one forums were held across NSW in 2006 and 4000 people and organisations provided direct feedback. Consultation on an update to the State Plan was also conducted in 2009.

During 2007, DECCW held a series of workshops with key stakeholders to discuss the implementation of the State Plan targets and new directions for *Action for Air*. Details of key events are included in Appendix 2.

Mechanisms for further and ongoing community input to air quality management in NSW are discussed under 'The action plan – the actions, Objective 5: Communicate and educate about air quality'.

### Experts Workshop

This initial workshop involved experts from a range of fields discussing new ways to address Sydney's greatest regional air quality issues: photochemical smog and particle pollution. Discussion also involved taking a broader perspective of air quality management that encompasses local exposure and liveability concerns, public health, and the air quality impacts of climate change. As well as representatives from academia, industry, government and non-government organisations, the workshop was attended by a representative from the US Environmental Protection Agency who provided information on recent successful US initiatives.

This was followed up with a series of targeted meetings with local government, industry and environment and health non-government organisations.

### **Vehicles Workshop**

In June 2007 the Roads and Traffic Authority (RTA) and DECC (now DECCW) jointly hosted a Future Vehicles Roundtable with overseas and local speakers and around 200 participants. The Roundtable focused on the impact of transport on air quality and climate change and identified possible technological solutions to this problem.

### **Action for Air Local Government Workshop**

The *Action for Air* Local Government Workshop was designed for local councils and industry associations in the Greater Metropolitan Region to discuss current thinking on air quality and climate change, and to give a perspective on the issues and needs of local councils in managing air quality in their jurisdictions. The workshop was well attended, with 25 representatives from councils, regional organisations of councils and associations, as well as speakers from the Sydney West Area Health Service and CSIRO.

### **Clean Air, Cool Climate Forum**

The third Clean Air Forum held in November 2007 was themed *Clean Air, Cool Climate*. It explored the links between air quality and climate change and how governments are addressing these issues jointly. These encompass the health impacts of air pollution and exposure issues at the local level, progress on the State Plan targets and in meeting the national air quality standards, and new initiatives and programs for action under the State Plan to improve air quality and reduce greenhouse gas emissions. Many of these are documented in this review of *Action for Air*. Videos of the presentations are available online ([www.environment.nsw.gov.au/air/actionforair/](http://www.environment.nsw.gov.au/air/actionforair/)).

### **The Total Environment Centre Report**

The Total Environment Centre provided a report reviewing implementation of *Action for Air* for the 2007 Clean Air, Cool Climate Forum, as it had done previously for the 2001 and 2004 Clean Air Forums.

## Cleaner Vehicles and Fuels Strategy

The *NSW Cleaner Vehicles and Fuels Strategy* sets out an expanded list of NSW Government actions for cleaner fuels and a cleaner fleet. The plan also links with transport and planning actions to reduce vehicle dependence and traffic congestion.

The *Draft NSW Cleaner Vehicles and Fuels Strategy* was released for comment at the Clean Air, Cool Climate Forum on 23 November 2007. The Strategy has been finalised and is available online ([www.environment.nsw.gov.au/air/actionforair/caf2007.htm](http://www.environment.nsw.gov.au/air/actionforair/caf2007.htm)).

The Strategy covers the following initiatives:

- Vapour recovery at service stations (Action 1.1)
- Summer lower volatility petrol (Action 1.2)
- NSW diesel retrofit program (Action 1.3)
- Environmental rating of heavy vehicles (Action 1.4)
- Benchmarking the vehicle fleet (Action 1.8)
- NSW Government FleetWise Partnership (Action 1.6)
- Alternative fuels (Action 1.7), and
- Community awareness and behaviour change education (Action 5.5).

## Clean Air, Healthy Communities Fund

The NSW Environmental Trust has allocated approximately \$5 million to the Clean Air, Healthy Communities Fund from July 2007 to June 2010. The funding available is:

- \$1.5 million for 2007–08
- \$2 million for 2008–09
- \$1.5 million for 2009–10.

The Clean Air, Healthy Communities Fund is working to address a series of priorities in the State Plan associated with environment for living and urban living and transport, with a focus on making progress towards air and greenhouse targets. It also funds projects that have regional and local air quality benefits, comprising the following:

- Stage 2 vapour recovery (Action 1.1)
- Diesel retrofit (Action 1.3)
- NSW Government FleetWise Partnership (Action 1.6)
- Sustainable Mobility Initiatives for Local Environments (Action 1.19)
- Low Emissions Air Program for Smash Repairers (Action 2.5)
- Woodsmoke reduction program (Action 3.3)
- On Your Bike – making it easier to cycle (Action 3.7), and
- Community awareness and behaviour change education (Action 5.5).

# Air quality goals

## Air NEPM goals

### Criteria pollutants

The national ambient air quality standards (Table 1) were agreed to in 1998 by all governments in Australia. They are intended to protect the community against the detrimental health impacts of air pollution. The Air NEPM requires that all states and territories meet the standards by 2008. In meeting the Air NEPM, one to five exceedences of the standards is allowed, to accommodate extreme meteorological conditions, such as bushfires and dust storms.

The State Plan cleaner air target requires meeting national air quality goals identified in the Air NEPM.

NSW meets four of these standards easily (carbon monoxide, nitrogen dioxide, sulfur dioxide and lead) as a result of programs conducted over the past 20 years. However, meeting the ground-level ozone and particle standards is difficult and additional air quality management strategies would be necessary.

### Air toxics

A NEPM for Air Toxics was introduced in 2004. Its purpose is to improve the information base for ambient air toxics within the Australian environment to facilitate the development of standards. (This will follow a review of the NEPM, to be held within eight years of its introduction.) It establishes 'Monitoring Investigation Levels' for five air toxics (benzene, toluene, xylenes, formaldehyde and polycyclic aromatic hydrocarbons). The NEPM requires monitoring of these five air toxics:

- where significantly elevated levels are likely to occur
- where there is a likelihood of significant population exposure, and
- where there are not already programs in place to manage emissions of concern.

Elevated levels of air toxics could occur at locations close to specific sources, such as clusters of industrial sites, heavily trafficked or congested roads, busy airports and areas affected by woodsmoke.

An earlier monitoring program at sites in the Greater Metropolitan Region and some regional centres found that ambient concentrations of air toxics are mostly very low compared to international goals (see [www.environment.nsw.gov.au/air/toxics.htm](http://www.environment.nsw.gov.au/air/toxics.htm)).

A small number of air toxics – benzene, 1,3-butadiene and benzo- $\alpha$ -pyrene – require ongoing assessment to ensure they remain at acceptable levels in the future. Strategies such as increasingly stringent regulation of motor vehicle emissions and fuel quality will assist in controlling air toxics.

## Air quality: 1998 to 2007

As part of reviewing *Action for Air* and implementing the State Plan, DECCW has undertaken detailed analysis of air quality monitoring data and regional air quality modelling results since *Action for Air* was introduced in 1998. Results of the new inventory of air emission sources have also been analysed. The DECCW technical paper, *Current and Projected Air Quality in NSW* (see [www.environment.nsw.gov.au/resources/air/07529cpairqual.pdf](http://www.environment.nsw.gov.au/resources/air/07529cpairqual.pdf)), summarises the results of this analysis and provides background information for developing new strategies.

As a result of industry, motor vehicle and fuel regulation and other programs, put in place progressively, particularly since 1985, concentrations of carbon monoxide, nitrogen dioxide, sulfur dioxide and lead are generally well below the Air NEPM standards.

**Table 1: National ambient air quality standards**

Pollutant	Averaging period	Maximum (ambient) concentration	Maximum allowable exceedences by 2008	NSW 2007 results (exceedence days per year)
Carbon monoxide	8 hours	9.00 ppm (parts per million)	1 day per year	8-hour max: 2.1 ppm no exceedences
Nitrogen dioxide	1 hour	0.12 ppm	1 day per year	1-hour max: 0.055 ppm
	1 year	0.03 ppm	none	1-year max: 0.013 ppm no exceedences
Sulfur dioxide	1 hour	0.20 ppm	1 day per year	1-hour max: 0.06 ppm
	1 day	0.08 ppm	1 day per year	24-hour max: 0.01 ppm
	1 year	0.02 ppm	none	1-year max: 0.002 ppm no exceedences
Lead	1 year	0.50 µg/m <sup>3</sup> (micrograms per cubic metre)	none	Annual average 0.1 µg/m <sup>3</sup> from 2001–2004. Monitoring ceased 2004 as NEPM standard achieved.
Photochemical oxidants (as ozone)	1 hour	0.10 ppm	1 day per year	<b>Sydney</b> 4-hour max: 0.12 ppm 11 exceedences
	4 hours	0.08 ppm	1 day per year	<b>Illawarra</b> 4-hour max: 0.082 ppm 2 exceedences
Particles (as PM <sub>10</sub> )	1 day	50 µg/m <sup>3</sup>	5 days per year	<b>Sydney</b> max: 70 µg/m <sup>3</sup> 4 exceedences <b>Illawarra</b> max: 60 µg/m <sup>3</sup> 7 exceedences <b>Albury</b> max: 198 µg/m <sup>3</sup> 11 exceedences <b>Wagga Wagga</b> max: 105 µg/m <sup>3</sup> 34 exceedences

### Carbon monoxide

Motor vehicles are the dominant source of carbon monoxide. Concentrations of carbon monoxide have fallen over the past 20 years as a result of changes to motor vehicle technology.

### Nitrogen dioxide

Motor vehicles are also the dominant source of nitrogen dioxide. Exceedences of the Air NEPM standard were commonly observed in the winter months during the early 1980s. Exceedences are now rare, and from 2002 to 2007 the highest 1-hour value recorded in Sydney was 75% of the standard. Over this period, maximum concentrations were even lower in the Illawarra and Lower Hunter regions.

### Sulfur dioxide

Sulfur dioxide in the Greater Metropolitan Region originates mainly from industries such as metal processing, oil refining and coal-fired power generation. As a result of regulatory efforts, from 1994 to 2007 concentrations of sulfur dioxide were low, with no exceedences recorded in the Greater Metropolitan Region. Maximum hourly ambient concentrations in Sydney were less than 25% of the Air NEPM standard. Higher concentrations are observed in the Illawarra and Lower Hunter regions as a result of industrial emissions, however these are also below the NEPM standard.

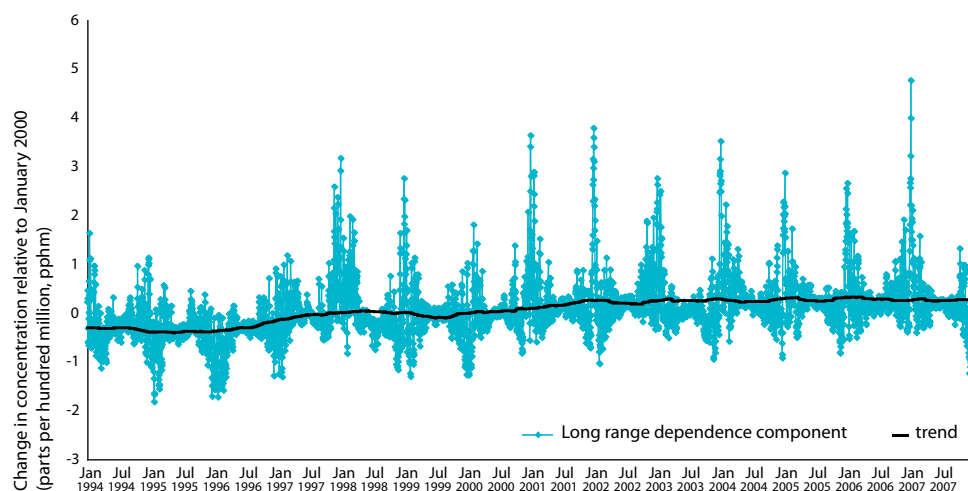
### Lead

Changes to fuel formulation have reduced concentrations of lead in the atmosphere. Annual averages in Sydney are less than 20% of the Air NEPM standard. With a complete ban on lead in petrol now in force, the primary source of lead in air at the regional scale has been eliminated. Consequently, routine monitoring of lead was no longer considered necessary and ceased in December 2004.

### Ozone

Ground-level ozone continues to be a problem in Sydney in summer. Ozone is a secondary pollutant formed in a chemical reaction when emissions of  $\text{NO}_x$  and VOCs combine in sunlight. The meteorology and topography of the Sydney basin play a significant role in the formation of ozone and in the year-to-year variations in concentrations in Sydney. There was a decline in peak ozone levels in the 1980s but currently there is no clear trend. Ozone levels are not decreasing and may actually be on a slight upward trend (Figure 2).

Figure 2: Trend in daily maximum 4-hour ozone concentrations in Sydney



Source: DECC 2007 (see [www.environment.nsw.gov.au/aqms/aqi.htm](http://www.environment.nsw.gov.au/aqms/aqi.htm))

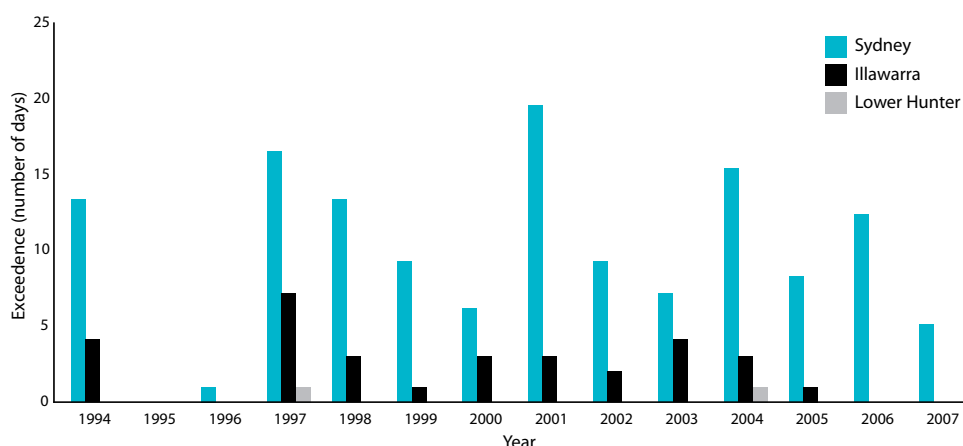
The Air NEPM sets two standards for ozone: a 1-hour standard and a 4-hour standard. The Air NEPM requires that by 2008 these standards not be exceeded on any more than one day per year at each monitoring site.

In Sydney in the years 1994 to 2007, the number of days on which concentrations exceeded the 4-hour standard ranged from 1 to 21, with 11 exceedence days in 2007. For the same period, exceedences of the 1-hour standard ranged from 0 to 19, with five exceedence days in 2007. Western Sydney tends to experience the highest ozone levels.

Exceedences are less frequent in the Illawarra, having occurred on up to seven days per year for either standard. The Lower Hunter region has only recorded one exceedence of the 1-hour standard since 1999.

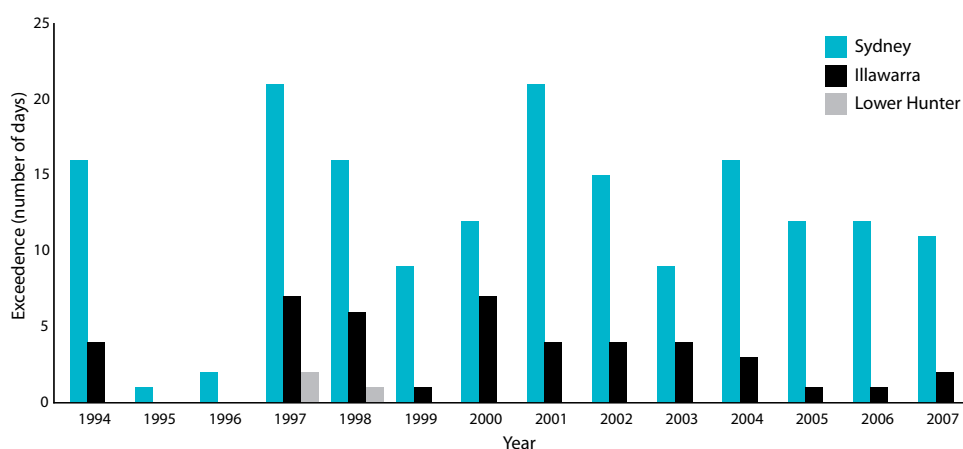
Figures 3a and 3b show exceedences of the Air NEPM standards for ozone between 1994 and 2007 in the Greater Metropolitan Region.

**Figure 3a: Exceedences of the 1-hour Air NEPM standards for ozone in the Greater Metropolitan Region (only one exceedence permitted)**



Source: DECC 2008 (see [www.environment.nsw.gov.au/aqms/aqi.htm](http://www.environment.nsw.gov.au/aqms/aqi.htm))

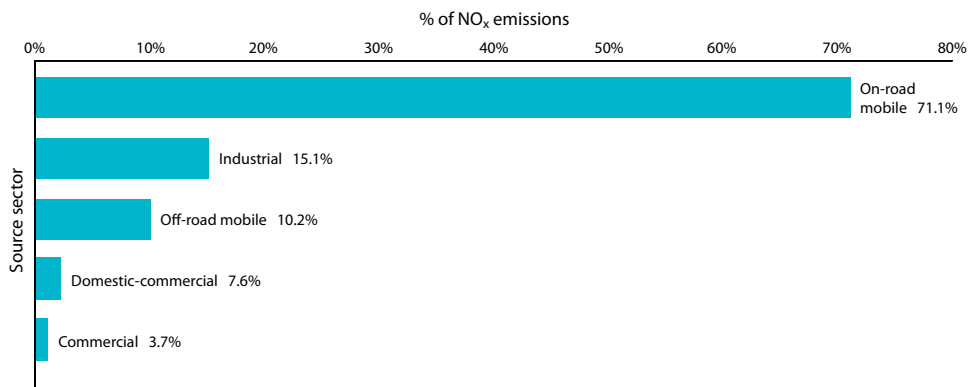
**Figure 3b: Exceedences of the 4-hour Air NEPM standards for ozone in the Greater Metropolitan Region (only one exceedence permitted)**



Source: DECC 2008 (see [www.environment.nsw.gov.au/aqms/aqi.htm](http://www.environment.nsw.gov.au/aqms/aqi.htm))

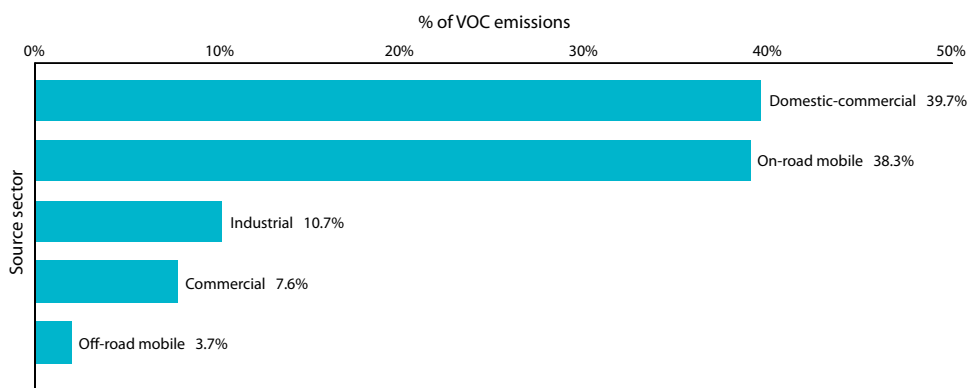
Figures 4 and 5 show the proportions of annual NO<sub>x</sub> and VOC emissions in Sydney by sector. Motor vehicles (on-road mobile) are the main source of NO<sub>x</sub> (71.1%) while motor vehicles (38%) and the domestic-commercial sector (39.7%) are almost equal as the main contributors of VOCs. Figures 6 and 7 provide a breakdown of sources for a typical summer month when ozone levels are at their highest.

**Figure 4: Proportion of annual NO<sub>x</sub> emissions in Sydney by sector**



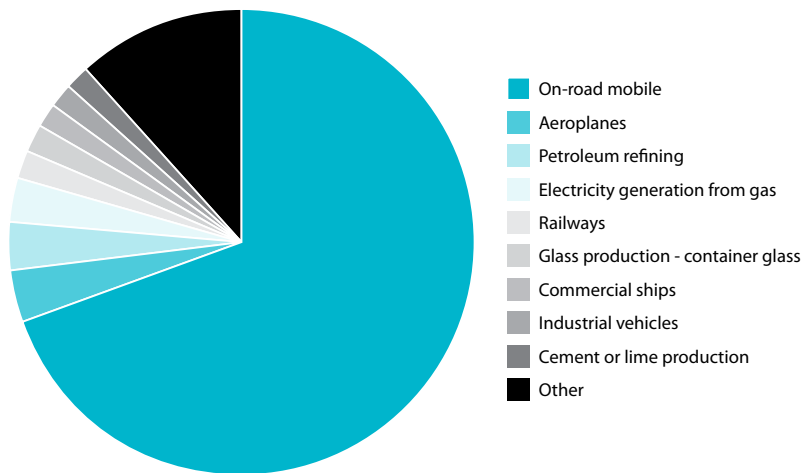
Source: DEC 2007 (see [www.environment.nsw.gov.au/air/airinventory.htm](http://www.environment.nsw.gov.au/air/airinventory.htm))

**Figure 5: Proportion of annual VOC emissions in Sydney by sector**



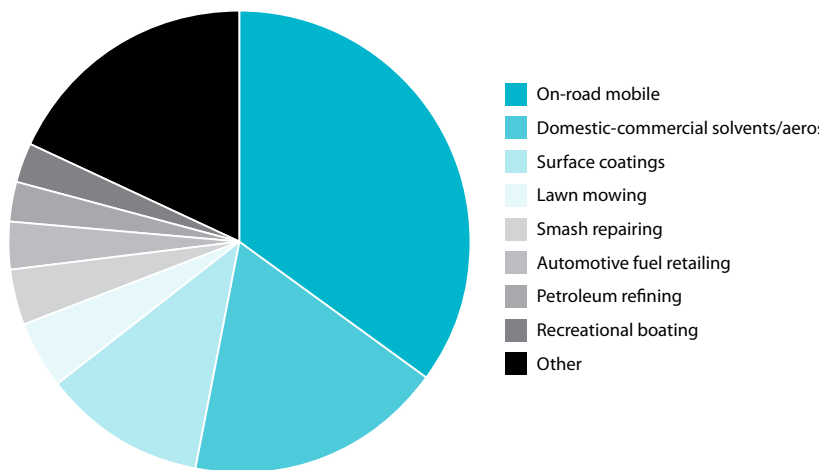
Source: DEC 2007 (see [www.environment.nsw.gov.au/air/airinventory.htm](http://www.environment.nsw.gov.au/air/airinventory.htm))

Figure 6: NO<sub>x</sub> emission sources for January in Sydney



Source: DEC 2007 (see [www.environment.nsw.gov.au/air/airinventory.htm](http://www.environment.nsw.gov.au/air/airinventory.htm))

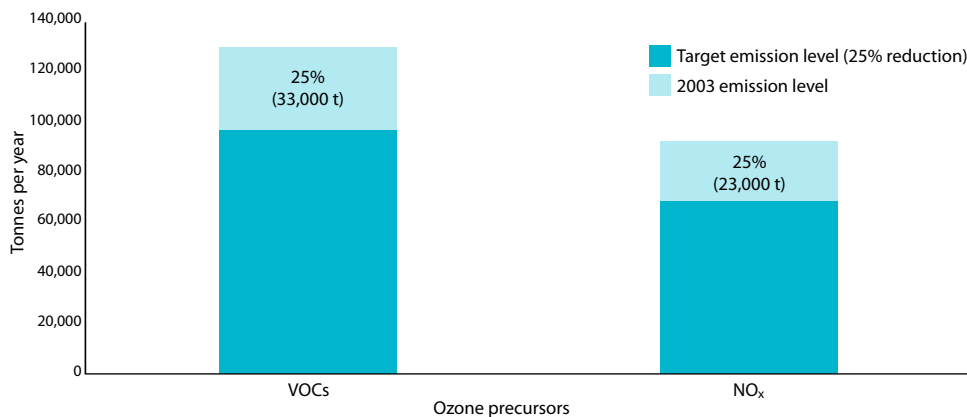
Figure 7: VOC emission sources for January in Sydney



Source: DEC 2007 (see [www.environment.nsw.gov.au/air/airinventory.htm](http://www.environment.nsw.gov.au/air/airinventory.htm))

A broad range of additional emission reduction strategies will be required to meet the ground-level ozone standard in the Air NEPM. An estimated 25% reduction (from 2003 emissions) of the overall levels of NO<sub>x</sub> and VOCs is needed to meet the ozone standard. This equates to a reduction of approximately 33,000 tonnes of VOCs and 23,000 tonnes of NO<sub>x</sub> emissions annually, as shown in Figure 8.

**Figure 8: Sydney VOC and NO<sub>x</sub> total emissions and reductions required to meet the national ozone standard (as at 2006)**



## Particles

Particles remain a health issue, particularly at the local level (such as near busy roads), even when ambient levels are low. At greatest risk from particle pollution are people with heart or lung disease, older adults and children.

The Air NEPM sets a standard for particles less than 10 micrograms (PM<sub>10</sub>) of 50 micrograms per cubic metre (1-day average), with a goal of no more than five exceedence days per year to allow for natural events such as dust storms and bushfires.

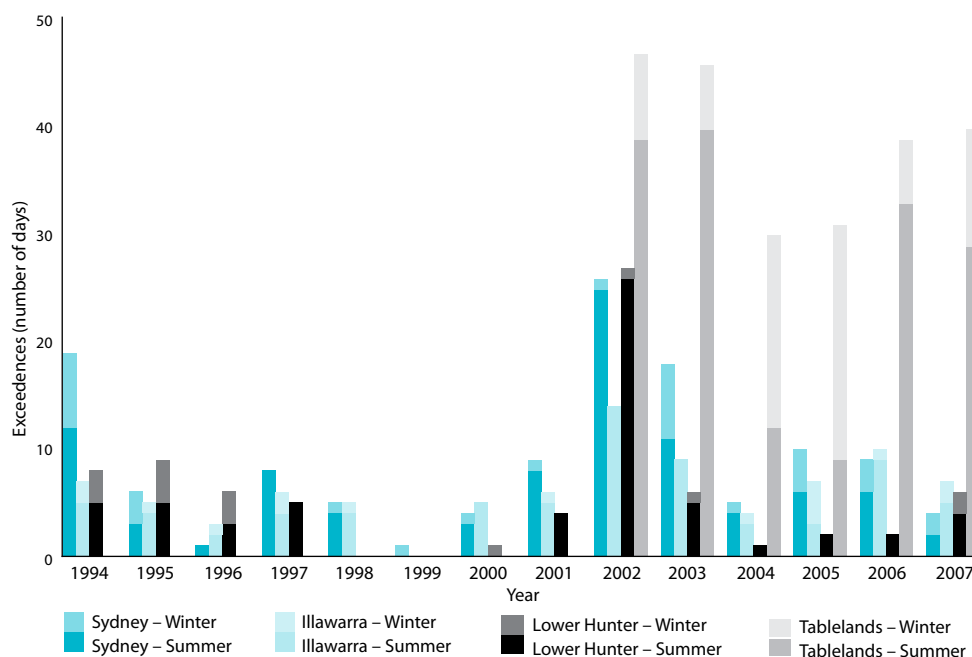
The national standard for PM<sub>10</sub> is generally being met in Sydney, except in years with bushfires or dust storms. Figure 9 shows summer (October to March) and winter (April to September) exceedences of the Air NEPM standard for particles in NSW regions from 1994 to 2007. Bushfires in 1994 and 2001 to 2003 were responsible for the extremely high concentrations of particle pollution recorded in the Greater Metropolitan Region in those years. The number of exceedences varies greatly from year to year as shown by the marked drop in 2004.

In rural areas like Wagga Wagga and Albury there have been up to 37 (2006) and 29 (2003) exceedences (respectively) of the standard in a year, due primarily to bushfires, hazard reduction burning, agricultural stubble burning and the use of solid-fuel heaters. Meeting the particle standard in some regional towns will require a significant reduction in emissions.

Health research identifies particles of less than 2.5 micrograms (PM<sub>2.5</sub>) as a particular concern because their smaller size means they can be inhaled deeper into the lungs, and because there is no safe threshold level to use for setting standards. Recognising that there is currently insufficient information to set a health-based standard, the NEPM was amended in 2003 to include advisory reporting standards for PM<sub>2.5</sub>. In NSW PM<sub>2.5</sub> levels are generally below the reporting standard for a 24-hour level but are currently above the annual reporting level.

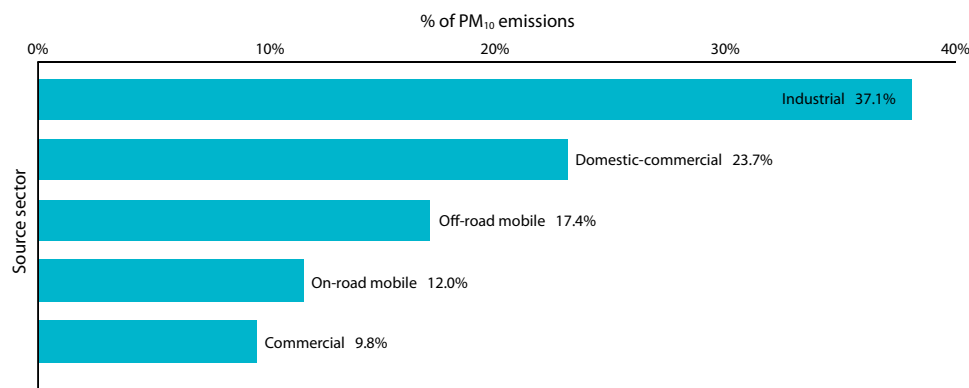
The major sources of anthropogenic particle emissions (PM<sub>10</sub>) in the Sydney region are industry (37.1%), the commercial and domestic sectors (23.7%), off-road mobile (17%) and motor vehicles (12%). Off-road mobile includes aircraft, railways, boats, and non-registered mining, construction and industrial vehicles. Diesel vehicles are the major contributor to motor vehicle particle emissions, and domestic solid-fuel heating makes up a significant proportion of commercial and domestic emissions in winter. In many rural and regional areas, solid-fuel heaters contribute a greater proportion of particle emissions during the colder months. Emissions from agriculture and hazard reduction burning are also a factor in rural and regional areas. Figure 10 shows the sources of particle emissions in the Sydney region annually. Figure 11 provides a breakdown of sources for a typical winter month.

Figure 9: Exceedences of the 24-hour Air NEPM standard for particles (PM<sub>10</sub>) in NSW regions



Source: DECC 2008 (see [www.environment.nsw.gov.au/aqms/aqi.htm](http://www.environment.nsw.gov.au/aqms/aqi.htm))

Figure 10: Proportion of annual particle (PM<sub>10</sub>) emissions in Sydney by sector

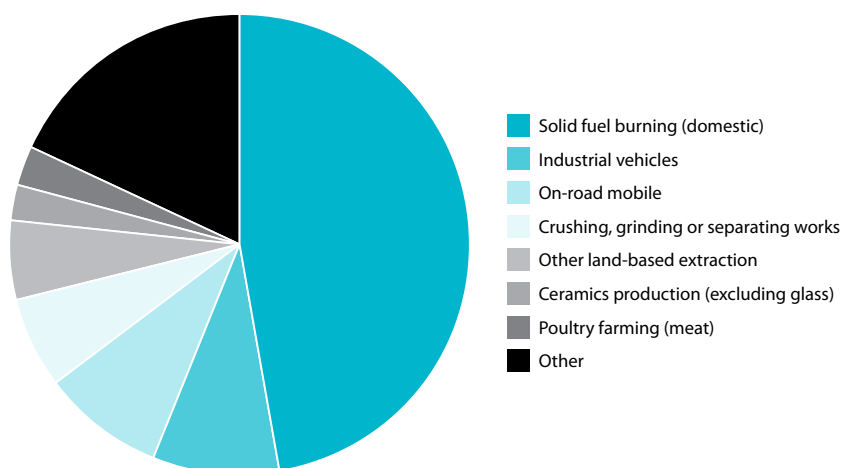


Source: DECC 2008 (see [www.environment.nsw.gov.au/air/airinventory.htm](http://www.environment.nsw.gov.au/air/airinventory.htm))

## The next 10 to 15 years

The projected performance for four of the Air NEPM pollutants is for stable levels or continuing reductions in concentrations. Carbon monoxide concentrations have continued to fall with the turnover of the vehicle fleet and older vehicles being replaced with newer vehicles with more stringent emission limits. Emissions of NO<sub>x</sub> from motor vehicles are predicted to fall due to the progressive introduction of stricter standards for fuel quality and vehicle emissions, despite forecast increases in vehicle kilometres travelled. The regulation of emissions from industrial sources has helped to ensure that sulfur dioxide concentrations remain well below the NEPM standard.

Figure 11: Particle (PM<sub>10</sub>) emission sources for a typical winter month in Sydney



Source: DECC 2008 (see [www.environment.nsw.gov.au/air/airinventory.htm](http://www.environment.nsw.gov.au/air/airinventory.htm))

Modelling work undertaken by DECCW, as outlined in the technical paper *Current and Projected Air Quality in NSW*, shows that further emission reductions are needed to achieve ozone NEPM standards well into the next decade. This emphasises the need for ongoing reductions from all major sources of ozone precursors.

Motor vehicles will remain the most significant source of smog-forming pollutants in the Sydney region. Gains from tighter fuel and vehicle emission standards are likely to be partially offset by growth in vehicle numbers and travel, both private and commercial, and use of heavier vehicles. This will require a continuing focus on motor vehicle emissions, including emphasis on integrated land-use and transport planning and public transport planning.

Particle emissions in the Sydney region also need to continue to be addressed because sometimes concentrations approach the national standard for PM<sub>10</sub> even in the absence of natural events such as bushfires and dust storms. In some rural and regional areas, exceedences of the national standard for PM<sub>10</sub> highlight the need for better management of anthropogenic sources, particularly agricultural burning and emissions from solid-fuel heaters.

The Air NEPM is currently under review, with a report due to be considered by the Environment Protection and Heritage Council (EPHC) in 2010, which may also change the settings for *Action for Air*.

It is likely that weather patterns for NSW will continue to alter due to global climate change, with associated changes to air quality in metropolitan and regional areas. Increased temperatures may result in a longer season for elevated concentrations of summertime ozone. Dynamic downscaling modelling undertaken by the CSIRO<sup>1,2</sup>, with emissions of ground-level ozone precursors held at current levels, indicated the following:

- a 27% increase in the average number of days over the 1-hour ozone standard by 2021 to 2030, and a 45% increase by 2051 to 2060, and
- a 33% increase in the average number of days over the 4-hour ozone standard by 2021 to 2030, and a 75% increase by 2051 to 2060.

The geographical extent of ozone impacts is also expected to increase under these climate change scenarios.

Changes to rainfall, temperature and weather patterns may increase the frequency of dust storms and bushfire-related pollution events.

1 These best estimates are based on simulations using climate model results from the Intergovernmental Panel on Climate Change (IPCC) greenhouse gas emission scenario A2, and assume that urban smog precursor emissions remain at current levels.

2 Source: CSIRO 2008, 'A Methodology for Determining the Impact of Climate Change on Ozone Levels in an Urban Area' (see [www.environment.gov.au/atmosphere/airquality/publications/pubs/climate-change.pdf](http://www.environment.gov.au/atmosphere/airquality/publications/pubs/climate-change.pdf)).

## Dust storms

Dust storms can result in widespread exposure to extreme levels of particles. For example, on 23 September 2009 a major dust storm covered most of NSW. This was also the largest dust storm to hit the eastern seaboard since air quality monitoring began. It resulted in extreme levels of particles over most of the state. The lower Hunter recorded the highest PM<sub>10</sub> averages over 24 hours of 2425 µg/m<sup>3</sup>, nearly 50 times the standard of 50 µg/m<sup>3</sup>. Sydney, the Illawarra, Bathurst and Tamworth recorded PM<sub>10</sub> concentrations ranging from 27 to 42 times the standard. The previous highest PM<sub>10</sub> concentration recorded in NSW was at Wagga Wagga during a dust storm on 19–20 March 2003, when the PM<sub>10</sub> 24 hour-average registered 970 µg/m<sup>3</sup>, almost 20 times the standard.



*The dust storm that covered NSW in September 2009 was the largest to hit the eastern seaboard since air quality monitoring began in NSW. Photo: A.Weeraratne/DECCW*

## Key issues

### Climate change

Global emissions of greenhouse gases will affect our climate and, in turn, this is likely to increase key air pollutants such as ozone and particulates. This means that Air NEPM goals may be more difficult to achieve in the future. In some cases, reducing air pollutants can also cut greenhouse gas emissions.

There are important links between activities that emit air pollutants and those that create greenhouse gas emissions:

- air pollutants and greenhouse gases are often emitted by the same sources (e.g. fuel combustion)
- technical measures to reduce greenhouse gas emissions may affect emissions of air pollutants, and vice versa

In addition there are links between air pollutants and greenhouse gases:

- some air pollutants (such as ozone) contribute to regional air pollution and are also greenhouse gases affecting climate on a global scale
- higher temperatures caused by escalating greenhouse gas concentrations are expected to increase the formation of atmospheric pollutants such as ozone and secondary particles that form in the air as a result of various chemical reactions.

As a result, links can be made between policy responses to both issues. Obvious applications for this include the energy and transport sectors, which are key sources of both greenhouse gases and regional air pollutants, and where policies to reduce the impacts of one problem can have significant co-benefits for the other.

Programs such as improving combustion, engine and vehicle efficiency will reduce emissions of all pollutants (ozone precursors and CO<sub>2-e</sub>) and switching to cleaner fuels will often have similar co-benefits. Strategies which encourage people to shift to a less polluting mode of transport and use more active transport will have considerable emission reduction benefits. Because ozone is also a potent greenhouse gas, in many instances policies to reduce emissions of ozone precursors will also contribute to greenhouse gas abatement.

It is beneficial to integrate climate change and air quality management policies, where appropriate, rather than tackle them separately. A coordinated approach also means we can use resources more efficiently, lowering the costs of abatement programs for greenhouse gases and other pollutants. This is because the benefits associated with reduced health impacts from particles and ozone exposure are combined with the benefits of reduced greenhouse emissions.

There are some instances where greenhouse and air emission measures are not aligned. For instance, the push toward cleaner heavy vehicles has resulted in a slight reduction in fuel efficiency for some vehicle classes due to the effect some control technologies have on engine performance. In some cases, avoiding air pollution emissions has an energy cost.

#### Approach adopted in Action for Air

- Actions targeting the transport sector are given a strong focus.
- Where air quality and climate change synergies are apparent, programs will be designed to reduce both air pollutants and greenhouse gases. An approach to vehicles that considers air quality and greenhouse gas reductions would encourage smaller or more fuel efficient vehicles.

- *Action for Air* seeks to manage and make explicit any trade-offs between greenhouse gas and air emission programs. For example, the development of more gas-fuelled power stations has positive impacts on greenhouse gas emissions and other pollutants (compared to coal). However, locating these new power stations in a region that already experiences ozone exceedences presents a challenge to air quality management, meaning that NO<sub>x</sub> emissions from these new sources need to be appropriately controlled.
- Health is the primary driver for air pollution reduction in *Action for Air*. Air pollution abatement actions address both short-term health impacts and, in conjunction with greenhouse gas abatement programs, address broader climate change impacts in the longer term (e.g. increases in heat stress with a greater number of very hot days and cardiovascular impacts from increased exposure to ozone and particles).

The actions to address air pollution which also have climate change co-benefits are identified in 'The action plan – the actions'.

The NSW Government also has extensive existing commitments to cut greenhouse gas emissions over the next 20 to 45 years, as set out in the State Plan and the *NSW Greenhouse Plan* (see [www.environment.nsw.gov.au/climatechange/greenhouseplan.htm](http://www.environment.nsw.gov.au/climatechange/greenhouseplan.htm)).

## Health implications

Air pollution, even at the relatively low levels common in many Australian urban environments, can have health impacts. Continued efforts to reduce exposure to air pollution are likely to reduce disease and provide additional health benefits and reduced health costs.

Air pollution is a persistent health concern in major cities in Australia and around the world. Continued exposure to common air pollutants such as ground-level ozone, nitrogen dioxide, carbon monoxide, and particulate matter (PM) can result in serious health impacts, including premature death and cardiovascular and respiratory illness. Those particularly susceptible to the health impacts of air pollution are the very young (because they are generally more active outdoors and their lungs are still developing), the elderly and those with pre-existing health conditions.

Since the early 1990s a substantial body of research has been published about the adverse health effects of air pollution. The research suggests that air pollution at the relatively low levels common in many urban environments of industrialised countries is a risk factor for health effects. An increasing range of adverse health effects has been linked to air pollution, especially particulate matter.

Short-term exposure exacerbates existing respiratory and cardiovascular symptoms and increases the risk of symptoms, hospitalisation, and death. Long-term exposure increases the risk of chronic respiratory and cardiovascular disease and death, impacts on birth weight, and can permanently affect the lung development of children<sup>2</sup>.

In 2005 the European Union (EU) estimated that average life expectancy in Europe was reduced by over 8 months due to exposure to particle pollution (equivalent to 3.6 million life years lost annually). For ozone the EU estimated around 21,000 cases of hastened mortality in 2020 unless further actions are taken<sup>3</sup>.

This new evidence is driving the need for new air quality management strategies around the world.

<sup>2</sup> CA Pope, *New England Journal of Medicine*, Vol. 351, 9 Sept 2004, No. 11, p. 1132

<sup>3</sup> Communication from the Commission to the Council and the European Parliament – Thematic strategy on air pollution (SEC (2005) 1132). Available from <http://europa.eu/scadplus/leg/en/lvb/l28159.htm>.

### Impact on air quality standards

The health evidence has led to the tightening of air quality standards and health guidelines, particularly for particles and ozone. The World Health Organization (WHO) tightened its guideline values for ozone in 2006 and introduced new guidelines for PM<sub>10</sub> and PM<sub>2.5</sub>. WHO noted that the guidelines cannot provide full protection against health effects of particles and ozone because thresholds below which adverse effects do not occur have not been identified<sup>4</sup>.

In 2006 the US EPA also revised its particle standards and in 2008 finalised a review of its ozone standards, adopting a tighter standard. The EU has also adopted new particle standards.

In Australia the Air NEPM is currently under review with final recommendations expected in 2010. As the State Plan and *Action for Air* targets are linked to the Air NEPM, the review may have direct bearing on the scope of future NSW strategies.

### Costs and benefits

Although there is a growing consensus that exposure to relatively low levels of air pollution contributes to heart and respiratory illness, the cost implications of tightening health-based standards and requiring new pollution abatement actions are significant. The health impacts research is leading to more sophisticated methodologies for calculating health costs.

The health costs of air pollution to the NSW community are real and substantial. The estimated annual health cost (direct and indirect) of current levels of air pollution in the Greater Metropolitan Region is \$4.7 billion, or \$893 per head of population. Air pollution causes between 640 and 1400 deaths per year in Sydney, between 359 and 784 hospital admissions for respiratory conditions and between 561 and 1206 hospital admissions for cardiovascular conditions<sup>5</sup>.

The Commonwealth Bureau of Transport and Regional Economics estimated that motor traffic pollution alone was responsible for health costs of \$3.3 billion per year in Australian capital cities. Sydney's share of this was estimated at \$1.5 billion<sup>6</sup>.

Although Sydney has good air quality by world standards, a reduction in current air pollution levels would deliver significant long-term benefits for the population's improved health and reduced health costs. However, these benefits have to be balanced against the costs of additional abatement actions.

### Particles and traffic pollution

There is still limited information on what component of particles is causing the health effects and what combustion sources are most critical. However, there is a growing body of research suggesting that particle pollution from vehicles is of major concern. The EU has identified its key priorities as particles, ozone and traffic-related air pollution.

The health evidence on particles and traffic, and the tighter air quality standards, have in turn driven policy approaches for more effectively controlling pollutants from vehicles. To address concerns about health impacts of traffic, countries and cities have implemented strategies such as speed reduction on major roads (The Netherlands), road pricing and congestion pricing (London and Stockholm), low-emission zones (Los Angeles), incentives for uptake of cleaner vehicles (Europe and the US), as well as tighter emission controls for new vehicles. These strategies are designed to have multiple benefits and address transport, planning and greenhouse gas issues, in addition to health impacts.

4 WHO Geneva 2006, *Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide: Global update 2005*

5 DEC 2005, *Air Pollution Economics: Health Costs of Air Pollution in the Greater Sydney Metropolitan Region*, [www.environment.nsw.gov.au/resources/aqms/airpollution05623.pdf](http://www.environment.nsw.gov.au/resources/aqms/airpollution05623.pdf)

6 Bureau of Transport and Regional Economics 2005, 'Health impacts of transport emissions in Australia: Economic costs', Working Paper no. 63, Department of Transport and Regional Services, Canberra.

## Planning for our changing population

In April 2008, the NSW Government released *Towards 2030: planning for our changing population*. *Towards 2030* complements the State Plan priorities and is a whole-of-government strategy to provide a range of practical ways in which NSW Government agencies can respond to the challenges of an ageing population. *Action for Air* recognises the important impact demographic change will have on NSW over the next 15–25 years and acknowledges that by 2030 the number of people aged over 65 living in NSW will have nearly doubled to 1.8 million, and increased by 86% in the Greater Metropolitan Region. The activities undertaken as part of *Action for Air* will assist in improving the quality of life for all NSW residents, including the growing number of people over 65.

## Approach adopted in Action for Air

- *Action for Air* continues to focus on reducing ambient levels of particles and ozone.
- Actions will continue to improve the emissions of the vehicle fleet, to reduce exposure to vehicle emissions for people living or working on major transport routes and to ensure that predicted reductions in vehicle pollution are realised.
- The health benefits and abatement costs of actions that will lead to additional marginal improvements in air quality will be carefully evaluated.

Some of the actions underway will increase the evidence base for understanding the health impacts of air pollution from particular sources, such as traffic, and will help us to better target the management responses. They will also enable individuals and communities to be better informed and reduce their exposure to air pollution. These are identified under 'The action plan – the actions'.

## Liveability

Liveability programs aim to create buildings, spaces and communities that are clean, safe, healthy and sustainable, with high accessibility to public transport, services, employment and open space and opportunities for physical activity and social interaction. Building communities this way can reduce car dependency and help reduce air pollution and greenhouse gas emissions.

There is growing recognition, both nationally and internationally, that some urban forms and associated transport patterns are related to public health issues, including exposure to air pollution, obesity, mental health and general wellbeing.



*Action for Air transport initiatives are designed to reduce traffic congestion and air pollution.*



*Fires around Sydney can affect air quality.*

‘Liveability’ is the concept that links these health, urban planning and environmental issues. Neighbourhood design, access to safe walking and cycling routes and mixed-use development provide health and environmental benefits by reducing car dependency and promoting physical activity. This is closely linked to other urban issues such as sustainable cities and urban mobility.

The State Plan sets a strong framework for developing liveability actions, by setting priorities across a range of issues directly related to or impacting on human and environmental health. These include improving health through reduced obesity, cleaner air and reduced greenhouse emissions, increasing the share of peak hour journeys on a safe and reliable transport system, improving the efficiency of the road network, locating jobs closer to home, and encouraging more people to use parks, sporting and recreational facilities.

The NSW Government already has a number of strategies and forums in place that relate to liveability, including its *Integrated Land Use and Transport Policy*, *City of Cities – A plan for Sydney’s future* (the Metropolitan Strategy), *Planning Guidelines for Walking and Cycling*, Draft Subregional Strategies and the Premier’s Council for Active Living. Initiatives underway include urban planning and design that make neighbourhoods, town centres and recreational destinations easier to access and move around by walking, cycling and public transport.

Overseas examples of government programs promoting liveability include:

- protecting and enhancing green zones and increasing and integrating transport choices, i.e. public transport, walking, cycling (Portland in Oregon, Vancouver)
- encouraging mixed-used development and higher density living to reduce the need for car travel (Vancouver)
- developing cycling plans with targets for increasing cycling as a mode of transport (London and Paris)
- providing traffic training for children so they have greater mobility choice (Odense in Denmark), and
- promoting walking by improving signage, surfacing, lighting, street furniture and map boards (London and Paris).

Non-government initiatives are also common, particularly in the US, including: green building design, innovative approaches to increase physical activity through community design, public policies and communications strategies combined with funding for community partnerships, demonstration projects, planning and design services, pilot projects, and training for local government planners.

Approaches incorporating liveability factors typically are not driven by high-level standards and targets for single issues, but focus on place-based planning and are characterised by multi-disciplinary approaches spanning urban planning and design, public health and environment protection. For this reason, the concept lends itself to local government initiatives supported by integrated local and regional planning.

Liveability-based approaches offer a number of synergies and potential co-benefits for reducing air pollution and greenhouse gas emissions. For example:

- through passive and active solar building design
- by reducing motor vehicle trips with improved access to jobs, schools, services and open space, and encouraging use of alternative transport modes, and
- by reducing our urban footprint and supporting increased green space and vegetation.

The benefits of trees and green space to human wellbeing are increasingly being recognised – encouraging outdoor activity, providing shade for walkable environments, offsetting the urban heat island effect, and serving as carbon dioxide sinks and filters for air pollutants. Utilising existing parks and gardens in and around urban areas is an important way to enhance liveability.

The liveability concept can also be clearly linked to the cleaner air goals in *Action for Air*, particularly via actions to reduce emissions from motor vehicles.

#### **Approach adopted in Action for Air**

- Link air quality and climate change goals to the goals for improved urban environments, and work with other agencies responsible for planning, transport and health to develop initiatives that serve multiple State Plan goals.
- Support local government in liveability planning that reduces air pollution and greenhouse gas impacts.
- Encourage private sector development projects based on sustainability and liveability.
- Increase greening of communities to promote liveability, air quality and greenhouse gas reduction goals.
- Using DECCW's Healthy Parks Healthy People program, promote the health benefits of our urban parks, and emphasise integration of national parks and communities via active and public transport.

New actions promoting improved liveability are identified in 'The action plan – the actions'.

### **Local exposure**

Air quality management strategies need to address the exposure to emissions, particularly particle emissions, of populations in close proximity to local-level pollution sources. Local exposure can be a health concern even when regional pollution levels are low.

Closely related to health and liveability is the issue of local exposure. Locally exposed populations include people living and working alongside major road corridors, other high-volume transport precincts (e.g. ports, airports), and specific sites and facilities that emit noxious pollutants (e.g. industrial and commercial premises). Exposure of some populations to air and noise emissions may increase as a result of land-use planning designed to reduce overall travel demand and transport emissions (e.g. infill development, higher density living in existing areas).



*Roadside remote sensing is used to profile vehicle emissions in Sydney.*

Research in Australia and overseas has explicitly linked pollution exposure, particularly along road corridors, to health impacts. The community, through the State Plan and *Action for Air* consultation processes, has also expressed growing concern about exposure of local populations to emissions. This has prompted action to address the local exposure issue, especially for vulnerable populations such as children.

The State Plan's target for jobs closer to home will help address this issue. It has positive implications for trip patterns and vehicle use which link it with the priorities for cleaner air. Development patterns that allow people to travel smaller distances to work and other locations will result in opportunities to reduce motor vehicle use (and emissions), through reduced distance travelled or use of other modes of transport.

Development alongside major roads is now guided by the Government's Metropolitan and Subregional Strategies. Both these strategies and the Infrastructure State Environmental Planning Policy (Infrastructure SEPP) 2007 refer to interim guideline *Development Near Rail Corridors and Busy Roads* which addresses health and liveability issues associated with busy roads, including techniques like staggering land uses with less sensitive activities located closer to the road, avoiding 'canyons' that limit dispersion of emissions and orientating air conditioning intakes away from the roadway. Measures guided by the NSW Government's Metropolitan Strategy will encourage the use of public transport and other more sustainable transport modes by managing the supply and price of parking in centres and locations with good access to public transport.

Strategies for continuing emission reductions in the industrial, commercial and domestic sectors will help reduce local exposure for people near industry or small commercial premises such as service stations and smash repairers.

**Approach adopted in Action for Air**

- Reduce local exposure to transport emissions through appropriate urban planning and design.
- Continue to reduce emissions from industry, small businesses and homes through a multi-strand approach to cleaner business processes and consumer products.
- Provide the community with more information about air quality to help them reduce their exposure.

Actions that address local exposure are identified in 'The action plan – the actions'.

## The action plan – the objectives

Ozone and particles are our biggest air quality challenges. Motor vehicles are the biggest contributor to these air pollution problems in Sydney. As the Greater Metropolitan Region continues to grow and the number of vehicles on the roads increases, major new strategies are needed to further reduce emissions from motor vehicles and fuels to avoid harmful health impacts. The benefits of cleaner vehicles alone are not sufficient to offset increases in the total vehicle kilometres travelled.

This is why a range of new strategies and actions in *Action for Air* aims to reduce emissions from vehicles. There are two aspects to dealing with this issue:

- making fuels, car technologies and fleets even cleaner, and
- reducing vehicle use.

Current actions, including adopting new national vehicle and fuel standards, will go a long way towards making fuels and cars cleaner.

Reducing vehicle use or emissions from the existing motor vehicle fleet poses a far greater challenge. It will require actions in two key areas:

- land-use changes – i.e. planning or ‘place-based’ actions – reducing the need to travel and the distance travelled, and
- improving and influencing transport choice.

Focusing on motor vehicles doesn’t mean that *Action for Air* has overlooked other sectors. Industry contributes to particle pollution in Sydney, as do woodheaters. The domestic–commercial sector is a large contributor of VOCs. In regional areas, agricultural burning is a major source of particles along with woodheaters. *Action for Air* includes a number of initiatives to target these areas as well.

We need to employ a variety of strategies across all sectors. For ozone in particular, DECCW modelling results suggest that targeting a single source sector or single pollutant will not be sufficient to meet the Air NEPM standards.

The actions set out in this version of *Action for Air* are essentially new programs and strategy directions since *Action for Air: 2006 Update*. Some of these actions are still in their early stages of development – particularly those concerning land-use and transport planning and public transport improvements which have long lead times before air quality, climate change, health and liveability benefits are realised. Many of these initiatives are currently described in strategic terms rather than as specific actionable items, and will be refined over time as work progresses and further research is conducted. Implementing these strategies and actions will require a concerted effort from all levels of government, industry and the community. To be able to do this, good information about air quality needs to be widely available.

With this in mind the following objectives have been formulated to guide the strategies and actions that will deliver the emission reductions needed to meet our cleaner air targets.

- Objective 1    Reduce motor vehicle emissions**
  - A Cleaner fuels, vehicles and fleet
  - B Reducing vehicle use
  - C Improving and influencing transport choice
- Objective 2    Make businesses even cleaner**
  - A Major industry
  - B Small businesses
- Objective 3    Make homes and local environments even cleaner, healthier and more liveable**
- Objective 4    Target particle pollution in regional NSW**
- Objective 5    Communicate and educate about air quality**

## The action plan – the actions

*Action for Air's* underlying aim is to achieve the cleaner air targets in the State Plan, with the outcome of reducing the population's exposure to air pollution and the associated health costs. The primary focus of the strategies and actions in *Action for Air* is therefore to reduce air pollutants.

The integrated approach to air quality management adopted in *Action for Air* means that, wherever possible, programs are also designed to produce benefits in one or more of the theme areas identified in this review of *Action for Air*.

The strategies and actions described on the following pages are assigned symbols to indicate the issues they address: ambient air pollution, climate change, liveability and local exposure. Addressing air pollution is taken to mean addressing air pollution-related health impacts.



air pollution



climate change



liveability



local exposure

### Objective 1 Reduce motor vehicle emissions

Programs in the motor vehicles and fuels sector over the past 30 years have contributed to significant improvements in air quality. These include introducing unleaded petrol and adopting progressively tighter vehicle emission controls.

However, even with the introduction of cleaner vehicles and fuels, motor vehicles will continue to be the main source of air pollution in Sydney as the city continues to grow and the number of vehicles increases. The large number of older vehicles in the fleet also delays the benefits arising from the tightening of new vehicle emission standards.

Motor vehicles and fuels are the dominant source of the ozone-forming pollutants  $\text{NO}_x$  and VOCs. They contribute over 70% of  $\text{NO}_x$  and 38% of VOC emissions in Sydney. Emissions from refuelling motor vehicles also contribute an additional 4–5% of VOC emissions.

Motor vehicles also contribute over 12% of  $\text{PM}_{10}$  and 18.5% of  $\text{PM}_{2.5}$  (Table 2). Diesel engines emit considerably more particle pollution than petrol engines.

**Table 2: Motor vehicle contribution to  $\text{NO}_x$ , VOCs and particles in Sydney by vehicle class**

Vehicle class	% $\text{NO}_x$ emissions	% VOC emissions	% $\text{PM}_{10}$ emissions	% $\text{PM}_{2.5}$ emissions
Passenger cars (petrol)	41.2%	19.9%	4.1%	6.1%
Heavy-duty diesel	18.2%	2.0%	3.3%	5.2%
Light-duty petrol	4.9%	3.5%	0.2%	0.4%
Light-duty diesel	4.6%	0.7%	4.1%	6.4%
Other vehicles	2.2%	3.2%	0.3%	0.4%
Evaporative emissions from petrol vehicles	~	9.0%	~	~
Total	71.1%	38.3%	12%	18.5%

Due to the tighter vehicle emission standards for new cars, older vehicles contribute a disproportionate quantity of emissions. A roadside vehicle emission survey (see Action 1.8) found that pre-1998 light vehicles make up approximately 30% of the light vehicle fleet, but contribute

more than 50% of CO<sub>2</sub>, VOC, NO<sub>x</sub> and PM emissions<sup>7</sup>. The survey also found that a significant proportion (45%) of existing heavy commercial vehicles were also manufactured before the introduction of improved standards in 1996.

The transport sector accounted for 14.4% of Australia's total greenhouse gas emissions in 2005<sup>8</sup>. Projections of Australia's greenhouse gas emissions in future years show that emissions are predicted to rise and transport emissions are one of the strongest sources of emissions growth.

Major new strategies are needed to continue reducing emissions from motor vehicles and fuels, both by making fuels and vehicles cleaner, and by encouraging people to use their cars less in favour of other transport options.

The *NSW Cleaner Vehicles and Fuels Strategy* (see [www.environment.nsw.gov.au/air/actionforair/caf2007.htm](http://www.environment.nsw.gov.au/air/actionforair/caf2007.htm)), released in 2008, is a key platform for this. It builds on the Government's existing actions to reduce pollution from vehicles, providing a comprehensive package of targeted emission reduction initiatives in the three strategic focus areas of cleaner fuels, vehicles and fleet. The plan also works in conjunction with planning and transport actions to reduce vehicle dependence and traffic congestion (Figure 12).

The *NSW Cleaner Vehicles and Fuels Strategy* encompasses regulations, education, awareness raising and economic incentives. It focuses on specific NSW initiatives and strategically important national initiatives where NSW leadership is important. Collectively these programs will achieve a significant reduction in NSW emissions of air pollutants and greenhouse gases over the 10 years of the State Plan and beyond, and deliver significant greenhouse, health and liveability co-benefits.

When *Action for Air* was first released in 1998, vehicle kilometres travelled (VKT) was considered the best indicator for measuring motor vehicle-related emissions. Since then our motor vehicle inventory capabilities have improved such that we can now better estimate emission trajectories associated with specific emission sources (including emissions by class and age of vehicle). VKT goals do not take such factors into account and so are a more generalised indicator of motor vehicle impacts on air quality.

*Action for Air: 2009 Update* emphasises achieving the emission reductions needed to comply with ambient air quality standards. In respect of the motor vehicle sector, this will continue to demand a mix of strategies, which focus both on containing growth in VKT and targeting improvements to fuels and the vehicle fleet.

The broad plans and specific actions designed to reduce vehicle emissions are categorised under:

- A Cleaner fuels, vehicles and fleet
- B Reducing vehicle use, and
- C Improving and influencing transport choice.

#### A Cleaner fuels, vehicles and fleet

Cleaner fuels are a prerequisite for cleaner vehicles in that fuel quality standards allow the introduction of more effective emissions control equipment on vehicles. Cleaner fuels can also reduce emissions directly.

Tighter emissions standards for new vehicles have achieved significant emission reductions, even with increasing car use and ownership. The introduction of Australian Design Rule 37/01 in 1997 for light-duty petrol vehicles reduced NO<sub>x</sub> emissions by 67% and VOC emissions by 32% compared to the previous standard set in 1986. Vehicle emission standards for new heavy-duty and light-duty vehicles are expected to further reduce levels of NO<sub>x</sub> from new vehicles. The planned introduction of Euro 4 standards from 2008 to 2010 for petrol cars will reduce NO<sub>x</sub> levels for new vehicles by 46% when compared with previous standards. Similarly, the introduction of Euro 4 standards for trucks is expected to lower NO<sub>x</sub> production rates for new vehicles by 43%.

7 National Institute of Water and Atmospheric Research Ltd, March 2008, *On-road vehicle emissions monitoring Sydney* (Pending release)

8 Australian Greenhouse Office 2007, *National Greenhouse Inventory 2005*, [www.greenhouse.gov.au/inventory/2005/pubs/inventory2005.pdf](http://www.greenhouse.gov.au/inventory/2005/pubs/inventory2005.pdf)

The opportunity for deriving significant emission benefits from further tightening of vehicle emission standards in the future appears to be marginal when the likely high cost of technology development is taken into consideration. This suggests we cannot rely on further changes to new vehicle emission standards alone as a means of maintaining regional air quality in the face of forecast growth in road travel.

**Figure 12: Actions and strategies for cleaner air and reduced greenhouse gas emissions**



Realising the air quality benefits from past and foreshadowed vehicle standards is also being hampered by the relatively old age of the vehicle fleet and the slow rate of fleet turnover, particularly for diesel vehicles. Significant emissions reductions could be achieved in the short term by accelerating the natural rate of replacement of these vehicles.

The following actions for cleaner fuels and a cleaner fleet, including measures that encourage the uptake of newer, cleaner vehicles, will help deliver the emissions reductions needed from this sector.

#### **Action 1.1 Vapour recovery at service stations**



Stage 2 vapour recovery (VR2) captures VOC emissions from vehicle petrol tanks during refuelling at petrol bowzers. VR2 will be introduced on a staged basis with vapour recovery equipment to be installed at the largest service stations in Sydney, Newcastle, Wollongong and the Central Coast by 2014, and at all but the smallest service stations in Sydney by 2017. Stage 1 vapour recovery (VR1), which captures VOC emissions from underground storage tanks as they are filled by road tankers, has been in place in most parts of Sydney for some time, but will be extended to all parts of Sydney, and the Wollongong, Newcastle and Central Coast metropolitan areas.

VR2 technology can reduce refuelling emissions by over 85% and its implementation will reduce VOC emissions in the Greater Metropolitan Region by 5000 tonnes per year by 2020, making it one of the single most significant actions available in NSW to substantially reduce VOCs and deliver both regional and local air quality and health benefits.

#### **Action 1.2 Summer low volatility petrol program**



Summer petrol volatility limits were first legislated in NSW in 2004 and are currently the strictest in Australia. They apply to petrol refiners, importers and blenders that supply petrol in the Greater Metropolitan Region. Regulating the volatility level of petrol in summer is a key strategy for managing ozone, via VOC reduction, as fuel evaporates more readily in summer due to higher ambient temperatures. Lowering petrol volatility also reduces exposure to air toxics. The emission reduction benefits are generated for fuel use over a range of pollution sources including motor vehicles, fuel storage facilities, service stations and other petrol-fuelled vehicles and equipment such as off-road vehicles, boats, lawnmowers and garden equipment. Further tightening of volatility limits is under consideration.



*Motor vehicle fuel distribution and use emits volatile organic compounds*

### Action 1.3 NSW diesel retrofit program



Diesel vehicles produce about 60% of the particulate matter emitted by road transport in Sydney and are increasing as a proportion of the total transport fleet. Strict new diesel vehicle emission limits were introduced in 2002. However, diesel engines are durable and older diesel vehicles with high emissions will continue to operate for many years. Retrofitting existing diesel vehicles with exhaust treatment devices is a viable and cost-effective strategy to reduce air pollutant emissions. (Estimates for the current diesel retrofit program are in Appendix 1.)

NSW established the diesel retrofit program in 2005 after a pilot program showed that particle emissions per vehicle could be reduced by an average of 50%, at a cost of \$7600.

Government funding of \$5.6 million has allowed the program to be continued and enhanced. The program involves DECCW, the State Transit Authority (STA) and the RTA. The NSW Government is leading by example by committing \$4 million to retrofit older Sydney buses operated by the STA.

Other elements of the expanded program include:

- introducing a 50% contribution by vehicle owners for the retrofit
- a reduction in costs for some vehicle owners by leveraging Commonwealth financial incentives such as the diesel fuel rebate for pre-1996 heavy vehicles that comply with applicable emission standards
- a 30% tax depreciation rate for diesel retrofit equipment, and
- an education program.

DECCW and the RTA are also evaluating the possibility of bundling fuel efficiency devices with exhaust treatment retrofit devices which will reduce both air pollution and greenhouse gases while increasing fuel efficiency. This will provide an additional positive financial incentive for truck owners to retrofit their vehicles.

#### SmartWay Transport Partnership (United States)

The SmartWay Transport Partnership is a voluntary partnership between the US EPA and the freight industry to create demand for cleaner, more efficient goods movement. The program offers long-haul diesel truck operators SmartWay Upgrade Kits which contain both fuel efficiency and emission control devices. The benefits for industry of participating in the program include reduced fuel consumption, public recognition, improved public image and corporate sustainability. Innovative public-private financing programs enable truck operators to purchase the Upgrade Kits, which cost \$US 14,500.

For a truck travelling 100,000 miles/year and consuming fuel at 6 miles/gallon, annual fuel savings amount to \$US 6,532, providing a payback period for the investment of approximately two years. Over a five-year loan period with a 12% interest rate, the monthly fuel savings add up to \$US 530 while the loan payment is \$US 323, leaving a \$US 207 per month cash incentive for the truck operator.

The environmental benefits are also significant. Particulate filters reduce particle emissions by 90%. Fitting the trucks with single tyres with aluminium wheels, a Trailer Aero Kit and a direct-fired heater reduces both NO<sub>x</sub> and CO<sub>2</sub> emissions by 14%. With over 400 truck and rail carriers, shippers, logistics companies and truck manufacturers involved across the US, this amounts to savings of up to 6.6 billion gallons of diesel fuel per year, resulting in reductions of 66 million tons of CO<sub>2</sub> and 200,000 tons of NO<sub>x</sub> per year.

Source: US EPA



A truck retrofitted with a diesel exhaust treatment device.

#### Action 1.4 Environmental rating of heavy vehicles



The rising use of road freight is accentuating the need to accelerate replacement (or retrofit) of older heavy vehicles to reduce greenhouse gas emissions and improve air quality. Environmental rating of these vehicles (i.e. trucks and buses over 3.5 tonnes gross vehicle mass) promotes recognition of cleaner, leading edge technologies and assists vehicle owners and operators to make informed decisions about environmental impacts and improved fuel efficiency when purchasing a vehicle.

A DECCW-commissioned study in 2006 on the feasibility of a heavy vehicle rating system found there is considerable demand for fuel efficiency information by purchasers of heavy vehicles since fuel consumption is a significant business cost.

Heavy vehicle engine manufacture is dominated by overseas firms and all engines are imported into Australia. Many heavy vehicles operate across state and territory borders. Environmental performance and fuel efficiency information is therefore best provided through a national scheme. DECCW is working with the Victorian and Commonwealth Governments to provide qualitative information about vehicle fuel performance for purchasers of new heavy vehicles. Future programs are likely to consider upgrades to existing vehicles to reduce fuel use, including alternative fuels.

#### Action 1.5 Government leading by example



The NSW Government fleet is one of the largest in the country, with approximately 25,000 vehicles. Actions taken to improve the environmental performance of the fleet have a major impact on emissions and a flow-on effect for the entire NSW fleet when the vehicles are sold.

The Cleaner NSW Government Fleet initiative requires all government agencies to reduce the emissions from their passenger and light commercial vehicle fleets. It encourages procurement of smaller, cleaner and less polluting vehicles, reduction in fuel consumption and greenhouse gas emissions, and savings in vehicle purchase and running costs. V8-powered vehicles have been removed from the Government's general motor vehicle contract due to their poor fuel efficiency, high emissions and high maintenance costs.

In April 2009, the NSW Government commenced a trial of a plug in hybrid electric vehicle in its fleet and announced an inter agency Electric Vehicles Taskforce to examine the feasibility, implications and potential barriers to the introduction of electric cars in NSW.

As of 2008 there were more than 340 hybrid vehicles in the NSW Government fleet. This represents 2% of the Government's passenger vehicle fleet, and exceeds the 1% target set under the *Cleaner NSW Government Fleet* initiative. Small, medium and hybrid passenger vehicles now make up 53% of the total passenger fleet, a substantial increase since the *Cleaner NSW Government Fleet* initiative was introduced in 2004, while the proportion of large vehicles has reduced to only 33% of the passenger fleet.

Each NSW Government agency is required to have a Fleet Improvement Plan which incorporates specific fleet environmental performance targets. An environment performance score is calculated using the vehicles scoring system adopted for the *NSW Clean Car Benchmarks*, which rates the greenhouse emissions and air quality impact of vehicles. Currently an average environment performance score of 12 out of 20 and an average reduction of greenhouse gases by 20% of 2004/05 performance is required.

The Government is also purchasing more than 500 new ultra low-emission Euro 5 diesel and compressed natural gas buses for heavily trafficked inner-city areas. These new buses will save over 190 tonnes per year of greenhouse gases, 7.2 tonnes of particulates and over 170 tonnes of NO<sub>x</sub>. In addition to this, 86 buses which meet Euro 4 diesel emission standards and 214 buses which meet low emission Euro 5 diesel emission standards will be purchased over two years from 2009 for use in metropolitan and outer metropolitan areas. Delivery of 150 low-emission Euro 5 diesel articulated buses is also being fast-tracked over the three years from 2009.

### Action 1.6 NSW Government FleetWise Partnership



The NSW Government FleetWise Program is a voluntary partnership program between DECCW and the operators of private sector and local government fleets in NSW, to reduce greenhouse gas and noxious emissions. In addition to helping to reduce emissions, the program also has the potential to reduce fleet operating costs.

The FleetWise program has two components:

- **Light vehicle partnership** – Passenger fleet operators are encouraged to improve the sustainability of their fleets, in a similar way to the NSW Government's commitment to move to smaller, cleaner four-cylinder vehicles. Corporate partners will engage in a benchmarking exercise to enable the measurement of improvements over time. The exercise will use the NSW Clean Car Benchmark approach, which rates the environmental performance of new passenger vehicles. This will encourage the purchase of cleaner, more efficient vehicles. In addition, participating fleets will also be encouraged to consider improvements in the operational performance of their fleets; that is, through practices that reduce the use of the fleet, such as tele working, or optimising the environmental performance of particular vehicles, by improved maintenance of vehicles, switching to less emissions-intensive fuels and improved driver skills.
- **Heavy vehicle research project** – This project will identify sustainability opportunities in the heavy-vehicle fleet, such as cleaner fuels and technologies, and improved operational and maintenance practices, to develop a model for more sustainable fleet practices. This will involve developing a benchmarking approach similar to that used in the light vehicle partnership. The aim of this component is to reduce greenhouse and noxious emissions through the use of cleaner, more efficient heavy (freight) vehicles, superior operational and maintenance practices (such as driver training and in-service inspection and maintenance programs to ensure that vehicles are operating at their most efficient), and the use of better technologies, such as hybrid electric vehicles.



DECCW Beachwatch Program's hybrid car.

### Action 1.7 Alternative fuels



NSW has a number of initiatives underway to encourage the use of alternative fuels which reduce both greenhouse gases and noxious air pollutants.

The NSW Government fuels contract, worth \$300 million annually, now includes alternative fuel suppliers. All NSW Government vehicles must use alternative fuels such as liquefied petroleum gas (LPG), compressed natural gas (CNG), ethanol-petrol and biodiesel fuel wherever practicable and cost-effective.

Of the total STA fleet approximately 27% or 561 buses (as at 1 September 2009) operate on CNG, with a further 98 to be progressively delivered by 2010.

In December 2008 the Government announced that the existing 2% volumetric ethanol mandate would be increased and a biodiesel mandate introduced. Under amending legislation from 2010 the ethanol mandate increases to 4%, and later 6% before requiring all regular grade unleaded petrol to be blended with 10% ethanol. A volumetric biodiesel mandate will be introduced, initially requiring 2% biodiesel from 2010, increasing to 5% as soon as practicable. The volumetric mandate obligations apply to major retailers as well as primary wholesalers. The amending legislation provides mechanisms for flexibility regarding implementation dates, which will primarily depend on the biofuels supply situation. The legislation also establishes a sustainability standard for biofuels.

Actual increases in the biofuels mandate would be subject to the determination of Government taking into account supply capacity, price, and consumer uptake.

NSW is also committed to investigating and publicising the benefits of environmentally friendly fuels. Based on DECCW-funded trials of biodiesel by Camden and Newcastle City Councils in 2005, broader adoption of biodiesel is being considered by other councils.

### Action 1.8 Vehicle fleet benchmarking



Inventories of all major sources of pollution have been developed as part of State and national efforts to control pollution. At present a number of assumed factors are used to calculate motor vehicle pollution emissions and their contribution to total pollution. A more accurate calculation can be made by measuring the pollutant levels in a vehicle's exhaust, under normal conditions, using monitoring equipment located on the roadside. Known as 'remote sensing', this allows a broad cross-section of vehicle fleets to be measured.

NSW, in partnership with other states and the Commonwealth, has conducted roadside monitoring to develop a national database of emission measurements for light-duty vehicles (see [www.environment.gov.au/atmosphere/airquality/publications/pubs/vehicle-pollution.pdf](http://www.environment.gov.au/atmosphere/airquality/publications/pubs/vehicle-pollution.pdf)).

The database will facilitate development of policy options to specifically target the worst polluting categories of the vehicle fleet. In NSW, over 20,000 vehicles have been measured in Parramatta, Marrickville, Baulkham Hills, Blacktown and Leichhardt local government areas. Preliminary results suggest that the older diesel fleet, particularly older light commercial vehicles, are responsible for a disproportionate amount of pollution.

### Remote sensing of vehicle emissions

Preliminary results of a DECC (now DECCW) and RTA survey of 20,564 light vehicles, conducted in March and April 2007 in the Sydney region using remote sensing technology, show that older vehicles disproportionately contribute to air pollution.

Year of manufacture	% of light vehicle fleet	% of CO <sub>2</sub> emissions	% of VOC emissions	% of NO <sub>x</sub> emissions	% of PM emissions
1958 to 1992	12	33	40	25	32
1993 to 1997	18	29	23	32	26
1998 to 2002	32	25	22	30	25
2003 to 2007	38	13	15	13	17

Source: National Institute of Water and Atmospheric Research Ltd, March 2008, *On-road vehicle emissions monitoring Sydney* (Pending release).

### Action 1.9 Hybrid taxis and hire cars



The NSW Government has changed hire car vehicle specifications to enable hybrid vehicles with 5-star ratings under the Commonwealth Government's *Green Vehicle Guide* to operate as hire cars in NSW. In addition, the Toyota Prius was checked against current taxi specifications and has been confirmed as complying with them. Following this a trial of a Prius taxicab in Sydney was designed to identify the operating costs and financial impact for taxi operators of using hybrid vehicles given the high start-up costs of hybrids compared to conventional vehicles used as taxis.

The trial revealed that the initial Prius cost is favourable compared to the average conventional car in the fleet. This suggests substantial savings can be made in vehicle running costs. Customer feedback was also very positive. The trial has now been extended in order to establish longer term operating and maintenance costs.

### B Reducing vehicle use

Locating businesses, services and lifestyle opportunities close to where people live has many benefits. Importantly for the environment, it means less travel, less congestion and less pollution, which in turn means better air quality and fewer greenhouse gases. For the community less travel time means more family time, more productive businesses, and more vibrant and attractive cities and centres.

Planning for jobs and services closer to home is a priority under the State Plan. Over the next 25 years, the regional cities of Parramatta, Liverpool, Penrith, Gosford, Newcastle and Wollongong will increasingly become a focus for jobs, services, cultural facilities, and recreation and lifestyle opportunities. This will enable people to work and carry out important activities closer to home.

Long-term planning and high quality design strategies are essential for building these communities, with their potential for reduced car dependency, in both new development and existing urban areas. This will mean working closely with local government and other stakeholders.

Depending on actual behaviour of people in choosing housing, jobs and travel mode, improving opportunities for jobs and services closer to home could still lead to increased car use for the commute trip and increased vehicle kilometres travelled. The air quality and greenhouse benefits of planning actions in *Action for Air* will only be maximised if the centres in which people live, work and recreate are accessible by public transport or active transport (walking and cycling), and are connected to other centres by the public transport network.

### Action 1.10 Subregional Strategies and Local Environmental Plans



The Metropolitan Strategy, released in December 2005, is a strategic plan to guide Sydney's growth and change over the next 25 years to 2031. It sets targets for new dwellings and employment capacity for each of the 10 subregions in Sydney for 2031.

The Metropolitan Strategy is being implemented at the local level through Subregional Strategies. Draft strategies for each subregion were released in 2007–08. The Subregional Strategies break down the subregion target into local government area (LGA) targets for new dwellings and employment capacity. Each local council must implement their LGA targets through their Principal Local Environmental Plan.

The Subregional Strategies also guide the location of new housing and jobs, with actions to:

- locate 80% of new housing in centres (strategic centres and local centres)
- increase the proportion of people living within 30 minutes by public transport of a strategic centre, and
- increase the number of jobs in strategic centres to over 1 million by 2031.

These targets will help improve air quality by locating activities in accessible locations and improving opportunities for walking, cycling and public transport use for both work and non-work travel.

### Action 1.11 Design toolkit



In 2009 the Department of Planning hopes to release the Centres Design Guidelines to support high-quality redevelopment in urban centres and protect existing character in suburban areas.

The Guidelines will contribute to improved air quality by ensuring high-quality development meets Subregional Strategy targets for new development located in accessible locations, with opportunities for walking, cycling and public transport use.

### Action 1.12 Strengthening Sydney's Strategic Centres



The Metropolitan Strategy identified four types of strategic centres: Global Sydney (Sydney and North Sydney), regional cities, major centres and specialised centres. The 29 strategic centres have a key role in delivering Metropolitan Strategy objectives to concentrate services and activities in accessible locations.

To support the role of strategic centres as attractive places for jobs, services and activities, the Department of Planning hopes to release Strengthening Sydney's Strategic Centres in 2009, with strategic directions to revitalise each of the 29 strategic centres in Sydney.

Strengthening Sydney's Strategic Centres is complemented by the existing City Centre Plans for the regional cities of Parramatta, Liverpool and Penrith in Sydney, and Gosford, Wollongong and Newcastle in the Central Coast, Illawarra and Lower Hunter regions.

### Kogarah Town Square

Transit, pedestrian and green orientation are good urban design ingredients used in the redevelopment of Kogarah Town Square. Occupying a former carpark and adjacent to the railway station, the development now comprises residential, office, retail and community spaces including a public library and town square. Buildings are oriented for maximum use of roof-mounted photovoltaic collectors, rainwater is collected and reused in toilet flushing and garden irrigation, and recycled and low-impact materials were used in the construction. Proximity to the train station facilitates public transport use.

Resulting reductions in car ownership and usage mean lower emissions of air pollutants as well as significant household savings from not owning a car. Community benefits include improvements in public health through cleaner air and greater use of walking and cycling, and reductions in energy use and greenhouse gas emissions. It is estimated that Kogarah Town Square saves 385 tonnes of greenhouse gases a year, not including emissions associated with transport which are likely to be even more substantial.

Source: Cityscape December 2007, [www.cityscape-news.com](http://www.cityscape-news.com)

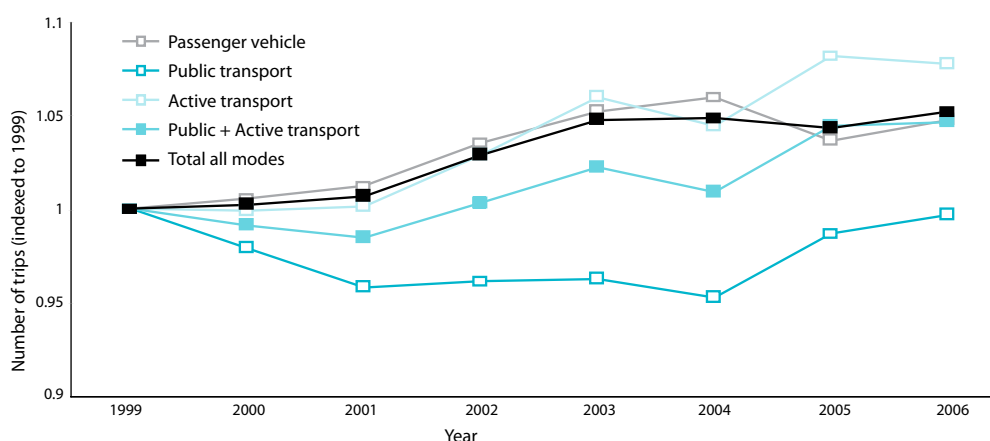
## C Improving and influencing transport choice

The transport task for NSW, and in particular for Sydney, is increasing. With it comes public concern about increasing levels of road congestion and the environmental impacts of transport, including the impact on air quality and climate change.

People travel for many reasons including commuting to work, for commerce, education, shopping and leisure. These trips are provided by one of three modes: private vehicle, public transport and active transport (walking and cycling). In addition, our road and rail networks face an increasing freight load.

Travel data shows that travel behaviour such as average VKT per person per day, and use of walking, cycling and public transport, varies by location reflecting aspects of the urban environment such as density and diversity of land uses and public transport, as well as demographic characteristics. Travel data is presented in Figure 13.

Figure 13: Trips in Sydney by mode of transport, indexed to 1999



Source: NSW Ministry of Transport 2008 (see [www.transport.nsw.gov.au/tdc/documents/hts-report-2006.pdf](http://www.transport.nsw.gov.au/tdc/documents/hts-report-2006.pdf))

There are links between these transport priorities and State Plan targets for cleaner air and progress on greenhouse gas reductions; they all broadly require significant changes to the historic patterns of demand for road travel.

Strategies for reducing motor vehicle emissions include providing viable alternatives to the private motor car, access to safe and reliable public transport, more opportunities for walking and cycling, and greater use of rail as a means of freight transport. However, a significant challenge will be shifting behaviour away from private vehicle use to public and active transport.

Improving and influencing transport choice means providing alternatives to the private motor car such as:

- expanding public transport networks
- improving the quality of public transport services, and
- expanding walking and cycling facilities and making them more attractive to use.

High-level NSW Government policies and plans, including the Metropolitan Strategy, State Plan and State Infrastructure Strategy contain specific actions, priorities and targets to improve transport choice. In addition a Transport Blueprint, a major new strategy for transport planning and delivery, will be released towards the end of 2009.

Examples of Government initiatives to support and encourage use of sustainable transport are identified below, under Action 3.7: On Your Bike – making it easier to cycle, Action 3.8: NSW BikePlan and Action 5.5: Community awareness and behaviour change education programs.

#### **Leichhardt Bus Depot redevelopment**

Sydney Buses is redeveloping its Leichhardt Depot to make it Australia's largest, clean, green-friendly bus depot. The depot has a long association with public transport, having played an important role in the delivery of tram, rail and bus services over the past 100 years.

The redevelopment aims to minimise the impacts on the neighbours of this busy depot, improve bus services for residents of Leichhardt and Sydney's Inner West, and provide a safer working environment for the people employed at the site. A key aspect of the redevelopment is restoring the site's heritage buildings.

The design rationale for the site incorporates ecologically sustainable strategies such as recycled concrete, passive cooling strategies and energy-efficient technologies. The facility will also recycle water on-site.

Buses located at the Leichhardt Depot will include the newest CNG vehicles which generate the lowest emissions of any mass-produced conventional commercial buses in Australia.

Source: [www.leichhardtdepot.com.au](http://www.leichhardtdepot.com.au)

Strategies to influence choice include: TravelSmart projects and travel planning at workplaces; some types of public transport and active transport marketing; transport access guides (TAGs); maps and web-based information; and policies for tele-working, working from home and flexible working hours.

NSW Transport and Infrastructure has undertaken the final stages of the two TravelSmart programs that were conducted in NSW with Department of the Environment, Water, Heritage and the Arts (Commonwealth Government) funding support: a pilot delivered to households in 2004 and a pilot delivered to schools in 2006–07.



*Leichhardt Bus Depot redevelopment.*

### **NSW TravelSmart Schools Travel Planning Program**

The NSW TravelSmart Schools Travel Planning Program ran between February 2006 and September 2007 as a collaborative effort between the Health Promotion Service of Sydney South West Area Health Service, NSW Transport and Infrastructure, DECCW, the Premier's Council for Active Living and the South Sydney Regional Organisation of Councils.

The program worked with 15 primary schools in Sydney's Inner West and Eastern Suburbs to promote alternatives to car travel for trips to and from school. Strategies included collaboratively developing Transport Access Guides for each school, helping to improve the safety and amenity of schools' surrounds, including streets and road crossings, funding bicycle racks and cycling skills courses, and providing curriculum support for teachers. Local government road safety officers, traffic engineers, parents and school staff were all involved.

Lessons and recommendations taken from the program will be used to shape future travel behaviour projects for schools and centres.

Funding for the initiative was provided by the Australian Greenhouse Office Travel Demand Management Initiative (\$100,000) and NSW stakeholder agencies (\$200,000).

Source: NSW TravelSmart Schools Program 2006–07: Summary Report, [www.pcal.nsw.gov.au/\\_\\_data/assets/file/0007/27682/travelsmart.pdf](http://www.pcal.nsw.gov.au/__data/assets/file/0007/27682/travelsmart.pdf)

### **Action 1.13 Rail initiatives**



The Sydney Metro (Stage 1 – Rozelle to Central) is the spine of a new public transport network for Sydney. The Metro will ease rail congestion through the CBD straight away and is the enabler of future metro rail systems for Sydney. It will operate between Central Station and Rozelle, with additional stations at Town Hall Square, Martin Place, Barangaroo / Wynyard and Pyrmont. Provision will be made for a possible future station at White Bay. Construction of the Sydney Metro

(Stage 1 – Rozelle to Central) will commence in 2010 and Sydney's first Metro trains will be operating by 2015. The New South Wales and Federal Governments have jointly funded a feasibility study in to West Metro – potentially Sydney's second Metro – running from the Parramatta area to the CBD via Central.

The Sydney Metro is in addition to the two-stage implementation of the South West Rail Link, with the first stage to be completed by 2014 and \$370 million allocated to support the acquisition of new outer-suburban rail cars and stabling berths.

#### **Action 1.14 Bus initiatives**



The Government has allocated \$170 million over two years for an additional 300 buses to be rolled out from 2009 and \$115 million to fast track the delivery of 150 articulated buses. All areas across Sydney and the greater Sydney region will benefit from the additional buses. The new buses will cater for increased bus patronage to enable a reduction in private vehicle use. These buses are not replacement buses but are additional to the services currently on the road.

Additionally, free CBD shuttle buses are now operating seven days a week in the Sydney and Wollongong CBDs to encourage people to use buses for short trips.

The Government is establishing strategic bus corridors which link major and minor centres across metropolitan Sydney to form a network that integrates with existing rail, bus and ferry networks.

The Government has announced a major expansion of the higher capacity Metrobus trial across Sydney. This is the result of the positive response to the existing Metrobus trial from Leichhardt to Kingsford. There will be four additional Metrobus routes introduced by the end of 2010:

- Route 20 – between Rosebery and Lane Cove
- Route 30 – between Mosman and Enmore
- Route 40 – between Chatswood and Bondi Junction, and
- Route 50 – between Drummoyne and Randwick.

#### **Action 1.15 Public transport ticketing initiatives**



The Government has introduced a range of ticketing initiatives to increase patronage of public transport. These include a Family Fun day ticket which is available in metropolitan and outer metropolitan areas; a discounted weekly ticket for private buses; the RED, a \$2.50 all day ticket now available in rural and regional town bus networks for seniors and pensioners; and a 14-day rail ticket which gives passengers two weeks travel for the cost of eight daily return tickets. In addition, PrePay-only bus services were introduced in the Sydney CBD in 2009 resulting in quicker boarding times for bus travellers with the aim of delivery improved service reliability.

#### **Action 1.16 Metropolitan Parking Policy**



The Metropolitan Strategy's Action D3.2.1 'Develop and implement a metropolitan-wide parking policy' supports sustainable travel by fostering a more integrated and consistent planning approach to public transport services and parking facilities.

The parking policy provides guidance on parking supply, pricing of parking and parking management. The availability and cost of car parking has a significant impact on people's travel choice, including where they go and the mode they use. Excess parking in locations with good public transport accessibility can undermine public transport use. Requirements for parking in areas close to good public transport can also place an unnecessary cost burden on development.

The Government's 'Improving Transport Choice Guidelines' in the Integrated Land Use and Transport policy package released in 2001 advocates reducing parking requirements for developments in areas with good public transport and providing well designed and located parking to ensure it does not detrimentally affect access by other modes of transport. Traffic-generating development should be located in areas with good accessibility, but where this cannot be achieved, mechanisms can be adopted to reduce parking levels as accessibility increases.

The Transport Blueprint, announced by the Premier in June 2009, builds on this policy position and will provide a comprehensive approach to land use and transport planning that incorporates all transport modes. An integral part of this is road space allocation and parking, both in terms of demand and supply.

The creation of NSW Transport and Infrastructure will provide improved governance and delivery mechanisms to implement the Government's parking policy.

#### **Action 1.17 Commuter car parking**



In addition to the 4000 spaces previously committed by the Government in 2006, the Government has committed \$56 million for 3000 additional car spaces across the CityRail network, funded by the increased Parking Space Levy. The increases in the levy apply to commercial parking spaces in Sydney's CBD, North Sydney and Milsons Point (increased from \$950 to \$2,000 a year) and to Parramatta, Bondi Junction, St Leonards and Chatswood (increased from \$470 to \$710 a year), which will apply from July 2009.

Additional commuter car spaces will also be provided in the upgrade of Glenfield Station under the first stage of the South West Rail Extension. The first stage is to be completed by 2014.

#### **Action 1.18 Parking guidelines for car share vehicles**



Car sharing schemes are growing in popularity worldwide and are being supported by a number of local councils in Sydney. Such schemes allow members to hire a motor vehicle on an hourly basis, collecting it from dedicated pick-up points in different parts of the city. Members pay a membership fee and then pay-as-they-drive costs which cover repairs and maintenance, insurance and fuel. Car sharing reduces the need for people to buy and use vehicles unnecessarily, and helps to reduce traffic congestion. Overseas experience has shown that car sharing schemes also generate an increase in walking and cycling and public transport use – to get to the shared car. There are further benefits for air quality and reducing greenhouse gas emissions because car sharing organisations often use small, compact or low-emission vehicles.

Car sharing initiatives can be encouraged by providing free parking for the shared vehicles. Recognising the alternative and sustainable transport merits of car sharing, the RTA developed *Guidelines for the Implementation of On-Street Car Share Parking*, released in September 2007, to assist local councils in providing parking for car share vehicles.

#### **Action 1.19 Sustainable Mobility Initiatives for Local Environments (SMILE)**



SMILE is a program coordinated by DECCW to help local government implement simple and effective solutions to improve urban mobility and reduce traffic congestion in targeted locations. It aims to improve local air emissions as well as showcase innovative practices that reduce greenhouse gas emissions from the transport sector. The program relies on strong partnerships between state and local governments, and engagement with community groups, businesses and commercial enterprises, transport providers and local planners.

The program has three main components:

- a sustainable mobility register listing initiatives and actions to promote sustainable mobility which can be implemented according to local opportunities and needs
- a demonstration project to illustrate the benefits of this approach and refine the register, and
- an online service to record local initiatives and activities that facilitate information sharing.

Potential solutions might include behavioural or educational initiatives for car users, freight efficiency measures, incentive schemes, taxation and pricing schemes, employment containment strategies and infrastructure improvements.

## Objective 2 Make businesses even cleaner

Emissions from businesses, large and small, are increasing as a proportion of total emissions in tandem with population and economic growth. This means that we need to continue seeking emission reductions from this sector in order to meet cleaner air and greenhouse gas reduction targets.

### A Major industry

Large industrial sources account for a significant portion of NO<sub>x</sub> (15%), VOCs (11%) and PM<sub>10</sub> (38%) in Sydney. In the Lower Hunter and Illawarra regions, industrial facilities such as power stations, mines and major industrial developments contribute the majority of NO<sub>x</sub> emissions and are a key source of particles and dust.

NSW has a strong regulatory platform for industry comprising licensing, regulation and economic incentives. A key element of this is the load-based licensing system which requires licensed premises to pay fees based on the annual amount of pollutants emitted. A licensee can reduce the fees by lowering its emissions. Regular review of the Protection of the Environment Operations (Clean Air) Regulation 2002, in particular the emission limits it sets, is the primary ongoing management tool for emissions from the industrial sector.

We also need to continue to look for new, innovative ways to encourage industry to drive pollution reduction below the minimum levels required by the Regulation, including measures that will also reduce greenhouse gas emissions.

#### BlueScope Steel

BlueScope Steel recently developed a new \$200 million paint line and service centre at Erskine Park in Western Sydney. The plant chemically treats, coats and dispatches 215,000 tonnes of steel coil and sheet products annually.

BlueScope Steel initially considered using an afterburner for pollution control (NO<sub>x</sub> and VOCs) but in consultation with DECCW opted for regenerative thermal oxidiser (RTO) technology which provides substantially improved emissions performance and exceeds current industry practice. The RTO itself is highly energy efficient. Once the system achieves operating temperature, the thermal energy released by oxidising emission fumes is mostly all that is needed to sustain operation. Heat recovered from the oxidation process is used in production processes across the plant, replacing gas or electricity, thus reducing total plant energy costs.

Pollutant	Originally proposed	Best practice	Achieved result *
NO <sub>x</sub>	> 250 mg/m <sup>3</sup>	100 mg/m <sup>3</sup>	< 25 mg/m <sup>3</sup>
VOC	214 mg/m <sup>3</sup>	50 mg/m <sup>3</sup>	< 4 mg/m <sup>3</sup>

\* Based on 1<sup>st</sup> quarter of operation.

### **Caltex Leak Detection and Repair Program**

Caltex has developed and implemented a Leak Detection and Repair (LDAR) Program, which is one of 14 pollution studies and pollution reduction programs to address key issues at the Kurnell Refinery. The LDAR Program focuses on the reduction of VOC emissions, in particular benzene. The other programs focus on emissions of sulfur dioxide, nitrogen oxides, hydrogen sulphide, particulates, noise and soil and groundwater contamination.

Through its LDAR Program, Caltex has made significant progress to date in improving the accuracy of VOC air emission estimates and reducing emissions. In particular:

- annual VOC emissions have been significantly reduced to 102,741 kilograms, and
- annual benzene emissions have been significantly reduced to 250 kilograms.

These reductions have been achieved by implementing the LDAR Program across the whole refinery.

The first round of monitoring of the 43,743 components (i.e. valves and pumps) was completed in April 2008 and will continue on an ongoing basis.

Source: Caltex Refineries (NSW) Pty Ltd, Load-based Licensing and National Pollutant Inventory reports for 2007 and 2008.



*Leak detection at Caltex refinery.*

### **Action 2.1 Review emission limits for new and existing industry and progress old plant upgrades**



DECCW introduced tighter emission standards for NO<sub>x</sub>, VOCs and particles when the regulation was reviewed in 2005 and also introduced a timetable for the upgrade of old plant and equipment.

An implementation program is now underway introducing more stringent particle emission limits for 130 industrial premises. These premises include some of the oldest and largest industrial facilities in NSW, including refineries and steel mills.

The second stage of the program (effective from 2012) will cover more than 300 industrial premises and will require improvements to old equipment to further reduce emissions of particles and additional pollutants including NO<sub>x</sub> and air toxics.

Between 2009 and 2012 DECCW proposes to review existing and new emission limits to determine whether these limits should be tightened further to achieve international best practice.

### **Action 2.2 Progress nitrogen oxide policy for new industry**



DECCW will progressively implement a policy requiring new industry in Sydney and the Illawarra to be either nitrogen oxide neutral, or use Best Available Techniques (BAT) to reduce nitrogen oxide emissions to the maximum extent practicable.

The Interim DECCW Nitrogen Oxide Policy for Cogeneration in Sydney and the Illawarra is available on the DECCW website ([www.environment.nsw.gov.au/air/emissind.htm](http://www.environment.nsw.gov.au/air/emissind.htm)) and outlines how DECCW is currently dealing with emissions from cogeneration proposals.

### **Action 2.3 Planning reform to support energy efficiency and low-emission energy**



Recent planning reforms will help to reduce growth in air emissions. For instance:

- The Infrastructure SEPP, gazetted in January 2008, exempts some development in relation to wind monitoring towers, solar photovoltaic panels and hot water systems from needing development consent.
- Low emission technologies, including new natural gas projects and wind farms, will receive a streamlined approval process by being assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* and some may be considered critical infrastructure.

### **Action 2.4 Green Business Program**



The Green Business Program, established under the NSW Government's Climate Change Fund, provides \$30 million over five years to help businesses save energy and water in their operations. It has two program streams:

- market transformation – for projects which stimulate lasting structural and behavioural changes in the marketplace, resulting in the broader adoption of efficient technologies and practices, and
- direct measures – for projects which deliver immediate energy and water savings at a site or group of sites.

Eligible activities may include education and technology trials which have the potential to increase the adoption of efficient technologies and practices, improvements in the efficiency of buildings, appliances and industrial processes, projects which reduce peak electricity demand, and projects which reduce the demand for electricity supplied from electricity supply networks, such as co-generation and fuel switching. The Green Business Program is expected to deliver annual savings of 65,000 megawatt hours of electricity, 13 megawatts of peak electricity demand, and 70,000 tonnes of greenhouse gas emissions.

### Improving air quality using bagasse energy for sugar mills

For more than 100 years, three sugar mills in northern NSW have been producing sugar and supplying their own energy by burning bagasse (the fibrous waste after sugar extraction). DECCW has required a reduction in air emissions for one of the mills via its Environment Protection Licence. To improve performance, the mills are updating equipment by replacing the old boilers with cleaner models and installing new stacks.

Traditionally, sugar cane is burnt before harvesting, causing regional air pollution. The new equipment can process unburnt green cane leaves. This enables the cane to be harvested without burning, reducing local air pollution, and providing a valuable renewable source of fuel for the mills' power stations. Electricity generation facilities are being constructed at Condong on the Tweed River (north of Murwillumbah) and Broadwater on the Richmond River (south of Ballina). The co-generation project is a joint venture by NSW Sugar Milling Co-operative and Delta Electricity. The new plant at Condong will also reuse treated effluent from the Murwillumbah sewage treatment plant, improving the water quality in the Rous River.

The mills will feed renewable energy into the local electricity grid. The leaf matter and sugar cane bagasse will fuel 30-megawatt power stations at each mill for most of the year. Combined, the first two mills to undergo conversion will generate 400 gigawatt hours of energy each year, enough to supply power to a town of 60,000 people. This is equivalent to 350,000 tonnes of greenhouse gases per year being replaced by the renewable energy generated from the two sites.

DECCW has been working closely with the sugar mill industry during final commissioning of these major upgrades which are currently generating electricity for their local communities.

Source: DECC Annual Report 2006–07



*Broadwater Sugar Mill (south of Ballina): aerial photo of Richmond River and Mill, with new boiler and stack, and showing conveyor system over the Pacific Highway from the bagasse stockpile area to the mill and co-generation plant.*

### Vales Point Power Station load reduction agreement

Vales Point Power Station operates two 660-megawatt generating units. This plant was constructed in the 1970s and was originally fitted with electrostatic precipitators to control particulate emissions. While the station's emissions complied with the appropriate regulatory limits, the emissions were highly visible under normal operating conditions and resulted in a large number of public complaints.

Delta Electricity's initial attempts to optimise the performance of the electrostatic precipitators resulted in a 40% reduction in particulate emissions, but the emissions were still highly visible.

Other power stations in NSW were either built with fabric filters or have retrofitted them as a means of meeting accepted best practice for particulate and visible emission controls from a coal-fired electricity generator. This generally also satisfies community expectations regarding power station emissions.

In December 2006, DECC (now DECCW) and Delta Electricity entered into a load reduction agreement that reduces the company's licence fees, providing it achieves environmental improvements. By fitting fabric filters to both generating units, Delta Electricity is expected to reduce its annual total suspended particulate emissions from 2,500 tonnes to 725 tonnes and its annual PM<sub>10</sub> emissions from 1,700 tonnes to 900 tonnes. The installation of fabric filters was completed by the end of 2007 and the generating units have been successfully returned to service.

Source: Load reduction agreement no. 1066299

## B Small businesses

Smaller commercial premises are responsible for a lesser share of NO<sub>x</sub> (2%), VOCs (8%) and PM<sub>10</sub> (10%) in Sydney, but their diverse and diffuse activities, from smash repairers to printing and food outlets, make emissions reduction in this sector a challenging task.

The approach needs to minimise emissions from products, equipment and activities; minimise the effects of those emissions; and reduce usage – either by lowering demand or promoting alternative products or equipment with less impact on air quality. Actions in this area will also reduce air toxics and local exposure to toxic chemicals.

### Action 2.5 Low Emissions Air Program for Smash Repairers



Smash repairers are a significant source of VOCs. Some smash repairers may also emit odours or air toxics which could impact sensitive land uses like houses, schools and nursing homes. The Local Emissions Air Program for Smash Repairers is a cooperative venture (funded by the NSW Environmental Trust) between DECCW and peak industry groups, councils and commercial businesses to develop emission reduction programs associated with smash repairing.

DECCW's Business Partnerships Section has produced a new publication for smash repairers as part of a new Environmental Action Series, which is supported by an education campaign.

## Action 2.6 Sustainability Advantage



The expansion of DECCW's Sustainability Advantage program will help more medium-to-large organisations to assess their environmental performance, prioritise actions and implement projects that will deliver environmental results and 'add business value'. Over 350 medium and large organisations are Sustainability Advantage participants.

Organisations commit to a minimum of 18 months involvement, although most continue beyond this time. Support focuses on the key areas of:

- vision, commitment and planning
- risk management and environmental responsibility
- resource efficiency
- supply chain
- staff engagement and education
- external stakeholder engagement, and
- climate change.

All of these areas are used to influence the climate change response of the participating organisations. Key area 'risk management and environmental responsibility' focuses on risk management and compliance, including air impacts. 'Resource efficiency' looks at broad efficiencies associated with energy, raw materials, water and waste, and also encourages organisations to manage the air emissions associated with issues such as the handling, storage and use of solvents and other chemicals. Assistance is provided in the form of education and training, technical support and networking.

The NSW Energy Efficiency Strategy has committed to funding Sustainability Advantage to expand its program to 1000 additional businesses over five years.



## Action 2.7 Energy efficiency measures for commercial buildings under the Building Code of Australia



The Building Code of Australia (BCA) is a national code of technical provisions for the design and construction of buildings. It is adopted by all states and territories as the technical building law. The BCA provisions for energy efficiency controls in commercial buildings were introduced in NSW on 1 November 2006, following a six-month transition period to facilitate education, training and upskilling of the industry. (In NSW, energy efficiency of housing and apartments is regulated by a combination of the NSW Government's Building Sustainability Index (BASIX) and the BCA.)

The term 'commercial buildings' applies to a range of buildings including hotels, motels and similar public accommodation buildings, offices, shops, pubs, factories, schools, churches, libraries, cinemas, theatres and other public buildings.

Improving energy efficiency in commercial buildings reduces greenhouse gas emissions and improves air quality by reducing emissions associated with existing electricity generation.

The scope of the BCA's energy efficiency measures includes:

- insulation for roofs, walls and floors to resist heat transfer
- the insulation and solar radiation resistance properties of glazing and its shading systems, taking account of orientation
- sealing buildings to prevent loss of heated or cooled air
- power allowances for lighting and electric power saving features, and
- efficiency and energy saving features of:
  - heating, ventilation and air conditioning systems
  - hot water supply, and
  - access for maintenance.

### Greenhouse gas reduction under the BCA

BCA energy efficiency provisions are predicted to reduce greenhouse gas emissions by the following amounts:

Estimated annual CO<sub>2-e</sub> reduction in 2010:

- 2003 – Provisions for housing 380,000 tonnes
- 2005 – Provisions for apartment buildings 20,000 tonnes
- 2006 – Provisions for commercial buildings 1,200,000 tonnes
- 2006 – Enhanced provisions for housing 100,000 tonnes

Total 1,700,000 tonnes per annum in 2010 – increasing thereafter.

Source: Australian Building Codes Board.

The current energy efficiency measures in the BCA are considered a reasonable first step in eliminating worst practice. Compared to when there were no such requirements under the BCA, the current measures improve greenhouse gas reductions by approximately 20%. Co-benefits include reductions in emissions of other air pollutants associated with electricity production.

The Council of Australian Governments is developing a National Energy Efficiency Strategy. NSW supports changes which will substantially improve the Building Code of Australia's energy efficiency requirements for commercial buildings.

### Objective 3    Make homes and local environments even cleaner, healthier and more liveable

It is important that the actions we take in our homes and in our local communities also contribute to cleaner air and healthier and more liveable local environments.

Emissions from the domestic sector are increasing as the NSW population rises. The domestic-commercial sector, of which households form a significant part, accounts for 39% of VOCs and 23% of PM<sub>10</sub> in Sydney.

Aerosols, solvents and surface coatings are the main source of VOCs in this sector, along with emissions from lawn mowing, garden equipment and recreational boating, particularly on summertime weekends.

The use of solid-fuel heaters in winter is the primary domestic source of particle emissions in Sydney and is also a concern in some regional areas.

New strategies are needed to improve the emissions performance of products used in and around the home. As these products are mostly manufactured or imported for a national market, a national approach may be appropriate.

Another area where we can all make a positive contribution to air quality and reducing greenhouse gases while improving our health and wellbeing is by choosing to live sustainably, whether this be in the design of our homes and our energy choices, or adopting active living principles.

#### Action 3.1    Develop a national approach to reduce VOC emissions from products such as paints and solvents



National decisions about aerosols and solvents would be preferable to different state-based requirements and would streamline processes for manufacturers and suppliers. NSW is leading a working group with other states and the Commonwealth Government to develop strategies targeting VOC emissions from paints and solvents and will continue to pursue emission reductions from these products through the Environment Protection and Heritage Council (EPHC).

#### Action 3.2    Emission limits for small engines



Small engines, particularly conventional two-stroke engines used in applications such as lawnmowers, handheld equipment and outboard engines, are high pollution emitters relative to their engine size and usage. The NSW Air Emissions Inventory 2007 shows that lawnmowers and outboard engines account for over 20% of VOCs in the Greater Metropolitan Region during a summertime weekend.

NSW is a member of the EPHC working party established to consider national management options to reduce emissions from small engines, primarily regulation of emission limits or targeted emission levels through agreement with industry. This project was initiated by NSW and has been taken up at a national level. The working party has undertaken a cost-benefit analysis and is developing a regulatory impact statement on possible national regulatory approaches to manage emissions from small engines.

### Action 3.3 Reduce particle emissions from woodheaters



Woodheating is a major cause of particle emissions in Sydney and in regional areas. Large volumes of woodsmoke typically arise when woodheaters are not installed and operated correctly. DECCW will build on current woodsmoke reduction programs to develop a comprehensive particle emissions reduction strategy. This includes training workshops funded by the NSW Environmental Trust to help local council officers manage local woodsmoke issues such as woodheater installation, enforcement action for excessive woodsmoke, the use of planning instruments to manage the number of woodheaters in a local government area, and community education programs to foster better woodheater operation.

DECCW will also continue to audit woodheater manufacturers and sales outlets for compliance with emission limits set out in standards governing their manufacture, and evidence of woodheater testing in accordance with these standards.

Together with the Growth Centres Commission, DECCW has investigated measures to manage installation of woodheaters in new land release areas to prevent further air pollution or disturbance to amenity of nearby residents. As a result, Development Control Plans for the first two precincts in the Growth Centres – Oran Park and Turner Road in Western Sydney – prohibit open fireplaces and slow combustion stoves.

#### Woodheater compliance audits

In June–November 2007 DECC (now DECCW) conducted routine compliance checks of woodheater sales outlets, factories and warehouses in NSW. The checks involved DECCW inspecting a random selection of woodheaters to see if they had valid compliance plates attached.

The Protection of the Environment Operations (Clean Air) Regulation 2002 requires all new woodheaters sold in NSW to have a compliance plate which specifies that the particular model has been tested in accordance with the relevant Standard (AS/NZS 4013:1999). The Regulation also requires that a certificate of compliance provides evidence that the heater model has been tested in accordance with the Standard and complies with the emission limit in the Standard. Unless woodheaters comply with the Regulation they are not permitted to be sold in NSW.

A total of 18 businesses were audited, all of which had at least one woodheater that did not comply. Each business was sent an audit report and was requested to submit a written explanation of the steps it intended to take to rectify any non-compliance and to ensure continuing compliance in the future. All businesses had rectified their non compliances by 2008.

### Action 3.4 Residential building standards – BASIX



BASIX, the NSW Government's Building Sustainability Index, is an online assessment tool that requires all new dwellings and renovations in NSW to be more energy and water efficient. BASIX measures all the major technologies that affect energy consumption, including those for hot water, heating, cooling, lighting and cooking. Reductions in energy usage result in decreased emissions of greenhouse gases and air pollutants associated with existing electricity generation.

Since its introduction in 2004, BASIX has been expanded in scope from single homes to multi-unit developments throughout NSW. From 1 July 2007 BASIX has applied to new alterations and additions valued at more than \$50,000 where development approval is required.

Monitoring shows that BASIX contributes to improved use of sustainable technologies that reduce overall energy consumption and greenhouse gas emissions. Based on single homes completed in 2005–06, 15,800 homes will save approximately 34,000 tonnes of greenhouse gas emissions each year. These savings typically arise from a switch away from air pollutant intensive energy sources to alternatives such as gas and solar power.

The Department of Planning will continue to expand BASIX to improve the energy and water efficiency of residential development. There is also an opportunity for BASIX to provide air quality information when users are making technology selections.

#### **Energy efficiency improvements under BASIX**

An analysis of over 6500 BASIX certificates issued in 2004–05 indicates that the proportion of electric storage or instantaneous hot water systems in new homes has decreased from 32% to 0.1% compared to new home installations pre-BASIX. Hot water systems are responsible for the largest share (37%) of a household's energy consumption and greenhouse gas emissions, with electric storage systems being the most energy intensive. The corresponding increased uptake of gas (11%), solar (14%) and heat pump (7%) hot water systems shows that BASIX has encouraged use of these technologies as effective means of achieving energy targets. A similar increased uptake of gas appliances has also been seen in other energy consumption sectors including heating and cooking.

Compared to existing homes, BASIX homes are also designed with significantly more insulation, performance glass and external shading. These and other elements of good building design, and use of appropriate construction materials, mean a reduction in greenhouse gas emissions compared with artificial heating and cooling systems.

Source: 2004–2005 Outcomes: BASIX Ongoing Monitoring Program



### Action 3.5 Renewable Energy Development Program



The Renewable Energy Development Program is a program under the NSW Climate Change Fund, offering \$40 million over five years to support demonstration and early commercialisation of renewable energy technologies. These may include solar thermal, geothermal, sun, wind, wave and tidal projects which will generate electricity or displace grid electricity use for stationary energy purposes. The program is expected to deliver annual savings of 125,000 megawatt hours of electricity generated, 35 megawatts of electricity generation, 134,000 tonnes of direct greenhouse gas emissions and decreased emissions of air pollutants.

### Action 3.6 Guideline for development near rail corridors and busy roads



The Department of Planning released the interim guideline *Development Near Rail Corridors and Busy Roads* in December 2008. This work responds to a number of Actions in the Metropolitan Strategy.

The guideline will help minimise community exposure to poor air quality and high noise levels by providing guidance on the location and design of housing and other sensitive development in enterprise corridors and other busy roads. It advises on alternatives and recommendations for achieving good amenity for sensitive uses such as housing, child care centres and schools along busy roads with an annual average daily traffic volume of more than 20,000 vehicles.

The Infrastructure SEPP also contains noise standards for new residential developments along nominated rail and road corridors and refers to these guidelines.

#### Why Active Living Statement

Launched at the NSW Clean Air Forum in November 2007, the *Why Active Living Statement* is an initiative of the NSW Premier's Council for Active Living which is a collaborative forum for NSW government agencies and business and community sectors to promote and implement active living principles.

The *Why Active Living Statement* summarises the evidence of the benefits of active living and the costs of a sedentary lifestyle – in terms of the health, environmental, social and economic costs and benefits. The statement aims to assist and support leaders in the public, private and community sectors to make decisions that will facilitate and encourage active living, including walking, cycling and using public transport. Air quality and greenhouse benefits will follow from this reduction in communities' car dependence.

The Statement demonstrates the Government's leadership in planning for active living and will contribute to the delivery of State Plan targets on health, cleaner air, reducing greenhouse emissions, transport and recreation.

### Action 3.7 On Your Bike – making it easier to cycle



Launched at the inaugural National Ride to Work Day in October 2007, On Your Bike is a \$900,000, three-year initiative – funded by the NSW Environmental Trust and developed in cooperation with Bicycle NSW – to promote cycling as an affordable, flexible and greener transport option. It recognises the public health benefits of cycling as well as the contribution cycling makes to reducing traffic congestion and improving air quality. Cycling initiatives designed to make cycling easier, safer and more attractive include:

- increasing opportunities for adults and children to learn how to cycle safely
- improving the bike friendliness of workplaces, schools and town centres

- providing more information about safe routes and cycling facilities, and
- planning for an increase in cycling trips.

With more than 50% of the car trips taken each year in Sydney estimated to be less than five kilometres in distance, On Your Bike is an important means to encourage the community to make significant inroads into air pollution and greenhouse gas emissions. For every person that chooses to leave their car in the garage and cycle to and from work for a year, the State's greenhouse gas emissions are reduced by more than a tonne. With vehicles being a major source of ozone precursors, reducing vehicle usage also has positive impacts on air quality.

### Action 3.8 NSW BikePlan



In August 2008 the NSW Government announced the preparation of a new cycling blueprint aimed at encouraging more people across the state to use bikes as a clean and healthy transport choice. Work on the new NSW BikePlan is being completed with the Premier's Council for Active Living (PCAL) by a joint project team of the RTA and Department of the Environment & Climate Change. The BikePlan is expected to be ready for release in 2009, updating and replacing the NSW Government's 1999 *Action for Bikes: BikePlan 2010*.

The BikePlan will also build on current investment commitments and map out the events, facilities and programs needed to support the development of cycling as both a recreational activity and a commuting option in NSW. Where the previous *Action for Bikes: BikePlan 2010* focused on cycling infrastructure, the new BikePlan will expand to take a whole-of-government approach to promote cycling for its value in reducing greenhouse emissions, improving air pollution and traffic congestion and health, and creating environmentally sustainable communities. The NSW Government is funding bicycle initiatives worth up to \$50 million in 2008/09. This will include funding contributions towards 91 local bicycle projects, matched by dollars from local councils, and off-road shared paths delivered when new roads are built.



#### Cycling Connecting Communities program

The NSW Department of Health is funding a three-year \$300,000 demonstration program and research project to promote cycling. The project is called Cycling Connecting Communities, and is being implemented in the Liverpool and Fairfield local government areas. It aims to increase the use of the local bicycle path network, and to assess how increases in cycling contribute to overall levels of population physical activity.

Project activities focus on the stages of the cycling continuum. Mass media (mainly local newspapers) and direct mail will be used to communicate that cycling is a fun and healthy activity, aiming to increase the proportion of people who are thinking about cycling even if they do not currently ride.

For people who lack skills and confidence riding a bicycle, a series of courses by a cycling coach will be offered. Advice on a variety of cycling techniques will be available, whatever the ability level. Discussion sessions exploring aspects of cycling and distributing resources will also be available to community groups.

A new map showing the best cycling paths in Liverpool and Fairfield has been developed and will be extensively distributed. Free social rides will also be available, run by experienced ride leaders from the local bicycle user groups.

The Cycling Connecting Communities project will be evaluated by a pre (2007)- and post (2009)-project telephone survey of residents in the Liverpool and Fairfield areas, as well as a demographically similar neighbouring area. Bike counters at strategic locations on major cycle paths will monitor use of cycle paths.

Source: [www.cyclingconnectingcommunities.net/](http://www.cyclingconnectingcommunities.net/)

Transport alternatives such as cycling reduce air pollution and provide health benefits.



*Particle pollution can occur in regional centres, particularly where geography traps woodsmoke in low lying valleys.*

## Objective 4 Target particle pollution in regional NSW

Parts of regional NSW, such as Wagga Wagga, Albury and Lithgow, face considerable challenges in meeting the national standard for particle emissions. Bushfires, stubble burning, dust (which is increased during drought) and woodheaters are the major contributors to particle pollution in regional areas.

### Action 4.1 Addressing regional particle emissions



Regional particle emissions are a significant contributor to exceedences of the Air NEPM particle matter standard. There are a number of potential contributors to rural air pollution including dust storms, agricultural burning, woodsmoke and bushfires. DECCW and the Department of Industry and Investment (DII) are working together with local government and local communities to focus on key priority problems by developing coordinated actions to tackle different sources of air pollution, with a pilot project proposed for Wagga Wagga.

### Action 4.2 Regional Strategies

The seven Regional Strategies released between 2006 and 2009 are strategic plans to guide change and growth over the next 25 years. These strategies include housing and employment capacity targets for regional councils and identify the boundaries of new growth by protecting rural and natural landscapes. They aim to increase jobs and housing near the established centres to improve accessibility and encourage sustainable transport forms. Regional strategies encourage local employment growth by designating a strategically located employment land which will also reduce commuting outside the regions. This and other strategies will help to improve air quality in the NSW regions.

## Objective 5 Communicate and educate about air quality

Action by both the Government and the community to improve air quality (and reduce greenhouse gas emissions) relies on sound, measurable and up-to-date information about pollutant sources and their impacts.

It is essential that we continue to gather air quality data with state-of-the-art monitoring technology. We also need to continually update our understanding of pollutant sources and their impacts. This requires periodic updating of emissions inventories and further air quality modelling and research.

As part of this requirement DECCW will continue to publish air quality information on a regular basis, including making regional pollution indices and the State of the Environment Report available on the DECCW website, and will comply with the reporting obligations for the Air NEPM, the Air Toxics NEPM, the Diesel NEPM and National Pollutant Inventory. Where appropriate, the quality and presentation of this information will be improved.

The community will continue to be able to provide input into air quality planning through consultation processes for specific strategies, policies and programs, and through the three-yearly Clean Air Forum.

In addition to these established practices, DECCW is investigating new opportunities and processes for enhancing the nature and quality of community information, and the mechanisms by which it can be delivered.

### Action 5.1 Build a better management and presentation system for air quality data



In 2008 DECCW completed upgrading its air quality data management and presentation system, at a cost of \$1.2 million, to make it more flexible and accessible. This included upgrading the data acquisition and telemetry system to allow monitoring stations to be continuously online, which has led to a number of significant changes in how air quality data is reported and presented.

These changes include:

- a revised Air Quality Index (AQI) calculation, increasing the number of pollutants used in the calculation from three to six, and bringing it into line with calculations used in other jurisdictions
- hourly updates of the AQI for each monitoring station and region; previously updates were twice daily
- new-look air quality pages on the DECCW website with improved navigation, including greater use of maps, and increased access to data through dynamic queries of historical summary data
- six air pollution categories instead of three (i.e. very good, good, fair, poor, very poor, hazardous), and
- a new subscription service (via SMS and email) to allow the community to subscribe to various alerts, including health alerts due to high pollution and regular pollution forecasts.



DECCW's new Air Quality Index website.

## Action 5.2 Enhance the public health alert system



The DECCW–NSW Health public health alert system for high air pollution days in the Sydney region was launched in 2004. It uses monitoring data and weather forecasts to advise the public when high pollution days are expected, and the possible health impacts.

The system has been enhanced (as part of the upgrade to DECCW's air quality data management and presentation system) to improve the information available to the public and to enable 'at risk' groups to subscribe to an air quality update service providing health alerts via a range of media, including email and SMS, with advice on how to reduce exposure.

## Action 5.3 Monitor for air toxics



NSW is currently conducting local 'hot spot monitoring' for air toxics at two locations in Sydney where traffic is one of the main sources of pollution. The sites were identified in accordance with the Air Toxics NEPM. The study is due to be complete by the end of 2009 and will provide data on the levels of pollutants such as benzene, formaldehyde, toluene and polycyclic aromatic hydrocarbons, supplementing the results of the five-year air toxics research project (1996 to 2001) published in 2002 (see [www.environment.nsw.gov.au/air/toxics.htm](http://www.environment.nsw.gov.au/air/toxics.htm)).

## Action 5.4 Further research and publish information about health impacts and costs of air pollution



A number of studies are underway, by NSW Government agencies and other organisations, that will improve the evidence base for health impacts, guide future policy and program development, and enable individuals and communities to become better informed and reduce their exposure to the impacts of air pollution.

For example:

- NSW is contributing to the first major national study of the impacts of air pollution on children's health. The report is due to be considered by the Environment Protection and Heritage Council in late 2009. It will contribute towards assessing whether current standards are sufficient to protect the health of children, a particularly sensitive group within the community.
- A health study is underway examining the impact of Sydney's Lane Cove Tunnel on air quality and respiratory health before and after opening.
- NSW is also participating in a review of the health-based standards in the Air NEPM, and is involved in considering the costs and benefits of new abatement strategies which will accompany this review.

### Action 5.5 Community awareness and behaviour change education programs



Changing community behaviour voluntarily through awareness and education programs is a potentially powerful tool for addressing the issues of air pollution and greenhouse gas emissions. Positive behaviour change can contribute to reducing air pollution and thus the potential for air-related health problems.

The Clean Air, Healthy Communities (CAHC) Fund provides the opportunity to deliver a public awareness and behaviour change program to increase community understanding of behaviours that can reduce air pollution and raise awareness of the benefits of doing so, to build support for actions designed to improve air quality. This is linked to the State Plan priorities on cleaner air and reducing greenhouse gas emissions, and increasing the share of peak hour journeys on public transport.

Targeted communications and campaign resources will be developed to:

- increase awareness of the connection between individuals' environmental concerns and air quality actions, and between individuals' choices and air quality actions, and
- provide information about actions people can undertake to reduce particle pollution, ozone, and greenhouse gas emissions.

The CAHC Community Awareness and Behaviour Change Program has the following components:

- **Research to provide a suitable knowledge base** for program design – Qualitative research has been completed on people's views and actions on air pollution, and the connections they make to climate change and health. Findings from the DECC (now DECCW) social research *Who Cares about the Environment 2006?* and *Who Cares about Water and Climate Change 2007?* have also been used to inform the program design.
- **An evaluation plan** to guide management of the program – This will include pre- and post-program testing.
- **Targeted communication and education** – This will include provision of online resources and targeted community education. Limited funding will be available for councils to develop and implement localised information and education activities. The approach will motivate people to take action to improve air quality. These actions include driving in a more environmentally friendly way and promoting the use of sustainable transport such as public transport, cycling and walking.
- **Education resources** – As part of the targeted communication and education component, an education resource kit and training program will be developed for environmental educators. Workshops and materials will present findings from social research, key messages and recommended behaviours from the Clean Air, Healthy Communities Program.

## Future directions for air quality management

Significant improvements in air quality have been achieved in the past two decades. However, maintaining emissions in the Greater Metropolitan Region – particularly in Sydney – at levels that present little risk to human health is likely to remain a significant challenge in the years to come. As air emissions in this region are largely a by-product of anthropogenic processes, changes in population and real income affect the level and composition of these activities and thereby drive air emissions. Over the next 30 years, Sydney's population is expected to grow by 30%. This combined with even modest growth in per capita real income will continue to stimulate demand for transport, construction and household products and services. Consumption and production activities in these sectors will directly impact on future emissions of VOC, NO<sub>x</sub> and particulate matter.

The implementation of the State Plan cleaner air target is a whole-of-government response to a significant air quality challenge. Not everything will happen immediately, but *Action for Air* will continue to address where and how to reduce air pollution across the various source sectors. Government agencies will continue to develop actions in response to transport and planning-related State Plan targets that will also have significant air quality benefits.

As research and policy development is completed and the evidence base grows, new strategies to improve air quality will be added to the *Action for Air* information on the DECCW website.

### Commercial and domestic sectors

Emissions from the commercial and domestic sectors are significant and growing, and are becoming increasingly important in terms of the contribution they make to overall emissions.

The growth in Sydney's population is expected to be accompanied by a growth in the proportion of single or two-person households; as a result, demand for housing is expected to grow by as much as 46% during 2001 to 2031. The labour force is also expected to grow – albeit at a slower rate than present – by 25% in the same period leading to an expansion in demand for commercial and industrial floor space. Further, the growing population and its increasing purchasing power will lead to a greater demand for retail goods and therefore increased need for transportation, storage and distribution of goods across Sydney. These increased requirements for housing, commercial and industrial space and more infrastructure to support transport and communications will see higher levels of activities in the construction industry and in sectors like land-based extraction, coal mining and energy production. This will have very significant implications for the growth in emissions.



*As Sydney's population increases, the demand for transport, construction and household products and services will impose further challenges on air quality.*



*Increased use of the rail network to transport freight improves air quality (Photo: courtesy National Pacific).*

Many commercial and domestic emission sources are currently uncontrolled. The main area for potential future action is establishing environmental standards for product formulations (e.g. for paints and solvents) and product performance (e.g. setting emission standards for small engines). NSW will continue to encourage other governments to pursue these issues at a national level, where they can be implemented most effectively.

## Transport

A closer look at the demand for transport shows that, historically, the demand for car trips and for cars in Sydney has grown at a much higher rate than the growth in population. While Sydney's population grew by 21% in the past 20 years, car trips went up by 41% and number of cars by 58%. Although there has been a recent slowing in the rate of VKT growth, if the trend of the past 20 years continues, emission increases in the next 30 years or so from increased car travel will more than offset gains in emission reductions made possible by cleaner vehicle and fuel technologies. Over a period of time, as the fleet composition changes in favour of cleaner cars, gains from technology will also begin to plateau out. Future growth in vehicle emissions will therefore be influenced by land-use patterns – i.e. how compact future development is and how close it is to the existing and emerging economic corridors – and by availability of affordable and reliable public transport.

The expected growth in Sydney's population will also keep up the demand for freight movements. As with the growth in passenger transport, container freight movement in Sydney has grown at a much higher rate than the growth in its population or the growth in the State's total output. The volume of Sydney's freight movement is expected to double by 2020. Given that commercial vehicles contribute to a disproportionately large amount of fuel consumption and to air emissions, the expected strong growth in road freight traffic will remain an important driver of on-road emissions in the future.

An important part of the Government's strategy to address Sydney's present and future transport needs is the expansion of bus services. The Government is purchasing 86 Euro 4 and 214 low-emission Euro 5 diesel buses and 150 Euro 5 articulated buses that will be on the road progressively across Sydney over the next two years. These buses will be additional to the services currently on our roads and will be strategically placed to link popular transport hubs and provide services where there is the greatest demand.

In addition the Government has announced the Sydney Metro (Stage 1 – Rozelle to Central), construction of which will commence in 2010, with Sydney's first Metro trains operating by 2015. This project will ease rail congestion on parts of the CityRail network and is the first step towards future metro lines in Sydney, supporting the growth of Sydney's economy.

The Epping to Chatswood Rail Link is a new underground passenger rail line that will increase the capacity of the CityRail network and provide direct rail access for the first time to the growing North Ryde/Macquarie Park area. A shuttle service began in February 2009, with full integration into the new October 2009 timetable.

The Government has also allocated \$370 million for the purchase of additional outer-suburban carriages (Oscars) and stabling, to come into service from 2010.

The NSW Government is also addressing the growth in freight with initiatives to attract more freight to rail. It has committed substantial funds – over \$80 million – to the Southern Sydney Freight Line, which is to be constructed by the Federal Australian Rail Track Corporation. The Southern Sydney Freight line will be 36 kilometres of dedicated freight track from Macarthur to Sefton.

Investigations are also underway to improve rail freight capacity and flexibility north of Sydney and reduce the interface between freight and passenger services on this corridor. This corridor is presently the subject of a \$15 million AusLink 1-funded Study. The Commonwealth has also committed \$840 million in the AusLink 2 funding round (2009–2014) for construction towards a dedicated freight line from Sydney to Gosford.

Towards the end of 2009, the Government will release a Transport Blueprint, a major new strategy for transport planning and delivery. The Blueprint will integrate land use planning and transport planning and link to the Metropolitan Strategy and Regional Strategies.

## Industry

DECCW continues to regulate industrial activities and require continuous improvement of emissions performance. This is driven through licensing and Pollution Reduction Programs as well as review and updating of the air emission standards specified in the Protection of the Environment Operations (POEO) (Clean Air) Regulation, with the next major review proposed for 2010.

Campaign programs, both voluntary and mandatory, targeting specific industrial activities (e.g. through cleaner production initiatives) also contribute to continuing emissions reductions. DECCW will continue to pursue the most feasible and cost-effective means of reducing emissions.

Policy measures to reduce greenhouse gas emissions will also generally create incentives for industry to reduce its contribution to air pollution. For example:

- major emitters will be covered by the Commonwealth's Carbon Pollution Reduction Scheme which will create a financial incentive to reduce greenhouse gas emissions
- the NSW Energy Efficiency Strategy includes measures to drive lower energy consumption by industry. These include mandatory implementation of cost-effective energy savings measures identified in Energy Savings Action Plans prepared by high energy users across NSW, and the Sustainability Advantage program which works in partnership with businesses to improve their resource efficiency.

Such initiatives provide significant potential for energy and resource efficiency and air quality improvements. The continued management of air quality issues associated with the implementation of co-generation facilities arising from some of these initiatives will also be important.

## Abbreviations used in this report

ABCB	Australian Building Codes Board
Air NEPM	National Environment Protection Measure for Ambient Air Quality
AQI	Air Quality Index
BASIX	NSW Government Building Sustainability Index
BAT	Best available techniques
BCA	Building Code of Australia
CAHC	Clean Air, Healthy Communities
CBD	Central Business District
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CNG	compressed natural gas
CO <sub>2</sub>	carbon dioxide
CO <sub>2-e</sub>	carbon dioxide equivalent
COAG	Council of Australian Governments
DECCW	Department of Environment, Climate Change and Water NSW (previously Department of Environment and Climate Change (DECC))
DII	Department of Industry and Investment
EPHC	Environment Protection and Heritage Council
EU	European Union
E10	Petrol with 10% ethanol
ILUT	Integrating Land Use and Transport
IPCC	Intergovernmental Panel on Climate Change
LDAR	leak detection and repair
LGA	local government area
LPG	liquefied petroleum gas
µg/m <sup>3</sup>	micrograms per cubic metre
NEPM	National Environment Protection Measure
NO <sub>x</sub>	oxides of nitrogen
PCAL	Premier's Council for Active Living
PM	particulate matter
PM <sub>2.5</sub>	particles of less than 2.5 micrometres in diameter
PM <sub>10</sub>	particles of less than 10 micrometres in diameter
POEO	Protection of the Environment Operations
ppm	parts per million
pphm	parts per hundred million
RTA	Roads and Traffic Authority
RTO	regenerative thermal oxidiser
SEPP	State Environmental Planning Policy
SMILE	Sustainable Mobility Initiatives for Local Environments
STA	State Transit Authority
TAGs	transport access guides
US EPA	United States Environmental Protection Agency
VKT	vehicle kilometres travelled
VOCs	volatile organic compounds
VR1	Stage 1 vapour recovery
VR2	Stage 2 vapour recovery
WHO	World Health Organization

## Appendix 1: Economic analysis

### Cost effectiveness of Action for Air programs

*Action for Air: 2009 Update* includes a number of policy initiatives aimed at reducing air pollutants in the Greater Metropolitan Region. These initiatives include strategies to reduce emissions from vehicles, from industry and from domestic and commercial sources. While some of these have already been implemented or are in the process of being implemented in a staged manner, others are in their formulation stages. This appendix summarises abatement costs associated with some of these strategies. It draws on study reports prepared by DECCW and by consultants commissioned by DECCW.

The following programs are included in this analysis:

1. Diesel retrofit
2. Vapour recovery Stage 2
3. Old plant upgrade, and
4. Cleaner NSW Government fleet.

The abatement costs reported here include direct costs and savings to industries and government that are expected to flow from the proposed programs. Health costs avoided as a result of reductions in the emissions are not included in the estimates. For each program, the assumptions on which the estimates are based, the time period over which they are calculated and the information sources are mentioned.

#### 1. Diesel retrofit

##### Current status

Emissions requirements under the Australian Design Rule introduced in 2002 (ADR80/00), 2008 (ADR80/02) and due in 2010-11 (ADR80/03) will reduce particulate emissions from new diesel heavy-duty vehicles considerably. However, diesel vehicles manufactured before strict emission limits will continue to form a large proportion of the fleet and therefore a significant source of particulate emissions. The diesel retrofit program aims to reduce emissions from such vehicles by retrofitting pollution reduction devices to the exhausts of older vehicles. The estimates given below are based on preliminary cost-benefit analysis conducted by DECCW in January 2007.

##### Inclusions

- Estimates are for the 10-year period 2007 to 2016.
- Costs include emission testing costs and retrofit device costs.
- \$2.1 million is committed to retrofit heavy vehicle fleets (excluding STA buses).

##### Assumptions

- On average, a diesel truck travels 18,150 kilometres per year.
- PM<sub>10</sub> emissions from diesel trucks equal 0.444 grams per kilometre.
- A retrofit device costs \$7,600 and cuts emissions by 50%.

**Table 3: Abatement costs for PM<sub>10</sub> reductions through diesel retrofits**

Total PM <sub>10</sub> avoided in 10 years	Total abatement costs	Average PM <sub>10</sub> avoided per year	Abatement costs per tonne
30.8 tonnes	\$2.1 million	3.08 tonnes	\$68,400

## 2. Vapour recovery Stage 2

### Current status

In November 2007 the NSW Government announced its intention to require Stage 2 vapour recovery (VR2) technology at service stations in Sydney, Newcastle, Wollongong and the Central Coast regions. The Government also announced its intention to extend the geographic area where service stations are required to install Stage 1 vapour recovery (VR1). VR1 is the control of petrol vapour that is released when a road tanker delivers fuel to a service station. It has been required across metropolitan Sydney since 1986. VR2 is the control of petrol vapour that is released into the atmosphere during vehicle refuelling. VR2 has wide international uptake but has never been compulsory in Australia.

VR1 will be phased in (2010–17) to include all of Sydney, the Lower Hunter, Illawarra and Central Coast regions. It is proposed that the introduction of VR2 to the Sydney, Newcastle, Wollongong and Central Coast regions will be phased-in over a nine-year period (2009–2017) with:

- service stations with petrol throughput greater than 12 megalitres per year required to install VR2 by 2014
- service stations in Sydney with throughput less than 12 megalitres per year and greater than 3.5 megalitres per year required to install VR2 by 2017, and
- an exemption for service stations with petrol throughput of less than 3.5 megalitres per year unless they are newly built or they undergo modification.

A two-year lead-in will be provided to resolve a range of issues including equipment certification, industry up-skilling, resolution of technical issues and development of industry codes and guidelines.

Estimates of VOC reductions and abatement costs associated with implementing VR2 in the Greater Metropolitan Region are given below. These estimates are based on an economic analysis of VR2 conducted in 2008 by McLennan Magasanik Associates (MMA).

### Inclusions

- Costs include capital, installation, disruption, operating and maintenance costs.

### Assumptions

- The VR2 compliance date is 2014 for all service stations in Sydney, Newcastle, Illawarra and Central Coast regions with throughput > 12 megalitres per year, and 2017 for service stations in Sydney with throughput > 3.5 megalitres per year.
- The VR1 compliance date is 2014 for all service stations in Sydney, Illawarra, Lower Hunter and Central Coast with throughput > 0.5 megalitres per year.

#### Information sources

- Economic analysis by MMA 2008.

**Table 4: Abatement costs for vapour recovery**

Cost per service station of installing VR2	Annual emission reduction in 2025	Abatement costs per tonne 2008–2040
\$20,000 – \$450,000	6,840 tonnes	\$730

### 3. Old plant upgrades

#### Current status

Amendments to the Protection of the Environment Operations (Clean Air) Regulation 2002 commenced from 1 September 2005. The amendments replaced the existing Clean Air (Plant and Equipment) Regulation 1997 that was repealed on 1 September 2005. The amended Regulation establishes, among other things, a framework for reviewing the suitability of the emission standards for plant and equipment installed before 1 July 1979 and upgrading them, if required, to meet contemporary emission standards (post-1997). Estimates of PM<sub>10</sub> and NO<sub>x</sub> reductions and abatement costs associated with upgrading of old plant and equipment are presented below. These are based on the cost-benefit analysis undertaken as part of the Regulatory Impact Statement for this amendment, with updates to the methodology to reflect current cost-benefit analysis practices.

#### Inclusions

- Emission reductions and costs are estimated for the period 2005 to 2031.
- Abatement costs to industry include costs of control equipment.
- Benefits in the form of reduced health costs are not included.

#### Assumptions

- Upgrades of plants that commenced operations in 1979 or earlier to meet emission requirements applicable to plants set up in 1997 or later are considered (i.e. upgrades of 'Group 1' and 'Group 2', to meet 'Group 5' limits).
- The cost of upgrading to meet 'Group 5' PM<sub>10</sub> limits is \$750 per tonne of PM<sub>10</sub> abated.
- The cost of upgrading to meet 'Group 5' NO<sub>x</sub> limits ranges between \$50 and \$600 per tonne for coal-fired electricity generators, and between \$900 and \$4,500 per tonne for the remaining emission sources.
- Costs are discounted to the base year 2004 using a real discount rate of 7% as recommended by NSW Treasury.

#### Information sources

- Pechan & Associates 2003, 'AirControlNet Development Report', Prepared for US Environmental Protection Agency Office of Air Quality Planning and Standards.
- Ramsay & Associates 1996, 'Analysis of Air Pollution Control Options and Costs: Reactive Organic Compounds and Oxides of Nitrogen', prepared for NSW EPA.
- EPA operating licence data and load-based licensing reporting data.
- National Pollutant Inventory 2002–03 emissions.

**Table 5: Abatement costs for PM<sub>10</sub> and NO<sub>x</sub> reductions through plant upgrades**

	Emissions avoided 2005–2031	Total abatement costs	Abatement costs per tonne
PM <sub>10</sub>	39,000 tonnes	\$11 million	\$280
NO <sub>x</sub> Low (i.e. using low cost, low effectiveness modifications)	297,000 tonnes	\$73 million	\$250
NO <sub>x</sub> High (i.e. using high cost, high effectiveness modifications)	516,000 tonnes	\$156 million	\$300

## 4. Cleaner NSW Government fleet

### Current status

A number of initiatives to improve fuel efficiency and reduce emissions of government vehicles have been introduced since the Cleaner NSW Government Fleet program was instituted in early 2005. One of these involves retrofitting STA's older diesel buses to reduce particulate emissions. STA has allocated \$4 million for this purpose. Emissions reduced through STA's diesel retrofits and associated costs are summarised here.

### Inclusions

- Benefits in the form of reduced health costs are not included.
- Estimates are for a 10-year period.
- Cost estimates include retrofit device costs.

### Assumptions

- 1 On average, a diesel bus travels 44,670 kilometres per year.
- 2 PM<sub>10</sub> emissions from Euro II buses equal 0.39 grams per kilometre.
- 3 A retrofit device cuts emissions by 50%.
- 4 A retrofit device costs \$4,000.
- 5 A total of \$4 million will be spent retrofitting 1,000 buses.

### Information sources

Data on retrofit device costs, mileage and emission reductions provided by STA.

**Table 6: Abatement costs for PM<sub>10</sub> reductions through diesel retrofits**

	Total PM <sub>10</sub> avoided in 10 years	Total abatement costs	Average PM <sub>10</sub> avoided per year	Abatement costs per tonne
To diesel retrofit 1,000 STA buses:	87 tonnes	\$4 million	8.71 tonnes	\$45,921

## Appendix 2: Consultation

### Outcomes: Experts Workshop 11 May 2007

On 11 May 2007 DECC (now DECCW) convened an Experts Workshop to consider new directions and actions for the review of *Action for Air*.

A number of key themes for potential future actions for the review of *Action for Air* emerged at the workshop and are identified below.

#### Key themes from the workshop

##### *Timing and level of public interest*

This is a critical time for air quality and greenhouse issues. Community attitudes are changing, interest is high and a new vision for air quality and greenhouse management will be expected by the community and receive a high level of acceptance. There is an opportunity for the Government to roll out new programs and initiatives and seize the day. Air quality and greenhouse targets are included in the NSW State Plan and there is a strong incentive to act now.

##### *Communication and behaviour change*

In order to take effective actions on air quality, it is critical to engage with the community and understand what is motivating people's choices, e.g. their car use. The community needs to be empowered to make their contribution and the NSW Government needs to communicate the health risks of ozone and particle pollution in order to help generate support for its actions.

Policy outcomes should be informed by a good understanding of financial incentives and their relationship with social behaviour, e.g. in relation to passenger preferences, switching capacity from cars to public transport. We need to develop understandable messages for the community in order for them to help enact change.

##### *Air quality and greenhouse gas emissions*

Policies and actions to address air pollution and greenhouse gas emissions should continue to be integrated and be part of the same agenda. There is a need to think 'big picture', not marginally, about the range of options available to reduce emissions. The solutions may lead to a transformation of markets and structural change in the economy. The use of life cycle analysis as a tool is critical to get the whole story.

##### *Costs and benefits*

The benefits of air quality actions should be better defined and promoted. There are co-benefits from tackling air quality issues that are often not recognised. These include not just the pollution reductions resulting from the technology for cleaning up vehicles but also the impact of getting people out of cars. This leads to air quality benefits, health benefits of people not dying prematurely, asthma and obesity reductions, and more liveable neighbourhoods and it provides real economic benefits. Better information about the broader costs and benefits provides strong arguments to support new actions.

#### Local-level exposure

Improved understanding of people's personal exposure to pollution, particularly to particle pollution, and improved understanding of local pollution sources will help to better target government and community responses. Local exposure is emerging as an important health issue given the increased population density around transport nodes, with apartments being built on high-volume transport corridors in Sydney. Zoning and building set-back criteria from roads are possible solutions to help minimise the risks.

### Priorities for further actions

There was a high level of support demonstrated at the workshop for a number of potential future actions to achieve emission reductions in the vehicle and fuel sector. These included:

- increased provision and use of buses and rail
- introduction of Stage 2 vapour recovery
- incentives to repair and retire gross polluting vehicles
- retrofitting of particle controls to older diesel vehicles
- provision and uptake of ultra-clean technology and vehicles
- education programs to promote travel behaviour change, and
- urging the Commonwealth to change tax provisions that encourage car use.

### Other key priority areas

Other key priority areas identified during the workshop included:

- the relationship between indoor and outdoor air and the need to consider the impacts of indoor emissions from paints, unflued gas heating and cooking etc.
- the need for the Government to lead by example, e.g. with its own vehicle fleet, procurement specifications for low-VOC paints used in government buildings, encouraging videoconferencing and working from home to reduce car and plane travel
- the opportunity to showcase and learn from innovative businesses and industries, e.g. those with clean fleets or low-emission products
- the need to target large road travel generators such as ports and airports
- the need to target the light commercial vehicle fleet to improve their fuel and engine efficiency, and
- the need for more research on the efficiency of different type of fuels, including a range of alternative fuels.

### Outcomes: Future Vehicles Roundtable 12 June 2007

In June 2007 the RTA and DECC (now DECCW) jointly hosted a Future Vehicles Roundtable with overseas and local speakers and around 200 participants. The Roundtable:

- focused on the impact of transport on air quality and climate change and identified possible solutions to this problem
- highlighted the impact of transport on air quality and climate change
- showcased innovative and best practice approaches to reducing greenhouse and other polluting emissions from vehicles
- predicted possible pathways for adopting low-emission vehicle technologies and fuels, and
- identified opportunities and barriers to adopting low-emission vehicle technologies and fuels in NSW.

### Outcomes: Local Government Workshop 12 July 2007

On 12 July 2007 DECC (now DECCW) convened a workshop for local government and industry associations on air quality and greenhouse management issues at the local level. The workshop was part of a series of consultations to generate ideas for the review of *Action for Air*.

As well as stimulating discussion and awareness, the workshop generated a number of ideas and themes that will be considered further in the review of *Action for Air*. These are summarised on the next page.

### Themes from council case studies

Speakers from North Sydney, Marrickville, and Newcastle Councils gave an insight into different ways local governments are working to address air quality and greenhouse. Programs included:

#### *Awareness and education*

- Showing leadership through education and demonstration of best practice

#### *More sustainable transport*

- Supporting car sharing ventures (e.g. GoGet)
- Specifying maximum parking rates for developments, rather than minimums
- Differential pricing on parking permits for different sized cars with different environmental impacts
- Establishing walking school bus (and pre-school bus) programs
- Education programs with local schools to stimulate positive travel behaviour (e.g. TravelSmart)
- Urban planning and traffic management to support more sustainable travel patterns
- Trial and use of alternative fuels (e.g. biodiesel) in council vehicle fleets

#### *Energy use*

- Reducing energy used by street lighting
- Local monitoring and awareness of greenhouse emissions, such as with Newcastle's 'ClimateCam'.

Many of the programs discussed had a focus on greenhouse emissions. In the case of transport, which was a popular topic and is a significant source of emissions, actions to reduce greenhouse gas emissions will also have benefits for local and regional air quality (together with health and liveability). This is an important link to recognise. Another key theme was the important role councils can play in raising awareness and encouraging more sustainable practices, as they are the closest level of government to local communities and businesses.

### Ideas for action on commercial and domestic emissions

As groups, participants considered a number of key commercial and domestic local sources of ozone and particle pollution in the Sydney Greater Metropolitan Region, and ways that these could be addressed.

### Outcomes: Clean Air, Cool Climate Forum 23 November 2007

The Clean Air, Cool Climate Forum took place on Friday 23 November 2007 at the Power House Museum, Sydney. The Forum is a triennial event, linked to the review of *Action for Air*. The event was very successful, providing a range of interesting and high-profile speakers and engaging panel discussions involving the audience, speakers and other experts.

Over 175 invited guests attended, representing industry, community and environment groups, academic and scientific experts, government agencies and local government.

The themes of air quality and climate change (and the links between them), health, emission sources and new initiatives to tackle these issues were explored in the speakers presentations and discussion sessions.

Minister Watkins (as Acting Premier), Minister Koperberg, and Minister Firth spoke at the Forum, announcing new policy initiatives, including the release of the draft NSW Cleaner Vehicles and Fuels Strategy.

DECC (now DECCW) was pleased to have Catherine Witherspoon, former head of the California Air Resources Board, as keynote speaker at the Forum on air and greenhouse policy experience and future directions. A number of meetings were held between Ms Witherspoon and key government, non-government and ministerial staff during her week-long stay in Sydney.

Other speakers were Gavin Fisher, principal author of an important air pollution and health study in New Zealand, and Ian Galbally, from CSIRO, who spoke on the links between air quality and climate change and the predicted impacts. Libby Darlison, Chair of the Premier's Council for Active Living released the new *Why Active Living Statement*; Jeff Angel, Executive Director of the Total Environment Centre released their Third Review of *Action for Air* report; Genia McCaffery outlined the significant initiatives being undertaken by local government to reduce emissions; school students from Callaghan College, Newcastle, spoke about the ClimateCam for Schools Program; Mark McKenzie (RARE Consulting) presented insights into emissions from road transport; Paul Wild (TNT Express) spoke about his company's 'Planet Me' international program to reduce emissions from its road freight fleet and Lisa Corbyn outlined future directions for air quality management in NSW. EPA Board members who attended were Genia McCaffery, John Keniry, Peter Prineas and Gerry Bates.

The Forum was a 'climate neutral' event. Carbon credits were purchased to offset all energy, transport, food and paper used on the day.

Forum presentations were filmed and are now available on the DECCW website ([www.environment.nsw.gov.au/air/actionforair/caf07speakers.htm](http://www.environment.nsw.gov.au/air/actionforair/caf07speakers.htm)).

A number of display tables showcased key government and industry initiatives. These included: DECCW

- information on Sustainability Programs, e.g. renewable energy development, Green Globe awards, Sustainability Advantage, and the Environmental Action series of publications
- the new air emissions inventory brochure, released in November
- the technical paper on current and future air quality in NSW
- the Cleaner Vehicles and Fuels Strategy, and
- an on-screen demonstration of the new online air quality index.

#### RTA

- information on the RTA's Clean Fleet and diesel retrofit programs, with retrofit devices on display.

#### PREMIER'S COUNCIL FOR ACTIVE LIVING

- the new *Why Active Living Statement*, to be released at the Forum, and
- general information on what the Premier's Council does.

#### DOTARS

- demonstration of Green Vehicles Guide online (live)
- Colpro Engineering
- a range of vehicle retrofit devices on display.

#### Gilbarco

- full-size VR2-equipped petrol bowser in the courtyard, with other equipment and posters demonstrating vapour recovery technology.

#### TNT Express

- diesel-retrofitted delivery truck parked in the courtyard.



