

Action FOR AIR

The NSW

Government's

25-Year

Air Quality

Management Plan



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Foreword

The New South Wales Government has made a significant commitment to develop and implement a comprehensive long-term plan to protect and improve air quality across NSW. We have also recognised the challenge of putting in place *Action for Air*—a 25 year plan which tackles the widest range of emissions specifically affecting the Greater Metropolitan Region of Sydney, the Illawarra and the Lower Hunter.

The Government undertook extensive public consultation through a series of Green Papers on developing the Air Quality Management Plan (AQMP) and the Smog Action Plan (SAP) during 1996-97. We received valuable information and input from all sectors of the community: business and industry, community groups, and local and State Government. This has led us to a more integrated approach by bringing forward *Action for Air* to tackle both photochemical smog and brown haze in one plan. It is a plan that commits all of government and also requires that we each contribute individually.

Everyone in NSW has a right to breathe clean air and to be protected from the adverse effects of air pollution. However, protecting air quality is a complex matter for which there is no one simple solution. *Action for Air* tackles our most significant and growing air quality issue: the increasing use of motor vehicles in the urban area. Our plan, for the first time, sets targets for reducing the use of vehicles and supports these targets with requirements for long-term transport and freight movement plans, which will give us more and better alternatives to increasing the use of vehicles.

The Government has also made a significant contribution to better public transport, which will improve both air quality and the growing congestion on our roads. At the same time, *Action for Air* continues to push for cleaner cars, trucks and buses. The plan also promotes a continued emphasis on cleaner business and improved management of pollution sources within our homes and from outdoor activities such as open burning.

Most importantly, we have set tough air quality goals within a framework that is publicly accountable and provides improved access to information. With regular reporting on the status of air quality, and on the effectiveness of our long-term strategies, we will be able to adapt our programs as we gain new information and new technologies over the next 25 years.

Our plan, *Action for Air*, will make a difference as long as we all contribute to it. We all need to do our fair share to ensure that we have clean air in NSW well into the future.



BOB CARR
Premier of NSW

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Introduction

The air we breathe

We have reached a critical point for air quality in NSW. The good news is that the air we breathe is substantially cleaner than it was 15 years ago, mostly through controls on industry, on motor vehicles and the fuels they use, and on backyard burning. But there is another side to the story.

Unless we shift air quality management into a higher gear, we are in danger of losing the gains we have already made; or, worse still, experiencing higher pollution levels than in the past.

As the population of Sydney grows, the number of cars and trucks on the road also increases. The number of trips we take and the length of those trips are rising too, as we use our vehicles more intensively than ever before. This seemingly unstoppable growth of vehicle use not only congests our roads: it is the most significant source of many of the pollutants that damage our air quality.

In the past, air quality management in NSW has focused mostly on the technological side of the equation—making vehicles and industrial technology cleaner. We will certainly need to continue to make gains through cleaner technology and cleaner production. But to protect our air quality well into the future, we must also approach the problem from another side of the equation: how we use our motor vehicles.

Changing behaviours can often be harder than changing technology. The whole community will need to make positive choices about improving air quality to protect both our health and our economy.

Getting the priorities right

Recognising the need for a comprehensive plan to make sure the air we breathe is clean, the NSW Government has combined scientific, health, urban planning and economic expertise with feedback from the community, industry and government to produce this plan. It is an ambitious initiative, seeking for the first time to develop a plan for air quality for the long-term, over a 25-year period. Everybody is being asked to take responsibility—

government, the community and industry—because integrated solutions are the ones that will work in the long-term.

Setting an air quality plan with goals, objectives and actions over 25 years is very ambitious but it is necessary. It is not a coincidence that NSW is now realising air quality gains from air pollution programs that were put in place in the mid 1980s. *Action for Air* will provide us with the next set of gains; and be adapted as new information comes to light and the technological landscape shifts. Its release marks a crucial phase of the Government's total air quality management strategy, concentrating on the Greater Metropolitan Area—Sydney, Newcastle and Wollongong—which contains about 70% of the State's population.

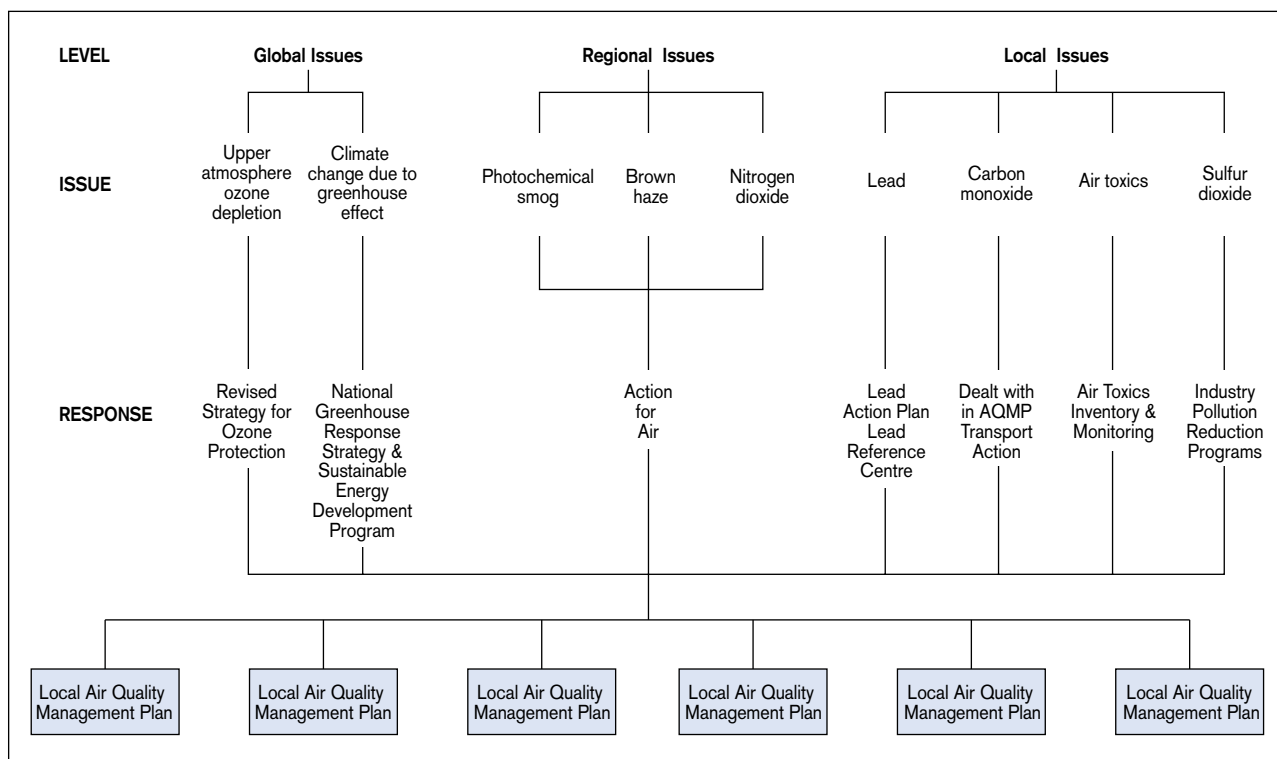
The plan supports the Government's overall air quality agenda, which includes local, regional and global issues. *Action for Air* focuses on regional air pollution—a comprehensive attack on photochemical smog and fine particle pollution. The regional approach taken here draws strong links to local and global issues, especially the Government's high priority campaigns to reduce greenhouse gas emissions and promote sustainable energy sources.

The plan is broad. It recognises that every action counts in tackling air pollution. It puts in place actions that will reduce emissions from motor vehicles as well as industrial and commercial sources and from everyday household activities. Figure 1 highlights the overall air quality framework.

Achieving air quality goals

Crucial to the plan are the ambient air quality goals being adopted by NSW, pending the final decisions on air quality standards at a national level. These are for ozone, nitrogen dioxide and particles, which relate to photochemical smog and brown haze. Additional standards for carbon monoxide, sulfur dioxide and lead will be included following the conclusion of the national process.

Figure 1. Structure of the Air Quality Management Plan



Reducing emissions from motor vehicles is the highest priority if we are to meet the goals in the long term. The Government has set in place a multi-pronged approach to do this. Improving transport choices and encouraging people to take fewer and shorter trips by individual motor vehicles are key objectives. This will rely heavily on developing a progressive transport plan, which is linked to the regions' five-year urban infrastructure management plan. Providing improved public transport and encouraging cycling and walking, as well as integrating the planning of freight movement, are also essential objectives to achieve clean air.

But these are not the only objectives. Promoting cleaner cars, trucks and buses through cleaner fuels and alternative technologies, for example, are among the other priorities found in the *Action for Air* plan. The plan takes a multi-layered approach. It includes seven key objectives for total air quality management, and puts in place a comprehensive slate of strategies to meet these objectives:

1. Integrate air quality goals and urban transport planning

- integrate transport and urban infrastructure planning
- improve management of freight transport

2. Provide more and better transport choices

- provide better public transport
- promote cycling and walking
- change travel behaviour through education

3. Make cars, trucks and buses cleaner

- reduce car emissions
- reduce diesel emissions
- promote cleaner fuels

4. Promote cleaner business

- improve regulation of industrial emissions
- promote a cost-effective approach for small business

5. Promote cleaner homes

- improve operation of wood heaters
- promote energy efficiency in the home

6. Manage the impact of open burning

- develop smoke management guidelines
- inform people of open burning restrictions

7 Monitor, report on and review air quality

- improve access to air quality data
- ensure an effective public review process
- report regularly on the state of air quality in NSW.

Some actions to support these strategies are already under way, some will be started in the near future, others are still to be devised during the 25-year timeframe.

How will the community be involved?

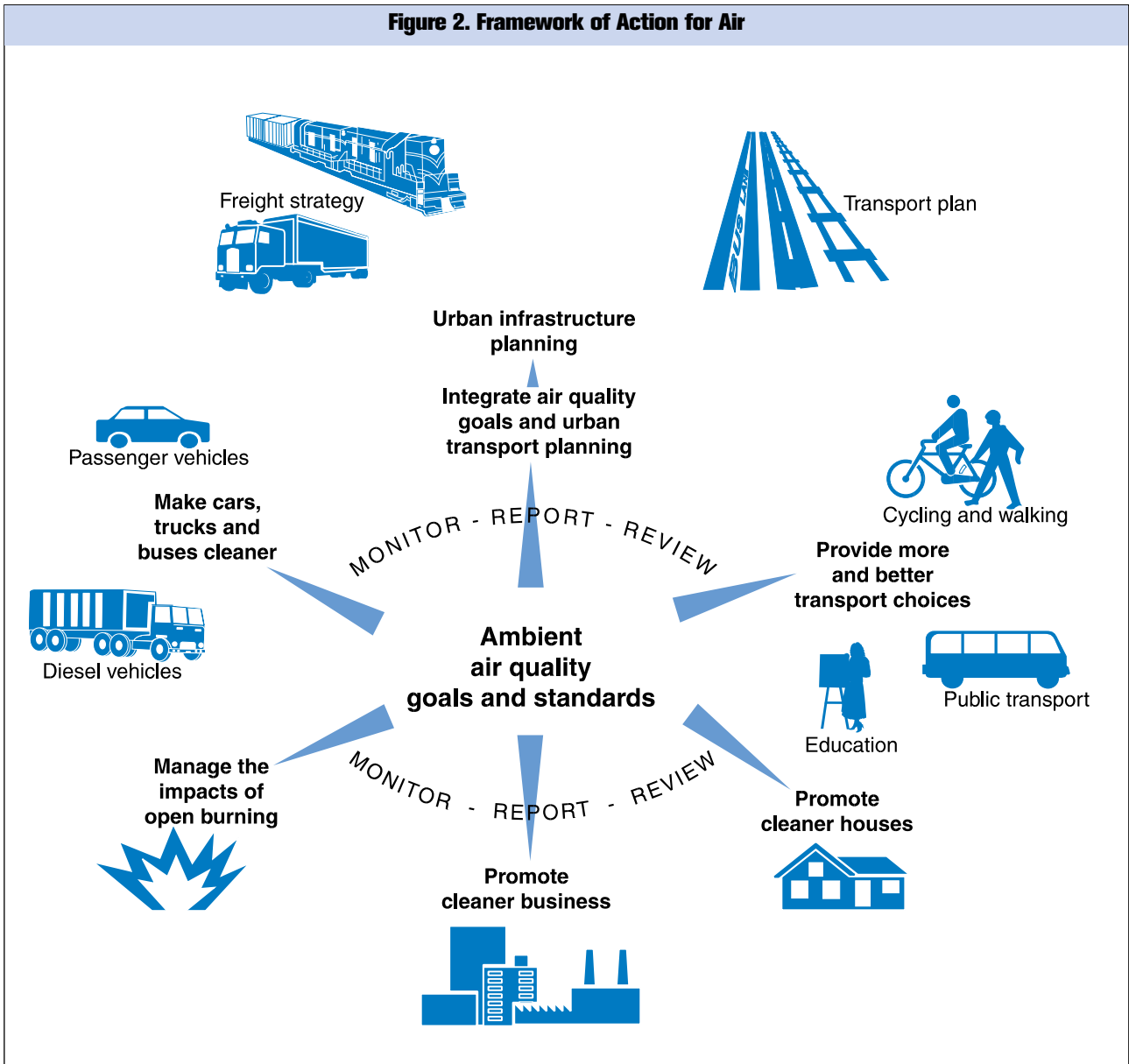
Consultation with the community on air quality issues is a high priority for the Government. Recent NSW-wide studies indicate an ongoing public concern about air quality and show that many people rank it as the highest environmental priority for the State.

Action for Air has numerous mechanisms to encourage further community input in the future, including:

- enhanced access to daily and quarterly air quality reporting data through the Internet
- a public Air Quality Forum to monitor air quality trends and strategies, and report back to Government
- an Air Quality Modelling Advisory Group as a forum for external input into priorities for future modelling
- the Public Transport Advisory Council, ensuring community input into public transport planning.

Whether you are an individual or a community organisation, the Government is calling for your involvement in its air quality improvement program and will work to keep you well informed about the quality of the air in NSW.

Figure 2. Framework of Action for Air



What's the problem?

Action for Air focuses primarily on regional air pollution in the Greater Metropolitan Region (GMR) of NSW, which is home to about 70% of the State's population and encompasses the major metropolitan centres of Sydney, Newcastle and Wollongong. Sydney, in particular, can experience poor air quality under certain weather conditions because of its size and topography.

Research shows that air quality problems in any of these three metropolitan centres can affect air quality in the others, so we need to consider them together rather than separately. At the same time, many of the actions implemented in *Action for Air* will also improve air quality in rural areas—e.g. improved standards applying to motor vehicles and wood heaters.

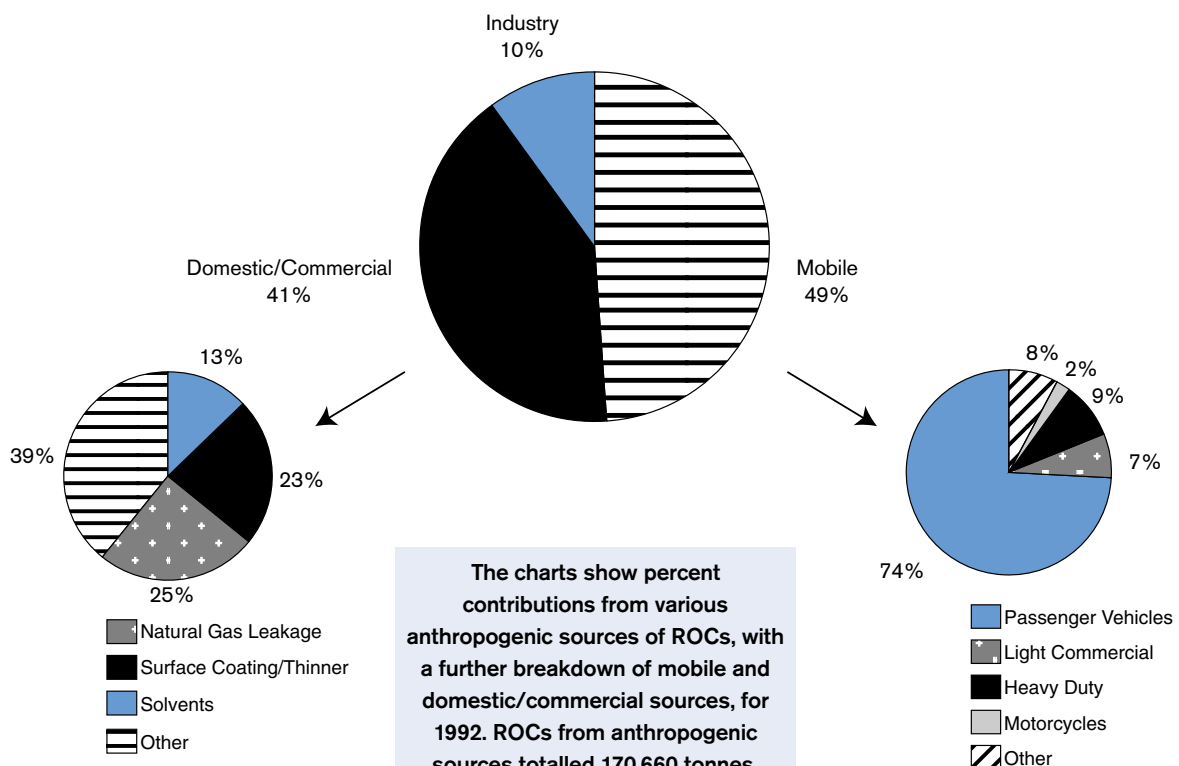
The two regional pollution problems of prime

concern within the GMR are photochemical smog and particle pollution. This section deals with the major pollutants that cause smog and particle pollution—**ground level ozone, nitrogen dioxide and total particulate matter**. It explains where they come from and their effects on human health, drawing on the available body of health related research from Australia and overseas. (The sources of pollutants and their air quality impact are outlined in more detail in EPA publications such as the *Metropolitan Air Quality Study—Outcomes and Implications for Managing Air Quality*).

Photochemical smog

Photochemical smog is a complex mixture of chemicals, which is sometimes visible as white haze. In Sydney, the Lower Hunter and Illawarra, its most significant components are the pollutants ground-level ozone and nitrogen dioxide. Ozone is the main concern in the warmer summer months,

Figure 3. Annual emissions, Sydney Region: Reactive organic compounds (ROCs)



and nitrogen dioxide in winter. These pollutants are formed in the atmosphere when two classes of compounds—reactive organic compounds (**ROCs**) and oxides of nitrogen (**NO_x**)—react under the influence of sunlight.

ROCs and NO_x are emitted by various human activities as well as from natural sources, including vegetation, soil and the ocean. Some nitrogen dioxide is also emitted directly from combustion processes.

Sources

The major sources of **ROCs** include:

- unburnt petrol and diesel from motor vehicle tailpipes
- evaporative losses from motor vehicles and petrochemical industries
- loss of solvents used in commercial and domestic activities
- natural emissions from vegetation

The major sources of NO_x are combustion processes including:

- motor vehicles (passenger and heavy duty vehicles)
- industry—e.g. the power industry

Effects on human health

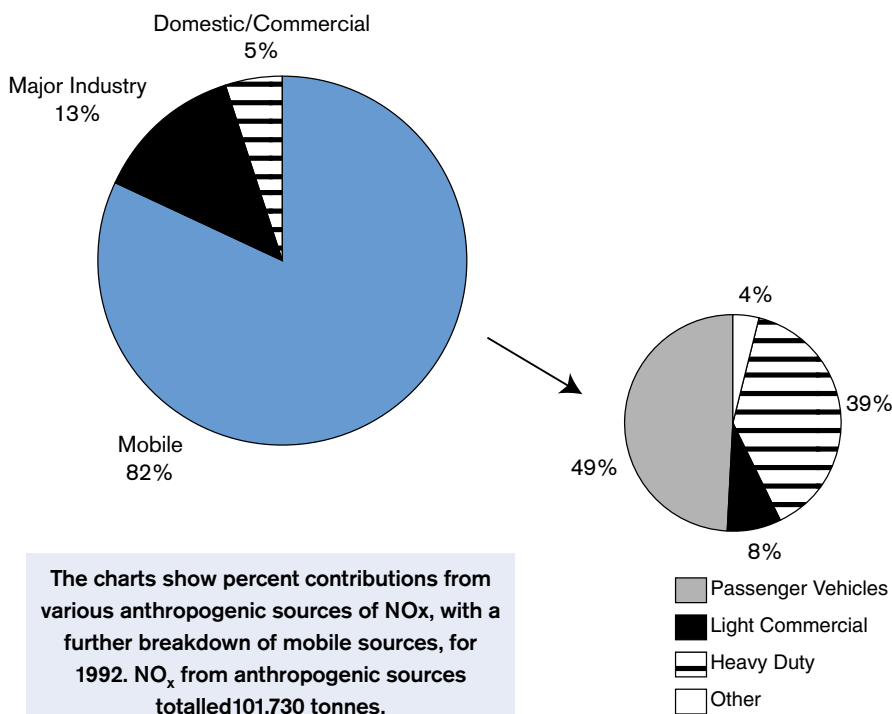
Ground level ozone

The health effects of ground level ozone, the major component of smog, have been widely studied. Even at very low levels, this ozone can:

- cause acute respiratory problems
- aggravate asthma
- cause temporary decreases in lung function in healthy adults
- lead to hospital admissions and emergency room visits
- impair the body's immune system

The effects of ozone vary with concentration,

Figure 4. Annual emissions, Sydney Region: Oxides of nitrogen (NO_x)



length of exposure and level of activity during exposure. Short-term acute effects, including reduced airflow to the lungs and inflammatory changes in the small airways and respiratory systems, have been detected in the laboratory when adults are exposed for 6.6 hours to an ozone concentration of 0.08 parts per million (ppm). There is clear evidence that substantial acute effects occur with one hour's exposure if the concentration is 0.25 ppm or higher.

Nitrogen dioxide

Nitrogen dioxide is a major precursor to ozone as well as being a pollutant in its own right. Health studies of nitrogen dioxide show that it:

- can damage the respiratory system
- is associated with increased respiratory infections in children, especially asthmatics
- may increase the effects of allergens
- is associated with hospital admissions for asthma
- is associated with hospital admissions for heart disease

- may possibly be linked to mortality.

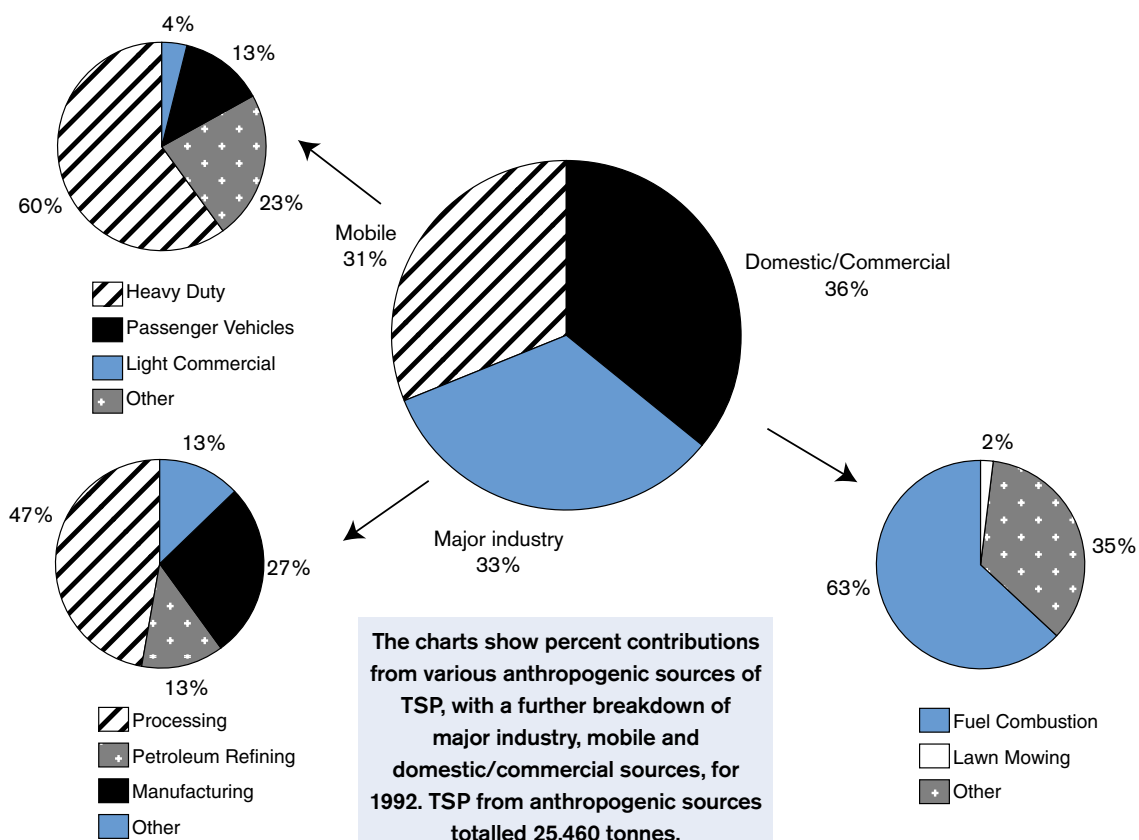
Negative respiratory health effects from exposure to nitrogen dioxide can occur at levels as low as 0.20 ppm. A Sydney-based health study, Health and Air Research Program (HARP), indicated that small increases in one-hour maximum levels of nitrogen dioxide produced an 11% increase in daily asthma admissions; and a similar study in Paris showed an 8% increase.

Particle pollution

Particle pollution can sometimes be seen in the metropolitan area as brown haze, usually during the cooler months of the year. This occurs most commonly in the late afternoon or the early morning—under cold, still conditions when surface temperature inversions are developing or breaking down.

Airborne particles (sometimes called particulate matter) are formed by the accumulation of substances into small, discrete entities in the atmosphere. They are typically less than 50

Figure 5. Annual emissions, Sydney Region: Total suspended particulates



micrometers (μm) in size and can be as small as $0.1\mu\text{m}$.

Fine particles—less than $10\mu\text{m}$ —can be transported some distance from their source, affecting air quality on a regional scale. Because they are small enough to be inhaled into the lungs, they can affect human health. Coarser particles remain in the air for relatively short periods before being deposited, sometimes soiling or damaging materials.

Total suspended particulates (TSP) refers to both fine and coarse particles together.

Sources

Particles originate from a wide range of human activities and natural sources, including motor vehicles, industrial processes, bushfires, hazard reduction burning, pollens, fungi and sea spray. The relative importance of sources varies according to time, season and locality.

The major sources of fine particles include:

- motor vehicles (particularly diesels)
- domestic solid fuel heaters, particularly wood burners (major source of particles during winter: 34% of TSP in Sydney on a winter weekday, 50% on a winter weekend)
- industry (also a major source of coarse particles in the GMR)
- open burning associated with agriculture, forestry management and hazard reduction (significant source of particles across NSW)

Effects on human health

Fine particles are measured in two categories:

- PM_{10} —particles $10\mu\text{m}$ or less in diameter, small enough to be inhaled into the respiratory system.
- $\text{PM}_{2.5}$ —particles $2.5\mu\text{m}$ or less in diameter, small enough to be inhaled deep into the lungs.

Our living environment is filled with particles of all shapes and sizes. Under normal conditions,

Table 1. Regional Ambient Air Quality

Pollutant	Averaging time	Previous NSW goal	Action for Air interim goal	Long-term reporting goal
Ozone (O_3)	1 hour	0.10 ppm	0.10 ppm	0.08 ppm*
	4 hour	0.08 ppm	0.08 ppm	0.06 ppm*
Nitrogen dioxide (NO_2)	1 hour	0.16 ppm	0.125 ppm	0.105*
	Annual	0.05 ppm	0.03 ppm**	—
Particulate matter < $10\mu\text{m}$ (PM_{10})	24 Hours	$150\mu\text{g}/\text{m}^3$	$50\mu\text{g}/\text{m}^3$	—
	Annual	$50\mu\text{g}/\text{m}^3$		$30\mu\text{g}/\text{m}^3$
Particulate matter < $2.5\mu\text{m}$ ($\text{PM}_{2.5}$)	24 Hours	—	Standard being developed.	Standard being developed.
		—	Insufficient data at this stage	Insufficient data at this stage
	Annual	—	Standard being developed.	Standard being developed.
			Insufficient data at this stage	Insufficient data at this stage
Total suspended particulates (TSP)	Annual	$90\mu\text{g}/\text{m}^3$	$90\mu\text{g}/\text{m}^3$	

* WHO goal
 ** Consistent with WHO goal of 0.021-0.026ppm

people in good health are able to deal with most particles without adverse effect. However, particles of the size of PM₁₀ can be inhaled into the lower airways and are closely associated with health effects. Recent research has focused on PM_{2.5} which can penetrate deep into the lungs and which, some studies suggest, are most closely associated with health effects. An important emerging issue from the most recent health studies is that there is no obvious threshold level of fine particles below which there are no effects on health.

Health studies of fine particles have shown that they can:

- increase mortality from cardiovascular and respiratory diseases
- increase hospital admissions for chronic obstructive pulmonary disease and heart disease
- reduce lung function in children with asthma
- increase respiratory symptoms in school children.

What are our air quality goals?

The starting point for any air quality management plan is to adopt air quality goals or acceptable standards for pollutants of concern. The NSW Government is committed to health based ambient air quality goals. State and Federal Governments have also made the important collaborative decision to develop national air quality standards as National

Environment Protection Measures (NEPMs) and expect to finalise these in 1998.

NSW is playing an active role in developing these national standards and is committed to adopting them when they are finalised. Pending that decision, NSW has established its own interim goals to guide the development of control strategies and for reporting purposes.

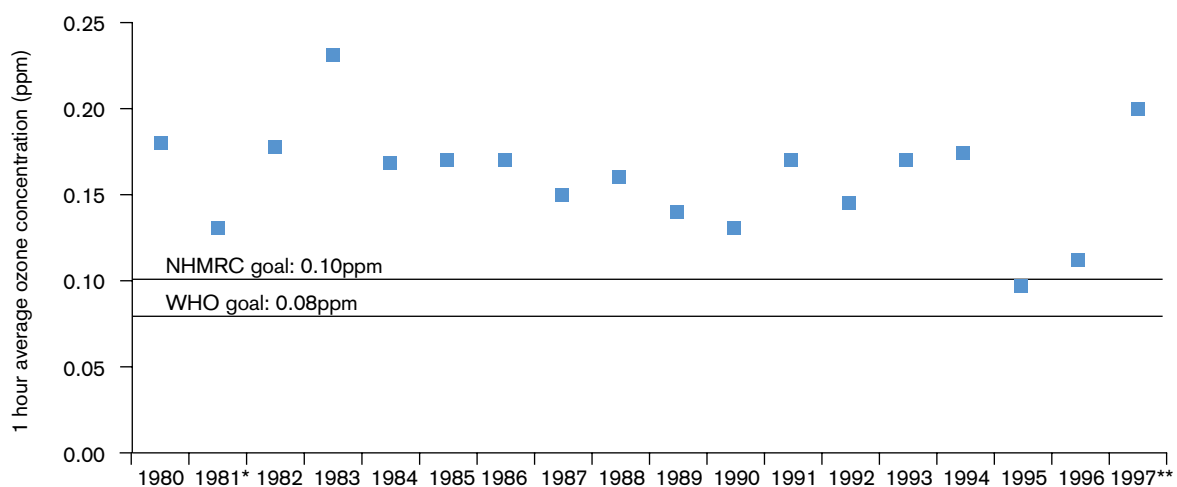
In setting these levels, NSW has examined the local and overseas health research relating to the adverse health effects from high levels of photochemical smog, nitrogen dioxide and fine particles. We have also been involved in the national discussions to set appropriate national standards through the air NEPM.

Table 1 outlines the air quality goals that form the basis of this action plan.

Over the 25 years of the *Action for Air* plan, there will undoubtedly be further health research undertaken and a better understanding of health effects established. In order to build a comprehensive picture of air quality in the region, the Government intends to report against a range of health-related goals. The plan therefore commits the EPA to provide information on air quality at different levels to ensure comparative data is available for the long-term.

This approach will ensure that public health in NSW is protected over the long term.

Figure 6. Annual maxima of 1-hour average ozone concentrations, greater metropolitan area



* data for 1981 incomplete

** at time of writing 1997 data had undergone first level validation only

Photochemical smog

Ground-level ozone

■ Ambient goals

The NSW goal for ground-level ozone is based on the national ozone goals set by the NHMRC in 1995. These are 0.10 part per million (ppm) (averaged over one hour) and 0.08 ppm (averaged over four hours).

The World Health Organization (WHO) ozone goals of 0.08 ppm (averaged over one hour) and 0.06 ppm (averaged over 4 hours) will be set as a long-term goal for reporting on air quality in NSW. The EPA will be required to report against the WHO standard as well as the interim goal for ozone.

The long-term objective is ambitious. It is, however, important to set a goal for progressive long-term reductions in ozone.

■ Trends in ground-level ozone

It can be difficult to establish trends in ozone levels because ozone formation depends on

meteorological conditions. In a cloudy summer such as in 1996, ozone goals may not be exceeded. On the other hand, unusually hot sunny weather in November 1997 caused unexpected high peak levels of ozone.

There has been little change in peak levels of ozone over the last decade, according to annual one-hour average maxima (see Figure 6).

Concentrations of ozone at EPA sites in the Sydney region over the last decade have exceeded the NHMRC goal (0.10 ppm) on up to 15 days in a given year. They have exceeded the long-term WHO goal (0.08 ppm) on up to 31 days in a given year.

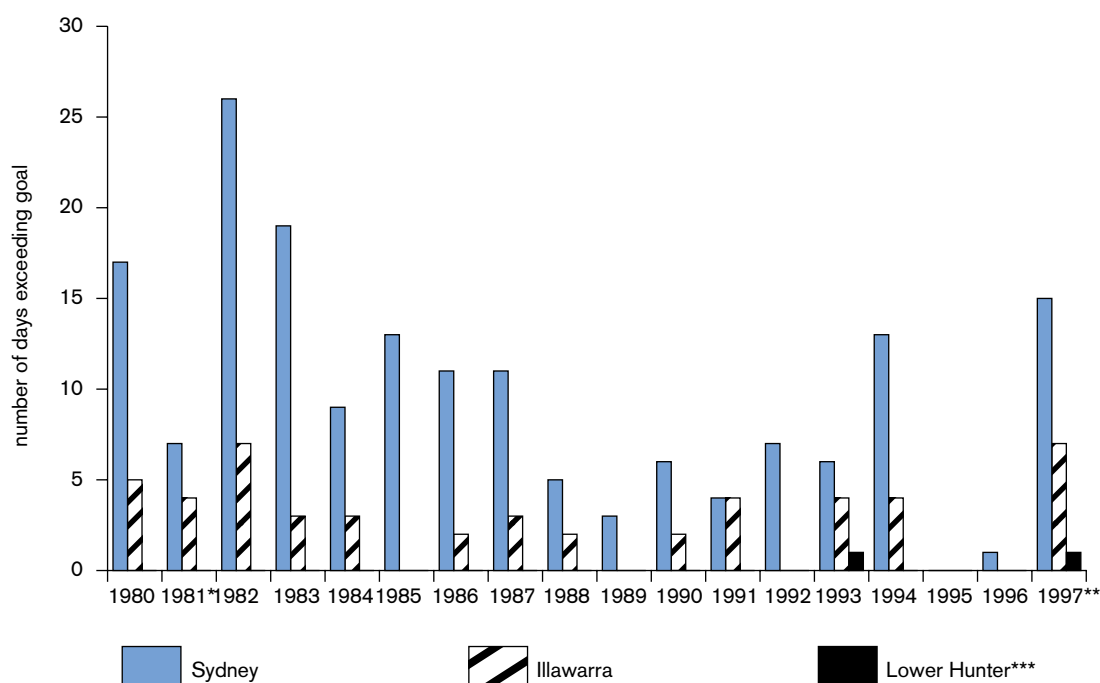
Nitrogen dioxide

■ Ambient goals

Until 1998 NSW has used a goal for nitrogen dioxide of 0.16 ppm (one-hour average) and 0.05 ppm (annual average).

To ensure an adequate safety margin to protect the very young and those with respiratory disease, NSW will use 0.125 ppm (one-hour average) and 0.03 ppm (annual average) as its interim goals for

Figure 7. Days exceeding the NHMRC 1-hour ozone goal at EPA sites in the Sydney, Illawarra and lower Hunter regions



* data for 1981 incomplete

** at time of writing 1997 data had undergone first level validation only

*** monitoring in the lower Hunter commenced in 1983

nitrogen dioxide. It will also adopt the WHO one-hour standard as a long-term reporting goal.

■ Trends in nitrogen dioxide levels

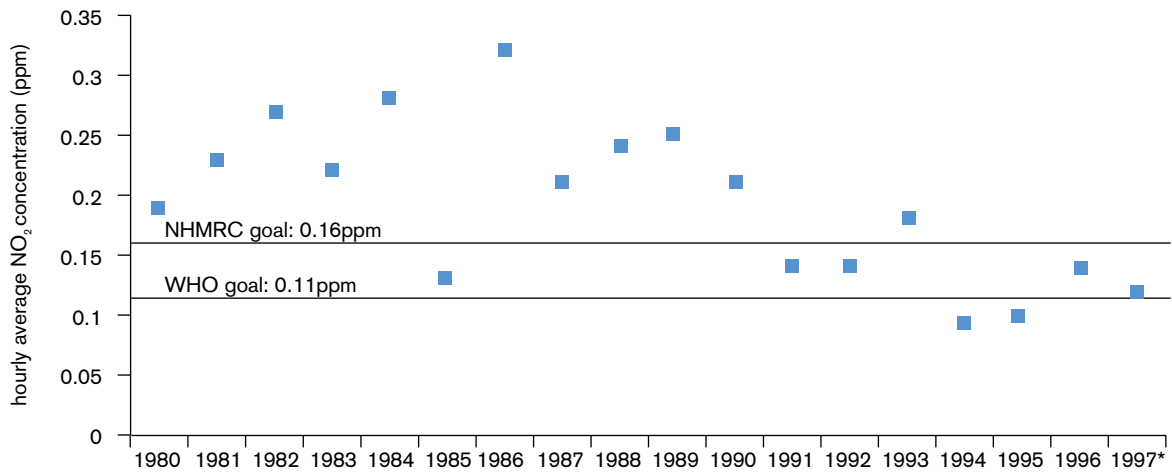
The frequency of nitrogen dioxide events in the Sydney region is highly variable (Figure 9). During the past six years, the NHMRC goal (0.16 ppm) has been exceeded on only one day. Over the last decade, it has been exceeded on up to 16 days per year. The more stringent WHO goal (0.11 ppm) has been exceeded more frequently.

Fine particles

Ambient goals

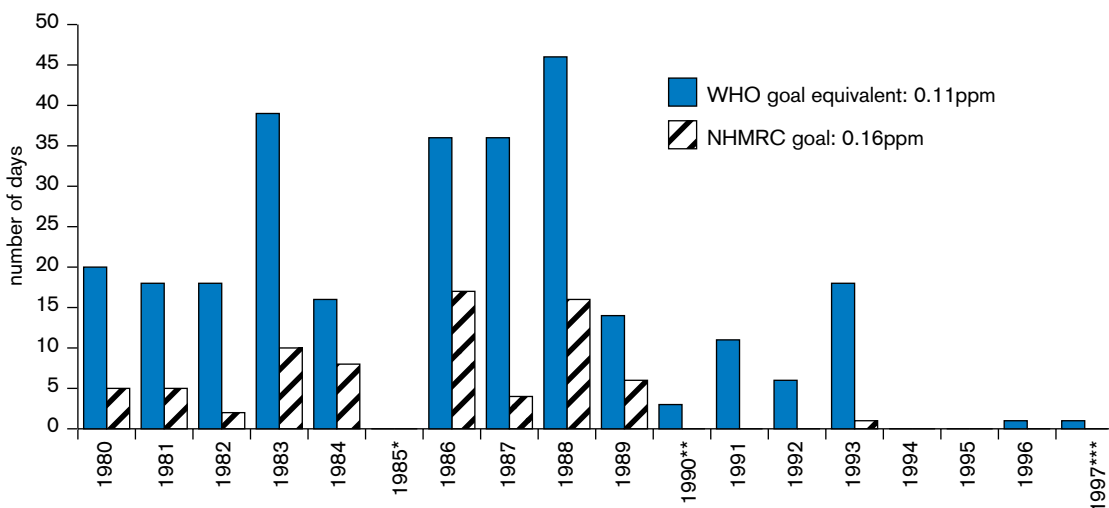
Current health advice is that there is no established threshold for fine particles below which there are no health effects. Setting a standard for fine particles therefore presents a dilemma. WHO does not have specific goals for fine particles because of this. Instead it issues a summary table of health effects to guide authorities.

Figure 8. Annual maxima of 1-hour average nitrogen dioxide concentrations, greater metropolitan area



* at time of writing 1997 data had undergone first level validation only

Figure 9. Days exceeding NHMRC and WHO nitrogen dioxide goals at EPA sites in the Sydney region



* data for 1985 not available ** data for 1990 incomplete

*** at time of writing 1997 data had undergone first level validation only

Historically, NSW has applied the US EPA PM₁₀ goal of 150 µg/m³ 24-hour average in the absence of available Australian information.

Because of rising health concerns from particles, NSW will adopt a 24-hour average goal of 50µg/m³ for PM₁₀ (24 hour average) as the interim goal. A new annual average standard of 30 µg/m³ will also be referenced as a long-term reporting goal.

Fine particles as small as of PM_{2.5}, which are capable of being absorbed deep into the lung, are of primary concern in terms of health effects. The NSW Government is committed to the development of a PM_{2.5} standard but further research is necessary to achieve this. NSW will set a PM_{2.5} goal as soon as sufficient information is available.

The NSW EPA currently uses an hourly visibility goal which equates to approximately 9 km under normal conditions. It will be maintained as an interim goal.

NSW will also maintain its current goal for reporting total suspended particulates (TSP) of 90µg/m³ annual average.

Trends in fine particle levels

Over the last seven years, annual average

concentrations of PM₁₀ in the Sydney region have generally remained below the proposed interim NSW goal of 30 µg/m³; however, annual averages for individual sites can exceed this goal (figure 11). Levels in the lower Hunter and Illawarra regions are very similar to those measured in Sydney.

Figure 11. Annual average PM₁₀ at EPA monitoring sites in the Sydney region, 1988-96

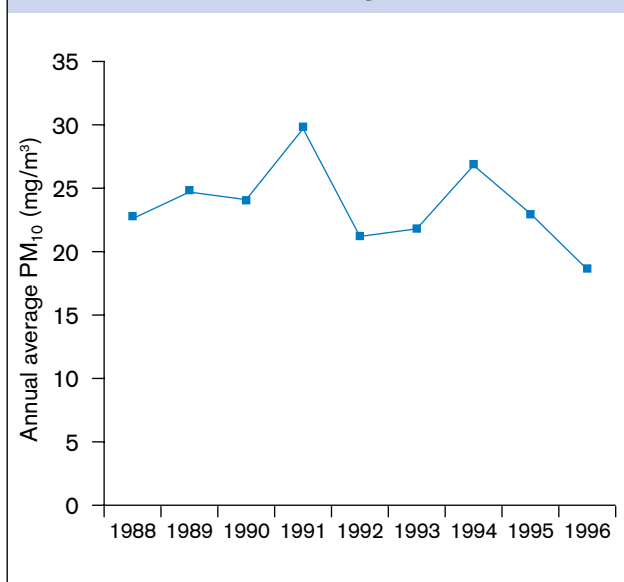
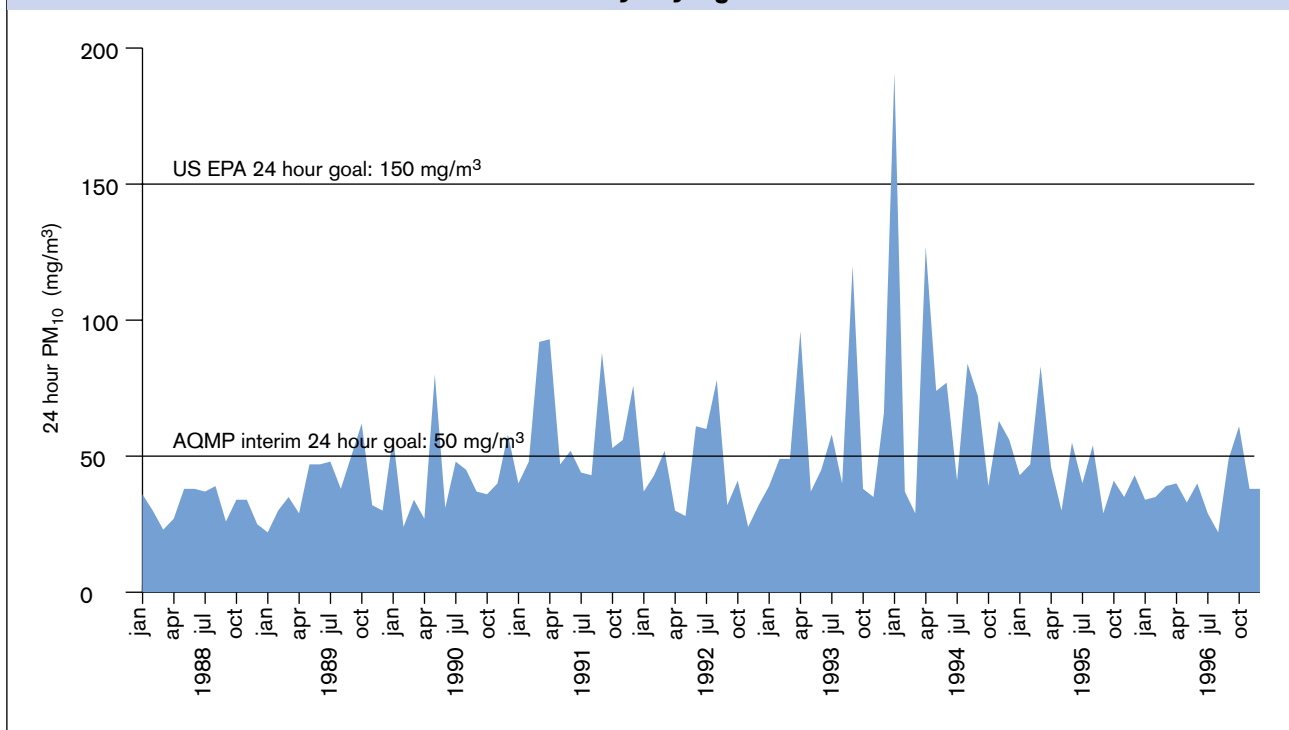


Figure 10. Monthly maxima of 24-hour PM₁₀ concentrations at EPA sites in the Sydney region



Overview

Isolated pockets of action will not achieve our air quality goals over the next 25 years; the key to protecting air quality is to launch a concerted and sustained effort across all spheres of government, industry and the community.

Action for Air aims for a fundamental change in air quality management in NSW by sketching the big picture and identifying everyone's place within it, so that government, the community and the business sector understand how they must work together to protect human health and the quality of the environment. The responsibility for keeping the air clean is shared by everyone.

The Action Plan focuses primarily on the greater metropolitan region and contains diverse strategies and actions, approaching the problem on many fronts and linking State and local government, industry and individual actions for an integrated attack on air pollution. Transport initiatives sit alongside actions to reduce industrial and household emissions. Technology initiatives sit alongside education and regulatory initiatives.

The Action Plan's key objectives are described in a brief overview and the strategies and actions that will support these objectives are detailed under seven separate headings. An overview of these is shown in Figure 12.

Summary of objectives

Objective 1. Integrate air quality goals and urban transport planning

Although big air quality gains have been made through new vehicle technologies and fuels, motor vehicles remain a major, and increasing, source of air pollution in the GMR. As well as contributing to smog and particle pollution, they are a source of air toxics and a major contributor to greenhouse gases.

Growth in car use is increasing faster than the growth in population. We are taking more and longer trips both to get to work and for domestic purposes. Emissions from diesel vehicles, both

heavy and light commercial vehicles, are becoming an increasing source of air pollutants as they move freight throughout the GMR.

To respond to this, the Action Plan has set an ambitious objective of containing the per capita growth in vehicle kilometres travelled (VKT) and then stopping the growth in total VKT by effectively integrating planning decisions and by improving transport choices.

The Government's objectives include achieving:

- a shift from private cars to public transport, cycling or walking
- smoother flows of traffic and reduced congestion, including for road-based public transport
- reduced need for travel
- reduced length of trips travelled by vehicles
- increased occupancy of cars and public transport carriers
- better planning and managing freight movement across all transport modes.

The Action Plan sets specific targets for reducing per capita VKT. To achieve these targets, the Government has required the development of two new overarching transport initiatives:

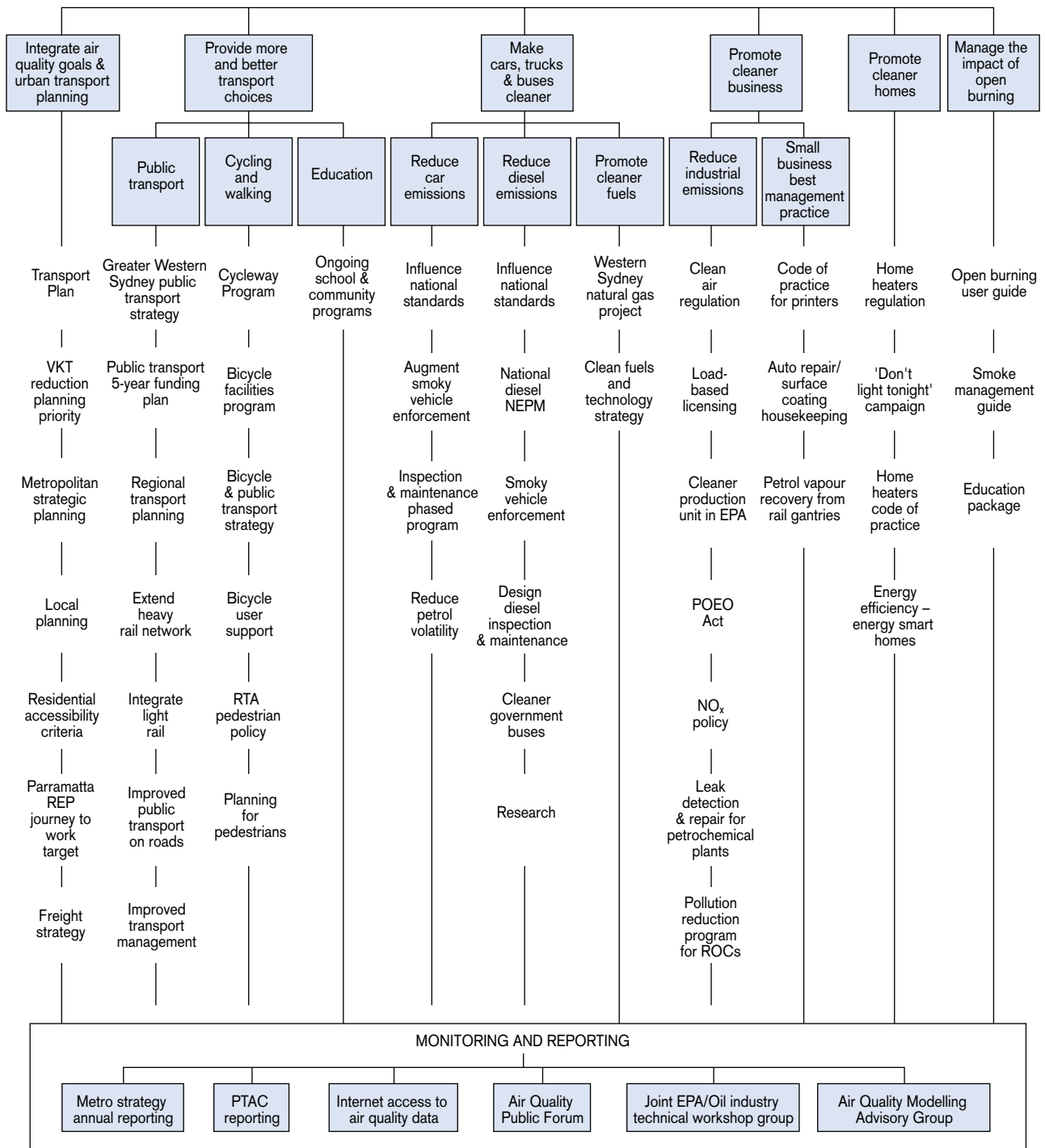
- an integrated transport plan
- an integrated freight management strategy across road, rail and other transport modes.

The VKT target will also be incorporated into the Government's metropolitan and regional planning processes and the five-year rolling Urban Infrastructure Management Plan—which helps to integrate land use and transport planning, and sets the priorities for infrastructure funding approvals.

Objective 2. Provide more and better transport choices

In addition to long-term planning, there is a clear need to provide more and better transport choices, which will encourage reduction in vehicle trips and kilometres travelled by both passenger and commercial vehicles.

Figure 12. Action for Air: key objectives, strategies and actions



The Action Plan outlines key commitments for improving provision of both fixed rail and road-based public transport. The plan balances construction of new public transport facilities with establishing priority for road-based public transport

services and management improvements such as integrated ticketing. Improved opportunities for walking and cycling are integral to the plan, to help reduce harmful emissions and improve people's health.

Objective 3. Make cars, trucks and buses cleaner

We have achieved significant gains in air quality in the GMR by adopting standards and putting in place programs to make motor vehicles cleaner. However, there is still more work to be done. This will be done at a national level for new vehicle standards and at a state level for in-service vehicles.

The Action Plan aims to reduce exhaust and evaporative emissions from both new and in-service cars, trucks and buses by continuing to improve the technology of vehicles and their fuels—including diesel vehicles, which contribute a disproportionately high level of emissions; and encouraging the use of alternative fuel sources (such as natural gas) and their application to private and public fleets. Specifically, the Government has brought forward a comprehensive program to have cars and trucks tested and properly maintained, beginning in 1998 in the Sydney region and expanding to the Illawarra and Hunter by 2004.

Objective 4. Promote cleaner business

Through *Action for Air*, the Government is continuing to put in place a revamped environment protection framework for industry, which combines strong legislation and regulation with economic incentives for change.

Successful measures to reduce industrial emissions of ROCs in the 1980s are being followed with new actions that concentrate on the control of NO_x. For smaller commercial sources, the goal of the Action Plan is to reduce emissions of ROCs in the most cost-effective way and, in the process, help reduce air toxics and workplace exposure to chemicals.

Objective 5. Promote cleaner homes

The domestic sector is a significant contributor to ROCs and fine particle emissions. While there are a number of household sources, including petrol lawn mowers and garden tools, the major domestic source of emissions is the solid-fuel (mainly wood) heater. The first phase of the 25-year plan will reinforce existing regulations to reduce emissions from solid fuel heaters with a new slate of education and management programs.

The home is also a significant consumer of power and a major contributor to regional

production of greenhouse gases. The second focus on the domestic front is to improve domestic energy efficiency and encourage the use of alternative, cleaner and sustainable energy sources.

6. Manage the impact of open burning

The effect of the Clean Air (Control of Burning) Regulation introduced in 1995 has been to prohibit backyard burning in the Sydney and Wollongong metropolitan regions. The major smoke management issue for Sydney air quality now relates to bushfire hazard reduction and forestry management burning. There is also some impact from ecological and bush regeneration burns and, in regional centres, the issue extends to agricultural open burning.

Hazard reduction burning practices are necessary to control bushfires, but the impact of prescribed burning on air quality can be greatly reduced if best practice in smoke minimisation is understood and implemented. Also, the public must have ready access to information about restrictions on open burning in their particular locality.

Objective 7. Monitor, report on and review air quality

Because of its 25-year time frame, *Action for Air* is an adaptive plan that will be monitored and evaluated against its own goals and objectives. To ensure greater input from the community, business and government in this monitoring and development process, the plan includes a number of actions to improve access to information on air quality and provide forums for input from the public and from industry on air quality strategies.

These include the provision of Internet access to air quality data, setting up an air quality modelling interest/advisory group, and convening a public forum to report to the Government. The forum is linked to the legislatively based 3-yearly *State of the Environment* report.

Objective 1. Integrate air quality goals and urban transport planning

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

It is now well known that the structure of our urban centres influences travel demand and choice of transport. Historically, urban development in Australian cities has been characterised by low density and separation of land uses. The result is a reliance on the private motor vehicle as the principal means of transport.

Related to that, motor vehicles, both cars and trucks, are a significant source of air-polluting emissions.

Population is projected to be 22% higher in 2021 than in 1991 for the Sydney region. Total VKT is projected to grow approximately 35% over the same period, reflecting increasing per capita VKT as a result of increasing trip lengths, people making more trips, and a higher reliance on cars. If the rise

in vehicle use continues at the same rate over the next 25 years, many air quality gains already made across the industrial, commercial and domestic sectors may be neutralised (see Figure 13).

For the health of the community, there is clearly a need to break this trend. There are also economic imperatives for change, as air pollution and traffic congestion undermine the attractiveness of Sydney as a tourist and commercial centre. The Australian Transport Council estimates that the cost of Sydney's traffic congestion is already in the vicinity of \$2 billion a year.

To reduce vehicle kilometres travelled (VKT), we need to create more compact cities, where:

- fringe expansion is reduced
- housing development near public transport routes is encouraged
- retail, entertainment, community service and other suitable high-use facilities are located in centres that are able to be well served by public transport.

We also need to create long-term transport and freight movement plans that provide the overall

A Snapshot of Motor Vehicle Emissions

ROCs

Almost half—49%—of the ROCs in Sydney and the GMR are produced by transport activity; of this, 70% are emitted by light duty vehicles

In summer, 60% of light duty vehicle emissions comes from evaporation and 40% from the tail-pipe.

NO_x

82% of the NO_x in Sydney are produced by transport activity. Of this, light duty vehicles contribute 48%, heavy duty vehicles 38%. That 38% is disproportionately high given the number of diesel vehicles in the fleet.

Industry is the major source of NO_x in the GMR but motor vehicles still contribute substantially in the Hunter and Illawarra regions.

Particles

24% of total suspended particles (TSP) emissions from human activity in Sydney are produced by motor vehicles. Of this, up to 80% comes from diesel emissions, even though diesel vehicles account for only 15% of vehicle kilometres travelled.

Industry is the major source of TSP outside Sydney.

Greenhouse gases

Transport activity contributes 12% of NSW greenhouse gases.

Not only is the number of vehicles on NSW roads increasing as the population increases, we are also becoming much more dependent on our cars. Between 1981 and 1991, the growth in car use in Sydney greatly exceeded the growth in population.

blueprint for investment in infrastructure and public transport management improvements.

Integrating land use and transport plans, and delivering coordinated services, help to reduce the length of vehicle trips and provide alternatives to private vehicle use. *Action for Air* aims to improve air quality by better and more integrated urban transport and relevant land-use planning.

Strategy A. Integrate urban infrastructure and transport planning

Because it is so wide-ranging, the progress of *Action for Air* will rely on unprecedented integration of State programs across different agendas. This can only happen by setting out the linkages, the steps and the goals clearly for all planning agencies to see and work with.

The creation of the Ministry of Urban Infrastructure Management (1996) and the Urban Management Committee of Cabinet were necessary steps to coordinate across planning, environment and infrastructure providers. The Ministry's role is to develop Urban Infrastructure Management Plans with a five-year outlook.

Equally important has been the recent decision to bring the roads, traffic and transport agencies together in a single portfolio under the same Minister.

Other important steps have been the creation of the Department of Urban Affairs and Planning (DUAP), by combining the Department of Planning, the Office of Housing Policy, Landcom and the City West and Honeysuckle Development Corporation; and the creation of an independently chaired Public Transport Authority, which is advised by a Public Transport Advisory Council made up of users and public interest groups.

The focal point for future action will be a long-term transport plan for the GMR.

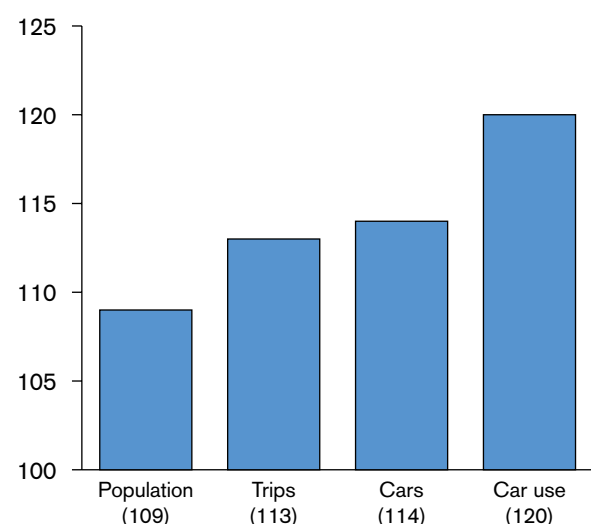
Action 1.1. Develop a transport plan to reduce VKT growth

At the request of the Premier, the Minister for Transport and Roads has directed transport agencies to develop an integrated Transport Plan in

conjunction with planning agencies. This plan will:

- set directions for public transport and road developments in conjunction with related land-use issues
- include the Government's goal of stopping the per capita growth of VKT by 2011 and stopping the growth in total VKT by 2021
- include regional and staged sub-targets for the achievement of the VKT target
- build on existing policies, plans and projects across the transport and planning agencies
- involve all relevant government agencies including the RTA, the Department of Transport, the DUAP and the EPA
- involve consultation with key community stakeholders in its framing and development
- be provided to the Government by November 1998.

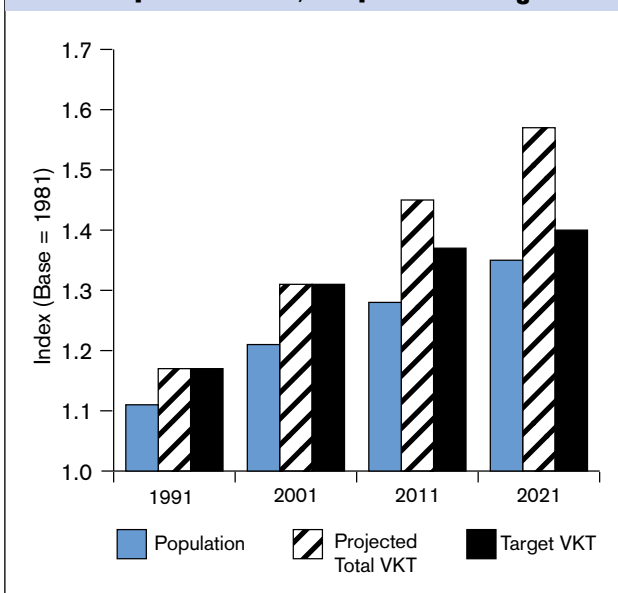
Figure 13. The mobility expansion, Sydney, 1981-91



*Sydney Statistical Division

The graph shows that, while Sydney's population increased by 9% in the 10 years 1981-91, the number of car trips increased by 13%, car ownership by 14% and car use by 20%. That is, people are using more cars, more often. (Data courtesy Department of Transport home interview surveys.)

Figure 14. Projected growth in population and total VKT based on present trends, compared with target VKT



Action 1.2. Make the reduction of VKT a planning priority across government

The Government has committed to a two-phased VKT target:

- to achieve zero growth in per capita VKT by 2011
- to achieve zero growth in total VKT by the year 2021.

This target will be refined through the development of the Transport Plan, as a realistic timeframe can only be set when detailed planning is complete. It is a very challenging goal, which will require determined effort.

The VKT target will require a reduction of around 9% in per capita VKT in the decade 2011–2021—a reversal of the current increasing trend.

It will deliver a major reduction in the overall growth of VKT for the 1991–2021 period. Projected VKT growth will be reduced by around 43%. To achieve this target there will have to be a major shift to public transport. The projected public transport share of trips to work of around 21% will have to increase to a figure approaching a 30% share by 2021. Again this requires a reversal of the current trend—which is away from public transport.

The targets will also be incorporated into the 5-

year rolling Urban Infrastructure Management Plan, which sets priorities for infrastructure funding approvals. They will also be reference criteria in major policies, strategies and projects across all transport and planning agencies.

Action 1.3. Integrate transport issues in regional and local planning

The Department of Transport (DOT), the Roads and Traffic authority (RTA) and the Department of Urban Affairs and Planning (DUAP) are working with local councils to improve their decision-making on transport issues through the statutory planning process. Issues being addressed include proposed changes to the development approval process; a review of planning instruments and guidelines to broaden their transport focus; and development of best-practice notes on public transport planning.

The DOT is convening a multi-agency taskforce to promote best practice in planning, design and management of streets and roads to support more effective public transport. The taskforce has developed a framework of transport issues for consideration when preparing development control plans.

The DUAP is pursuing a number of key land-use policies that will contribute to achievement of the VKT targets. In particular:

- urban consolidation policies which provide for a range of housing choices and for higher-density development close to rail and other transport corridors
- ‘centres’ policies which facilitate multi-purpose trips and reduce demand for car travel by encouraging the concentration of retail, commercial, entertainment and community-service activities into centres that can be well served by public transport.

Action 1.4. Implement accessibility criteria for new residential development

It is important that the location, design and development of new residential areas maximise access to public transport. The DOT in conjunction with the DUAP have developed accessibility criteria for new residential development. This will provide a framework for assessing areas for inclusion in the Metropolitan

Urban Development Program (UDP) or for setting priorities for areas already in the UDP. The criteria will also be used by local government in the design and staging of new residential development areas.

Action 1.5. Set targets for journey to work by public transport at key centres

Parramatta provides a major opportunity to increase the use of public transport for journey to work trips. Through the Parramatta Regional Environmental Plan (REP), the Government has set a target of increasing public transport patronage for journeys to work—from its current 25% to 40-60% as the workforce doubles.

The Government is working with Parramatta City Council to ensure coordinated development of the Parramatta City Centre as a major employment location and service centre for the residents of western Sydney, with greatly improved public transport access. The REP for Parramatta has a range of specific access strategies:

- actively pursuing a high modal split towards public transport
- developing regional public transport corridors to

provide efficient access from all catchment areas, with particular priority for the North West, South West, North Shore/Chatswood/Hills Districts and Homebush Bay

- managing road-traffic demand
- developing an integrated access system, including public transport, pedestrian and cycle access within Parramatta Primary Centre, linking all areas important for its growth
- ensuring the city is accessible through the provision of services, information, technology, and built structures.

This integrated approach to the Parramatta REP, including a growth target for public transport in line with growth in the workforce, will be used as a model for planning development of other centres.

Strategy B. Improve management of freight transportation

Clear planning to improve the efficiency of urban freight movements is an urgent priority. We need smarter and more integrated planning for the management of freight transportation by road, rail and other modes to reduce the impact of heavy diesel vehicles in built-up areas.

Action 1.6. Develop and implement an integrated freight strategy

The Government has recognised the need for a wider integrated freight strategy that combines a comprehensive road freight strategy with strategies for other transport modes, including ports and rail. The Minister for Transport and Roads is responsible for developing the integrated strategy by the end of 1998.

Case Study: City West Project

The City West (Ultimo-Pyrmont) area is being redeveloped for high density residential and mixed use, with strong emphasis on providing good access to jobs through public transport, pedestrian and cycling networks. A projected 7,500 new dwellings and jobs for 40,000 people will be provided over the next 20 to 30 years.

Development is based on the assumption of the following proportions of the local workforce travelling to/from work by public transport:

1990	15%
2001	45%
2011	55%
2020	65%

Public transport to Ultimo and Pyrmont will be provided by light rail as well as extensions to bus and ferry services; and a comprehensive pedestrian and cycle network has been developed to complement the public transport system. Unrestricted on-street parking is gradually being removed and replaced by more restrictive parking zones intended to reduce motor vehicle use in the area.

Objective 2. Provide more and better transport choices

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

Contemporary households now have complex travel patterns that extend beyond the conventional trip to work, presenting a major challenge for transport planners and networks. This section deals with the strategies and actions chosen to create more and better alternatives to private car use.

The Government clearly has a major responsibility for action on this issue; however, in the long run the community will determine whether NSW will reverse the current trend in growth of per capita VKT.

The community must decide whether it will change travel behaviour and use alternatives to the single occupant private car wherever suitable choices are available. It will have to consider what disincentives to growing private-car use it is willing to accept: for example, strong pricing policies for parking.

The aim of *Action for Air* is by no means to discourage car use altogether; cars and trucks will continue to have a central and valued role in transporting people and goods in NSW. The challenge for the community is to reduce the negative impact of motor vehicles by reducing the number and length of trips.

The major strategies selected to achieve this goal are:

- A. Provide better public transport
- B. Promote cycling and walking
- C. Change travel behaviour through education.

Strategy A. Provide better public transport

Existing patterns of car use can only be changed if viable public transport options are available. Improvements in public transport—both fixed-rail and road-based—across the distinct regions in the GMR, are a high priority for the Government.

The key elements of *Action for Air* public transport strategy are:

- implementing the Greater Western Sydney Public Transport Strategy
- extending the heavy rail infrastructure
- integrating light rail
- improving public transport on roads
- improving transport management
- upgrading regional transport strategies.

A.1. Greater Western Sydney Public Transport Strategy

The job of reversing the long neglect of public transport in the fast growing region of western Sydney is being coordinated through the Greater Western Sydney Public Transport Strategy, which will dramatically improve public transport services in the area. Key actions from this strategy include:

Action 2.1. Consider funding for public transport

The NSW Government has increased its public transport allocation by over \$200 million in the period 1995-97. In the 1998-99 budget, the Government will provide funds for projects for public transport in line with its identified public transport priorities and directions in the Air Quality Management Plan, *Action for Air*.

As part of the 1999-2000 budget process, the Government will consider a five-year funding program for public transport, arising from the integrated transport plan. The focus of the plan will be on areas of greatest need, such as western Sydney.

The development of an integrated public transport plan and consideration of a five-year funding program represent the Government's commitment to promoting growth in public transport usage, and allowing proper medium and longer-term public transport infrastructure planning.

Action 2.2. Enhance the Parramatta rail link

The Government is committed to commencing the enhancement of the Parramatta rail link.

The Government is considering options that will greatly improve rail access to Parramatta and for western Sydney residents. By improving fast and efficient public links from western, south-western and north-western Sydney, such options will greatly reduce dependence on private vehicles in this region.

Options being considered will:

- free up train paths on the main western rail line
- enable more frequent and more punctual services, including express services
- be consistent with reducing travel times and with the objectives of the proposed Parramatta REP.

Action 2.3. Consider fast-tracked public transport for the Hoxton Park to Parramatta corridor

The Government is identifying the most appropriate services for a rapid public transport route on a reserved corridor from Hoxton Park to Parramatta—intended to strengthen Parramatta’s development as Sydney’s second CBD.

Action 2.4. Plan for public transport in north-west Sydney

The Department of Transport is developing a transport strategy for north-west Sydney, which will provide a comprehensive framework for this growing region.

A dedicated bus land has now been completed on part of the Sunnyholt Road transit corridor, giving priority to road-based transport in the first stage of development of the Rouse Hill release area. The corridor is part of the strategic plan to link Rouse Hill with the proposed Mungerie Park sub-regional centre, Blacktown, Parramatta and other key employment areas. The feasibility of running a light rail service along the corridor to connect with the Blacktown/Riverstone railway line is being considered.

Within two years, work will commence on a new centre at Mungerie Park at Rouse Hill, which will become the anchor for a comprehensive public transport network in the Rouse Hill development.

The Richmond rail line is also being upgraded in 1998, to provide for track amplification. This will enable CityRail to meet the expected increase in demand from population growth in the north-west.

Action 2.5. Improve bus services in western Sydney

Improvements already made to bus services include minibuses, a 24-hour information service and letter-boxing of timetables, but there is strong community demand for further improvements. The Government amended the Passenger Transport Act in 1996 to enhance the quality of services delivered by private bus operators, so that a contract will only be renewed for another five years if a series of best-practice benchmarks are achieved.

The GWS Public Transport Strategy includes many other bus service improvement strategies such as establishing a TransitWay Policy and upgrading the provision of public transport information.

Improvements to the road network to provide for bus priority, interchange upgrades and the development of future cross-regional services will also improve bus services.

Action 2.6. Provide public transport to new suburbs

Public transport will be introduced at the outset of new developments (greenfield areas), to encourage the use of public transport before consumers become car-dependent or house-bound. Criteria for awarding bus contracts in greenfield areas will set mandatory requirements for links to the overall transport network, minimum levels for services, fares and vehicle and driver standards, and the accreditation of operators.

A.2 Extend the heavy rail network

Major heavy rail initiatives under way or in planning (in addition to the Parramatta rail link) include:

Action 2.7. Complete construction on the New Southern Railway

The \$600 million New Southern Railway is currently under construction and expected to open by May 2000. It provides a new rail link between Central and the East Hills line, with new stations at Green Square, Mascot, Kingsford Smith Airport’s domestic and international terminals, and North Arncliffe (North Arncliffe station has been added to provide for cross-regional transport between Illawarra/south-western Sydney and the developing

Sydney South area. It is expected that about 4600 passengers will use this station daily); and that 13,000 new dwellings will be developed as a result, providing housing for 30,000 residents.

Action 2.8. Extend the Eastern Suburbs rail line

The Government is considering a private sector proposal to extend the rail line from Bondi Junction to Bondi Beach. It will link a high-density residential area directly into the CityRail network and provide a seamless public transport connection to a premier tourism precinct.

Action 2.9. Construct the Homebush Bay rail loop

As part of a comprehensive strategy to make public transport the predominant form of travel to major events at Homebush, a new rail link has been completed. This will be complemented by extensive cross-regional bus services, limited car parking and integrated ticketing for events.

A.3. Integrate light rail

Action 2.10. Integrate light rail

The Government is committed to integrating light rail into the transport network where it is appropriate. A new light rail service between Central Railway and the Fishmarkets at Pyrmont has already opened to the public to service urban renewal in this region. An EIS for extending the route has been completed and a preliminary feasibility study of light rail in the eastern suburbs is under way.

A.4. Improve public transport on roads

Road-based public transport services provide a crucial service and require ongoing improvement to meet demand. Initiatives to reduce car use by improving road-based public transport include:

Action 2.11. Fund road-based public transport

The Public Transport Infrastructure Improvement Program (PTIIP) has allocated \$170 million from the RTA budget for the period 1995-96 to 1998-99,

to support a greater modal share of road trips by public transport.

Action 2.12. Implement the M2 public transport management plan

The newly-opened M2 includes an exclusive busway from the Epping bus-rail interchange west to Windsor Road. A management plan for the busway will ensure its potential is maximised and commit all relevant agencies to implementing recommendations. The plan provides an effective model for developing buses as a viable form of mass transit on road-based corridors.

Action 2.13. Implement the M5-East sub-regional air quality plan

The M5 East will ease traffic flow between the city and the south-west, removing an estimated 70% of heavy vehicles from residential roads and local suburbs by 2011.

Planning approval for the M5 East has imposed stringent environmental conditions on the development. The RTA will be required to meet rigorous local ambient air quality standards for the tunnel. Also, the Government has required the RTA, DUAP, the Department of Health and the EPA to work together to identify key contributors to local air pollution and develop appropriate control strategies. This will include consideration of a Transport Plan for the M5 East and surrounding streets.

The RTA will contribute \$500,000 a year for five years to fund the implementation of these strategies. The objective of this integrated approach is an overall reduction in air pollution emissions in the locality.

Action 2.14. Implement an extensive bus priority scheme

Under the PTIIP, the Government is progressively developing the Sydney CBD Bus Priority Scheme, the most extensive of its kind in Australia. In addition, bus and transit lanes have been set up on Epping Road, Windsor Road and the Great Western Highway.

Action 2.15. Improve services to the Eastern Suburbs

Approval of the Eastern Distributor was contingent on the implementation of a comprehensive Eastern Distributor bus priority plan for the Eastern Suburbs of Sydney. The benefits will include improved travel times and reliability for the 44 million passenger trips made each year on buses in the east. Faster, more reliable services will encourage more people in this area to travel by bus rather than car.

Action 2.16. Upgrade the Warringah peninsula bus system

A five-year strategy to upgrade the existing bus system on the Warringah peninsula is being developed by the RTA and other agencies. Bus priority on Military Road has been improved and a Bus Rapid Transit System is being developed.

Case Study: The Olympics

Planning for the Olympics provides a unique opportunity to maximise public transport facilities for the future and launch innovative transport management practices. It is intended to be a blueprint for sustainable urban transport networks well beyond 2000.

Car access will be limited mainly to emergency vehicles. Expected mode splits for spectators are:

■ rail	60%
■ regional bus services	20%
■ park and ride	15%
■ cycling and walking	5%

To facilitate public transport access to the Olympic Park, a new railway station and ferry wharf have been constructed. A comprehensive system of bicycle and pedestrian pathways will facilitate travel around the area. Bicycle parking will be provided at all major venues. Four major park and ride facilities, providing up to 16,000 cars with feeder bus services to the venues will be located north, south, east and west of the Park (e.g. Eastern Creek, Macquarie University).

A.5. Improve transport management

To make public transport more attractive to consumers, the following management initiatives will be undertaken:

Action 2.17. Better integrate ticketing, especially in Greater Western Sydney (GWS)

Integrated ticketing is operating to a large extent in the areas serviced by CityRail trains and State Transit buses and ferries. The main challenge now is to integrate the rail ticketing system with private bus operations in western Sydney. The Government has directed transport agencies to provide advice on how to extend integrated ticketing to GWS.

The Premier has also directed DOT to investigate the possibility of making integrated ticketing available to those using public transport on a regular casual basis—for example, to those who leave their car at home one day a week.

DOT has a number of integrated ticketing programs under way, including the ‘Bus Plus’ trial, which combines into one ticket a point-to-point rail weekly and an equivalent bus weekly. Trials are currently operating in Blacktown, Rooty Hill, Mount Druitt, Campbelltown, Minto, Wyong, Gosford and Woy Woy.

Action 2.18. Improve transport information services

The Public Transport Authority will investigate and advise on the coordination of information relating to all modes of public transport. The goal is to have a fully comprehensive centralised phone information system that covers all public transport modes, all providers and all Sydney regions. As part of the new best practice requirements for the renewal of commercial bus contracts, information benchmarks will be developed to ensure improved timetable and route information.

Action 2.19. Develop a metropolitan parking policy

The availability of parking is a key factor influencing people’s transport choices: easily available and relatively cheap parking encourages car use. For a consistent approach to the issue, transport and planning agencies and local government will produce a comprehensive policy to guide the provision, management, licensing and enforcement of parking and parking regulations.

Action 2.20. Promote teleworking in government and the business sector

Teleworking is emerging as a significant and realistic work mode with the potential to reduce travel demand, especially in peak hours. An RTA survey revealed that 5% of the sample teleworked on a regular basis, 10% on an occasional basis and a further 65 % would if given the opportunity.

The Government will investigate options for its own workforce as well as working with the NRMA Clean Air 2000 Taskforce to support effective implementation of teleworking in government and business sectors.

Integrated ticketing will be a key to the successful integration of transport systems. Ticketing for Olympic and other events (e.g. the Royal Easter Show), combining entry and public transport fares, will be actively marketed to encourage bus and train use.

A.6 Implement regional transport planning

Action 2.21. Develop a settlement strategy for the Central Coast

The Central Coast and Illawarra are both major and growing urban areas. A settlement strategy is being developed for the Central Coast by the DUAP and local councils. Integration of land use and transport planning will be a central element.

Action 2.22. Develop a long-term strategy for improving transport in the Illawarra

The Illawarra sub-committee of the Metropolitan Strategy Committee has formed a task force to evaluate options for improving transport in the region. A preliminary analysis of the region's transport infrastructure, planning and coordination needs has been prepared. A draft long-term strategy for improved public transport, reduced reliance on private cars and better integration with residential development will be provided to the Illawarra sub-committee of the Metropolitan Strategy Committee.

Action 2.23. Prepare a Newcastle-Sydney corridor study

The Sydney-Newcastle corridor links the State's major economies and urban areas. Road links in the

corridor are under increasing pressure as a result of the growth in commuter traffic between the Central Coast and Sydney. DOT, RTA, State and Regional Development and DUAP are working together and a corridor study is being carried out to develop an integrated package of land use, transport and local employment measures.

Action 2.24. Prepare a Penrith to Orange Corridor integrated road and rail strategy

The Government has established the Penrith to Orange Transport Corridor Task Force to develop an integrated road and rail strategy for the area. The Task Force will report to the Premier.

Strategy B. Provide for cycling and walking

Walking and cycling have important parts to play in reducing car dependency. They perform the vital function of feeding into the public transport network and are key transport modes for people without cars or access to public transport. The significance of walking and cycling is likely to increase as integrated land-use and transport planning policies take effect and more journeys are brought within their scope.

Action 2.25. Improve government support for safer and more convenient bicycle use

Improvements will be on a number of fronts, including increasing the size of the bicycle network available to cyclists; encouraging dual-mode public transport/cycling; providing bicycle access along rail easements; providing better facilities such as parking and lockers; and improving motorists' attitudes towards cyclists. Key programs include:

- the Cycleways Program and Bicycle Facilities Program, run by the RTA and local councils to provide on- and off-road cycleways, State, regional and local bicycle networks, bicycle parking, and local improvements to cycleways. The Government has allocated \$5.5 million annually to cycleway programs in NSW of which almost \$3 million is in the Sydney region
- the Bicycles and Public Transport Strategy, managed by the DOT in collaboration with the SRA and other transport agencies. The strategy

encourages the use of cycling and public transport as a dual mode.

- the Bicycle User Support Program, run by the RTA in collaboration with NSW Police, education agencies and local government. It focuses on increasing bicycle use and reducing accidents involving bicyclists through training and promotion. Its goals are a threefold increase in bicycle use statewide, and a 5% reduction in accidents, by 2001.

In support of these programs the Government has allocated over \$8m of funding through the RTA. In addition, the RTA provides for cyclists in the design of new roadworks and in the maintenance of existing roads, with the additional cost being about \$12m per year over and above the specific programs.

Action 2.26. Facilitate walking as a mode of transport

The Government has a number of initiatives under way to facilitate walking. The Shaping Up Streets and Roads Taskforce, comprising government and non-government representatives, has been working with councils to ensure that the needs of pedestrians, public transport users and cyclists are considered in the design of new developments and suburbs.

The RTA is developing a comprehensive pedestrian policy. The initial stage of the project involves a broad community consultation, with workshops currently being held around NSW. The policy will recognise walking as a legitimate form of transport, thereby reinforcing the need to provide safe, convenient and direct routes and facilities for pedestrians.

Strategy C. Change travel behaviour through education

Education and public information strategies play a vital role in achieving change in travel behaviours. Major efforts by government agencies, local councils and community bodies are under way, or in planning, to bring about a shift in community understanding of the health and environmental consequences of individual travel choices. To help people translate this understanding into action, the quality, range and

scope of information available on transport alternatives will be substantially upgraded. The potential for teleworking and trip-linking will illustrate travel demand-management philosophies.

Action 2.27. Continue to promote school and community education programs

Several initiatives involving government agencies, local councils and community groups—such as the NRMA Clean Air 2000 Task Force and the Nature Conservation Council—are under way or in planning. They include Airwatch for schools, the City Savers resource kit, Smogbusters, and the annual ‘Travel Smart Day’ public transport campaign.

Objective 3. Make cars, trucks and buses cleaner

OBJECTIVE: To reduce exhaust and evaporative emissions from new and in-service cars, trucks and buses.

Another key objective of *Action for Air* is to augment the gains already made in air quality through standards and programs to make cars, trucks and buses cleaner. Standards for new vehicles are set by the Commonwealth Government through the Motor Vehicle Standards Act, while in-service vehicles in NSW are currently regulated by the State Government.

The major strategies that will achieve this objective are:

- A. Reduce car emissions.
- B. Reduce diesel vehicle emissions.
- C. Promote cleaner fuels.

Strategy A. Reduce car emissions

Action 3.1. Advocate tighter national emission standards for new cars

A new national vehicle emissions standard was introduced in January 1997 but further action is needed. NSW is chairing the national working

group reviewing Australian Design Rule 37/01 and is supporting new standards equivalent to those adopted in the USA in 1994 or Europe in 1996. If agreed to nationally, these will come into effect from 2003.

The new standards would achieve for each car further major reductions in emissions of carbon monoxide (20%), ROCs (30%) and NO_x (68%), and the resulting improvement in fuel economy would reduce greenhouse gases. It would be a very cost-effective approach for each tonne of pollutants reduced (less than \$1000/tonne). The State Government's long-term goal is national implementation of the very stringent California Low Emission Vehicle Standards or their equivalent. The EPA will monitor all quality trends and provide advice over time on the appropriate timing for achieving these standards.

Action 3.2. Augment the Smoky Vehicle Enforcement Program

NSW has had a Smoky Vehicle Enforcement Program since 1974. Under the NSW Clean Air Act it is an offence for a vehicle to emit visible smoke continuously for a period of more than ten seconds. The EPA and RTA have strengthened this program, which is enforced by issuing penalty notices to offending vehicles. Smoky vehicles have been identified as the priority target for the new mandatory testing and repair program outlined below.

Action 3.3. Implement an inspection and maintenance program for in-service vehicles

Although new cars meet stringent emission standards, in-service vehicle emissions are often excessive owing to lack of proper maintenance or the removal, modification or deterioration of emission controls.

An Inspection and Maintenance (I/M) program for passenger and in-service light commercial petrol vehicles will reduce emissions from in-service vehicles by identifying and requiring the repair of high polluting vehicles. It will be supported by a major public information campaign on I/M. NSW will introduce the I/M program beginning in June 1998. It will be extended throughout Sydney, Illawarra and the Hunter in a phased program to 2004.

A fully implemented I/M program will achieve significant reductions in air pollution emissions within the GMR. Estimates are: NO_x—13 tonnes per day; ROCs—16 tonnes per day and CO—342 tonnes per day. Fuel economy will be improved by 2.5% on average, resulting in a corresponding reduction in carbon dioxide emissions; air toxics will also be reduced. Vehicle performance will generally be enhanced through more consistent, regular car maintenance.

The program will be implemented in three phases:

- Phase 1 will target high-polluting vehicles such as modified and smoky vehicles within the Sydney Region and will be operational in mid-1998, by expanding two RTA emissions-testing facilities. There will also be random inspections of high-usage vehicles to assess their overall impact.
- Phase 2 will require testing of passenger and light commercial vehicles in the Sydney region—through a network of 20 privately-operated testing facilities across the region—and will be implemented in 2000. Repairs would be required after the first 12 months of phase 2.
- Phase 3 will extend the testing program for passenger and light commercial vehicles to the lower Hunter and Wollongong in 2004.

Action 3.4. Reduce petrol volatility in summer

Reducing petrol volatility will reduce fuel evaporation and the formation of photochemical smog. Reducing Reid Vapour Pressure (RVP)—the measure for volatility—will lower emissions from vehicles, lawn mowers, fuel storage facilities and service stations.

Because fuel evaporates more readily when it is hot, RVP reductions are only necessary during summer. NSW has negotiated a phased reduction in RVP during the peak ozone period of 15 November to 15 March, to be phased in from 1997-98 to 2003. There is an annual review program to assess the effectiveness of this phased reduction. The new requirements are included in a formal memorandum of understanding with industry. When fully implemented they will reduce emissions of ROCs by about 7000 tonnes each summer and will also reduce air toxics.

Action 3.5. Investigate merits of reducing sulfur content in petrol

Lowering the sulfur content in petrol can increase catalyst efficiency, thereby reducing tailpipe emissions of SO₂, ROCs, NO_x and CO. It may be appropriate to use this strategy at some stage in the future; however, further evaluation of the estimated environmental benefits compared with the economic impacts and feasibility for Australian oil refineries is needed. The feasibility, cost and effectiveness of the strategy will be evaluated by the EPA/Oil Industry Technical Committee for further consideration by Government at a later date.

Strategy B. Reduce diesel vehicle emissions

Emissions from diesel vehicles, especially small commercial vehicles and vans, are a growing source of urban air pollution. Diesel vehicles create a disproportionate share of emissions compared to cars—for example, they produce up to 80% of TSP emissions from motor vehicles in Sydney, even though they account for only 15% of VKT.

Action 3.6. Advocate tighter national emission standards for heavy-duty diesel vehicles

Australia is lagging behind international developments in regulating heavy-duty diesel vehicles. Our current standards are equivalent to 1991 standards in the USA, 1992 standards in Europe and 1993 standards in Japan. NSW is supporting national review, through Australian Design Rule 70/00 (ADR 70), of the more rigorous Euro II standards. If agreed to nationally, these will be phased in from 2000.

Vehicles and fuels operate as a system and must be compatible to achieve improvements in emissions and performance. If Australian diesel emission standards become as stringent as those in the USA and Europe, changes to the composition of diesel fuel will be necessary for control technology to be effective. There is a need to understand the links between diesel fuel production and passenger vehicle fuel. These issues will be considered in the future review of national diesel emission standards (ADR 70) and will be referred

to the National Environment Protection Council for consideration.

In the interim, the EPA/Oil Industry Technical Committee will be asked to investigate the feasibility, cost and effectiveness of low-sulfur diesel fuel as an emission control strategy.

Action 3.7. Develop a national diesel environment protection measure

NSW will continue to champion a comprehensive national diesel measure through the National Environment Protection Council. The measure would allow governments to tackle diesel exhaust emissions and fuel quality collectively. It would also provide an opportunity to work with industry to gather a better information profile on the national diesel fleet so that an environmentally sound and cost-effective program can be brought forward.

Action 3.8. Design an inspection and maintenance program for diesels.

Inspection and maintenance programs for diesel trucks and buses are not as advanced as those for cars. There is no readily available short emissions test for diesel vehicles that is both economical and accurate. Further research into diesel vehicle inspection and maintenance programs is under way at a state level to develop the appropriate test.

The Government is committed to implementing a comparable inspection and maintenance program for diesel vehicles. In the meantime diesel vehicles will be subject to the visual Smoky Vehicle Enforcement Program.

Action 3.9. Ensure cutting-edge emission technology for the State bus fleet

The Government gives high priority to ensuring that its own fleets are as clean as is possible. This is being achieved in a number of ways:

- from 1997, specifying that new diesel buses for the State bus fleet meet the very stringent Euro II emission control standards, although these are not required nationally
- purchasing an additional 300 natural-gas-fuelled buses over the next five years to add to the 107 already operating from the Kingsgrove Depot. The State Transit Authority will call for tenders to supply compressed natural gas and the associated infrastructure to bus depots.

Action 3.10. Support research to identify effective emission control strategies

Through a joint research program the EPA, RTA and Sydney Buses are working to identify the most effective ways of reducing emissions from existing buses and other heavy-duty diesel vehicles. Because these vehicles will remain on our roads for many years (the diesel fleet turnover rate in Australia is a slow 30-35 years), the project is very significant. Three key options being evaluated are catalytic converter retrofits, regular maintenance programs and the use of compressed natural gas fuel.

There is plenty of scope for improved emissions from these vehicles. Research results available in 1998 will assist the Government, local councils and other fleet owners to make sound environmental and economic decisions.

Strategy C. Promote cleaner fuels

Action 3.11. Participate in Western Sydney Gas Natural Vehicle Project

This project was initiated by Liverpool City Council with a focus on the Liverpool area, but there is opportunity to expand the scope to the wider Western Sydney Region.

In partnership with Liverpool Council, NRMA Clean Air 2000, Planet Ark and the Australian Natural Gas Vehicles Council, the NSW Government will promote the benefits of a regional compressed natural gas infrastructure. A priority will be to encourage fleet operators to use natural gas, especially for diesel vehicles and possibly taxis. The Government will work closely with the project, providing seed funding, technical assistance and advice.

Action 3.12. Develop a cleaner transport fuels and technology strategy

The Premier's Department will work with government agencies, private sector interests such as AGL, the Australasian Natural Gas Vehicles Council and the NRMA, universities and the CSIRO to draw together many existing and emerging initiatives into a strategic framework on adoption of cleaner fuels and technologies. This

will include integration of options for the use of alternative fuels in government and private-sector fleets. There is much evidence to suggest that significant opportunities exist for environmental, social and economic gains in this area. This strategy will be developed by July 1998.

The Government has already supported Waverley Council in its conversion of two of its trucks to compressed natural gas. This a pilot project which emerged from the Southern Sydney Regional Organisation of Councils Greenhouse Strategy and is supported by the private sector and all levels of Government.

Objective 4. Promote cleaner business

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

The Government is committed to finding new and more effective ways of reducing industrial emissions without imposing unnecessary economic costs on industry. It has begun to put in place a revamped environment protection framework for the industrial sector, combining strong legislation and regulation with economic incentives for change.

Because reduction strategies introduced in the 1980s have been successful in controlling ROCs emissions from large industrial sources, new programs will concentrate more heavily on the control of NO_x. Both traditional and innovative regulatory tools will be used to achieve maximum emissions reduction.

For smaller commercial sources, the broad goal is to reduce emissions of ROCs in the most cost-effective way. The actions supporting this goal will also reduce air toxics and workplace exposure to toxic chemicals.

Strategy A. Reduce industrial emissions

Industrial emissions are a relatively small proportion of total emissions of ROCs, NO_x and particles in the Sydney region. In 1992, large industry contributed 11% of ROCs, 14% of NO_x and 33% of particles .

Industry accounts for a much larger proportion of NO_x emissions in the GMR, however—mainly through the contribution of power stations on the fringe of the region.

There is potential for significant growth of NO_x emissions from new industry over the next 25 years, which could substantially increase formation of smog or cause exceedences of the nitrogen dioxide goal. New industrial sources in western Sydney are of particular concern: although small in terms of total NO_x, they are relatively concentrated and could feed into the photochemical smog reaction at a stage where they cause rapid production of ozone. The concentration of ozone formed in the emission plume from a large industrial source could be significantly higher than in the surrounding area for up to 15 kilometres downwind of the source.

Consequently, the strategy to reduce emissions from heavy industry makes the control of NO_x a top priority.

Action 4.1. Implement revised Clean Air Regulation 1997

As an immediate action, the Government has implemented the revised Clean Air (Plant and Equipment) Regulation 1997, setting never-to-be-exceeded emission concentration limits for air pollutants. Limits for new premises are, in most cases, based on NHMRC limits. In order to create further improvements, the EPA will implement a new performance-based licensing system (load based licensing) beginning in 1998.

Action 4.2. Implement load-based licensing

The introduction of load-based licensing (LBL) will see a shift from uniform emission concentration standards as the main pollution control tool (as in the current Clear Air (Plant and Equipment) Regulation) to a focus on the total mass of pollutants discharged into the environment. Licence-specific limits will be retained to ensure air quality in local areas is protected. Licence fees will be used to provide powerful financial incentives for licensees to achieve discharges below the required minimum performance. LBL will also form the platform for trading schemes to cap and reduce total emissions.

The Government brought forward necessary

legislative amendments to implement LBL, which were passed by Parliament in December 1997. The draft Regulation and Regulatory Impact Statement are scheduled to be released for public consultation in February 1998, with phased implementation to begin in mid 1998.

Action 4.3. Establish a Cleaner Industry Unit in the EPA

A new unit within the EPA will develop partnerships with industry to promote cleaner production. It will encourage industry to put in place environmental management systems to control its own environmental performance and will bring forward a State Cleaner Production Strategy, developed in consultation with industry.

Action 4.4. Implement the Protection of the Environment Operations legislation

The Clean Air Act passed more than 30 years ago has been revised and incorporated into the *Protection of the Environment Operations Act 1997*. The new legislation will provide stronger tools for the EPA and local councils in dealing with cumulative industrial emissions. It will commence in July 1998.

Action 4.5. Develop a framework to control NO_x emissions in the GMR

Future industrial growth, such as an expansion of cogeneration (a positive greenhouse initiative), has the potential to increase NO_x emissions in the Sydney region—thus generating a conflict with regional air quality goals for ozone.

Action to control industrial emissions is best approached through a framework that allows industry and the EPA to work together to find the most appropriate and cost-effective controls for each situation. An innovative framework to control NO_x emissions in the Sydney region will allow set parameters for licence negotiations with power generation (including cogeneration) plants, petroleum refineries, metal processing plants, chemical manufacturers and other scheduled premises with NO_x emissions.

The new policy will take into account:

- benefits to the National Greenhouse Strategy and the NSW economy of new technology and fuels, especially cogeneration

- a commitment to achieve NO_x reductions with the least cost to industry and maximum flexibility
- a commitment to transparent and predictable regulatory processes
- the complexity of the air chemistry involved in the production of ozone and nitrogen dioxide, which makes it extremely difficult to specify appropriate levels of NO_x for any airshed.

The EPA will implement its NO_x policy for the GMR by capping total emissions and setting up a scheme for trading within the cap. The scheme will be scoped and developed during 1998 for implementation, commencing in the 1999-2000 financial year. Its aim will be to limit and progressively reduce emissions to achieve a long-term cap on emissions at 1998 licensed levels.

Until LBL and the full trading scheme are operational, the EPA has put in place an interim approach for both replacement and greenfield proposals. In all cases, this will include: the Clean Air Regulation and the safety-net requirement that new plant (replacement or greenfield) should not be allowed to cause extra exceedences of the interim air quality goals for nitrogen dioxide and ozone in local or adjacent areas.

For replacement proposals, a minimum requirement of no net increase in NO_x emissions from the individual site, and an economic impact analysis of the cost of available control technologies for new plant, will apply. With a view to encouraging emission reductions, the EPA will record any reduction in annual NO_x emissions for possible future credit when the trading scheme is finalised.

For greenfield sites, the EPA will seek emission limits consistent with best available control technology, dependent on an economic impact analysis of the cost of achieving these limits.

Action 4.6. Enhance leak-detection and repair programs at petrochemical facilities

Fugitive emissions, caused by equipment leaks from pump and compressor seals, valves, flanges and other equipment connections, are a significant source of ROCs emissions from petrochemical facilities (such as petroleum refineries and chemical plants). Emissions can be reduced by an active inspection and maintenance program.

A program to reduce emissions from petrochemical facilities will apply to plants run by ICI, Ampol, Shell and Montell. In some cases, existing pollution-control licence conditions already require fugitive emissions control; the program will ensure a comprehensive coverage of all plants. It will be implemented as part of the licensing process, with appropriate conditions negotiated for each plant prior to review of its licence.

The environmental benefits include an estimated reduction in ROCs of up to 2,600 tonnes per year in the GMR. There will also be reductions in fugitive emissions of air toxics such as benzene, toluene and xylene. Workplace exposure to such chemicals will be reduced and odour may also be reduced.

Industry is progressively installing low-emission valves and seals. It may be feasible to move to zero-emission leakless valves and seals over time, but the cost is currently prohibitive. However, future development will be monitored.

Action 4.7. Negotiate reductions in ROCs emissions from major industry sources through licence conditions

There are feasible ways to further reduce ROCs emissions from industrial sources and these will become a focus for licensing review processes with plants in relevant industrial areas. Appropriate reduction strategies will be negotiated on a plant-by-plant basis.

The range of actions to be explored includes:

- improved storage tank operations for fuel and chemical storage and distribution
- improved wastewater treatment in petroleum refineries
- technical process modifications, add-on controls and improvements to existing control equipment for chemical manufacturing plants
- improved transfer efficiency and use of waterborne coatings to reduce ROCs emissions from can and coil-coating industries and other fabricated metals manufacturers.

Strategy B. Develop cost-effective approaches for small business

The broad goal for small commercial premises that produce regional pollutants is to reduce emissions of ROCs compounds in the most cost-effective way. The supporting actions will also reduce air toxics and workplace exposure to toxic chemicals.

Action 4.8. Implement staged code of practice for commercial printing premises

The EPA, the Printing Association of Australia, the Australia Flexographic Technical Association and local government are working together to develop a code of practice and a complementary industry education campaign to reduce ROCs emissions from printing activities.

They will focus on the adoption of low ROCs or ROCs-free coatings in the flexographic and gravure printing industry, for premises emitting 35 tonnes or more of ROCs a year. The code of practice will be implemented in three stages:

- Phase 1 (2000): Improved housekeeping measures. Flexographic printing presses will have chambered doctor blades, anilox rollers and ink trays fitted; there will be some conversion of gravure presses to run water-based inks; some laminating machines will be converted to allow use of high-solids adhesives; and the drier components on presses will be upgraded.
- Phase 2 (2003): Installation of incineration devices for laminating/coating operations and flexographic presses and some conversion to water-based adhesives.
- Phase 3 (2006): Installation of control equipment on rotogravure presses, solvent recovery for laminating/coating machines and changeover to an extrusion laminator.

When fully implemented, the code has the capacity to produce a reduction of over 2,800 tonnes of ROCs per year, to reduce air toxics and odours, and possibly reduce workplace exposure to chemicals. The costs for the program are medium and the cost-effectiveness rating is good.

Printing industry associations have agreed to inform and educate the industry on the code of

practice. Ink manufacturers will be responsible for developing low-ROCs ink alternatives. Local government will monitor implementation of the code.

The education program will be an extension of the successful Small Business Solutions to Pollution Program and the EPA will work with other partners to develop and implement it.

Action 4.9. Improve housekeeping practices in auto repair shops and surface-coating premises

The Small Business Solutions to Pollution program has been effective in supporting a cooperative approach to environmental protection. The EPA is working with local government and industry to extend the program to cover air quality in auto repair shops and surface coating premises. Guidelines and an information campaign to improve practices are being developed for local implementation in 1998.

There are various points in the work process in auto repair shops and surface-coating premises where improved practices can reduce emissions of ROCs. Measures will include the use of high-volume, low-pressure spray guns; avoiding spillage; recycling and reuse of materials; and generally improved housekeeping practices.

This cost-effective program has the capacity to reduce ROCs emissions in the GMR by over 4,000 tonnes a year. There will also be reductions in air toxics, odours, and in workplace exposure to toxic compounds.

Action 4.10. Install petrol-vapour recovery units at rail-loading gantries

Vapour controls can minimise the evaporation of petrol that frequently occurs during its distribution. Installing petrol-vapour recovery units at rail-loading gantries extends the vapour controls currently required by the Clean Air Regulations during the transfer of petrol at service stations in Sydney.

At present, the only operational rail-loading facility is at Parramatta, where fuel is loaded for rail-tanker distribution from both Sydney refineries. Negotiations with industry are under way and it is expected that an activated carbon vapour-recovery unit will be installed on the Parramatta Rail Gantry in 1998.

The reduction in ROCs emissions from this action is expected to be about 310 tonnes per year, with associated benefits possibly including reduced air toxics and odour. Product savings are an additional benefit, as fuel vapour is returned to the system rather than lost to the atmosphere. The cost-effectiveness of the strategy is rated as good.

The EPA will consult further with industry in relation to the extension of vapour recovery units to bulk loading terminals and service stations in Wollongong and Newcastle. Until now, the environmental benefit of this strategy has only been considered in the context of its impact on photochemical pollution. The EPA's current monitoring and inventory work on air toxics will provide additional information to assist in the environmental and economic assessment of the proposal.

Objective 5. Promote cleaner homes

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

In the domestic arena, individuals and households can initiate direct action to improve air quality.

Our homes are a significant contributor to fine particle emissions and ROCs, mainly through solid fuel heaters but also through petrol lawn mowers and garden tools. As a significant consumer of power, the home is also a big contributor to regional production of greenhouse gases and an important site for innovations in energy efficiency.

Action for Air is responding with a package of strategies to reduce fine particles and other emissions from wood heaters, improve energy efficiency and encourage the use of alternative, cleaner and sustainable energy sources in the home.

Strategy A. Reduce Emissions from solid-fuel heaters

Domestic solid fuel heaters (mainly wood heaters) are a significant source of fine-particle pollution in both Sydney and a number of rural regional centres in winter.

They also can produce:

- carbon monoxide (CO) through incomplete combustion of fuel
- ROCs (including benzene, aldehydes, phenols and organic acids), which are responsible for most of the odours produced
- semi-volatile organic compounds such as the polycyclic aromatic hydrocarbons, which need higher temperatures to evaporate. Some of these are known to be toxic or carcinogenic at particular levels and others may be so.

The EPA has examined strategies developed in other countries and used consultative tools to canvass appropriate action for NSW. An independent social research organisation was commissioned to survey community knowledge, attitudes and behaviour relating to wood heaters in 1995. In 1996, the EPA distributed a discussion paper, *Air Pollution from Solid Fuel Heaters*, to all NSW local councils seeking feedback on preferred strategies.

Since 1995, the Government, in collaboration with industry, has put into place a number of strategies to reduce the negative impact of wood heaters, including regulatory action, education programs and requests for voluntary avoidance of wood fires on high-pollution days.

A continuing program of action includes the following:

Action 5.1. Ensure compliance with the Clean Air Regulations 1997

The Government enacted regulations in 1995 to control emissions from new wood heaters and these were renewed in 1997.

Under the Clean Air (Domestic Solid Fuel Heaters) Regulations 1997, all new wood heaters sold in NSW must be certified and labelled to confirm that they comply with emissions standards set by Standards Australia. The EPA estimates that properly certified heaters will reduce emissions by up to 80% over time (the full effect of implementation will not be felt for a number of years).

Action 5.2. Develop a code of practice for installation of heaters

Heaters must be installed properly, as inappropriate installation can greatly increase the negative impact of smoke emissions.

The EPA is working with the key players, including industry and councils, to facilitate the development of a comprehensive industry code of practice—covering all aspects of the installation of domestic solid fuel heaters—scheduled to be available in early 1998.

The industry code will be made available to local councils, domestic solid fuel heater retailers, consumer bodies and relevant licensing and training authorities. It will provide useful information and education material.

Action 5.3. Conduct a community education program on using wood heaters

Armidale City Council and the EPA began a pilot education campaign in 1996, focusing on the correct operation of wood heaters and the use of seasoned wood to reduce emissions. The pilot provided a successful model and the EPA extended the program as part of the 1997 winter campaign to reduce brown haze pollution in Sydney and regional centres (including Wollongong, Newcastle, Dubbo, Orange, Lithgow, Oberon and Queanbeyan).

The EPA will continue to work with local councils, the industry association, retailers and the media on a regular community education program addressing these issues in Sydney and other relevant regional centres.

Action 5.4. Continue voluntary ‘Don’t Light Tonight’ campaign

The environmental and health impacts of wood heaters, especially those that do not meet the new emissions standards, are most severe on cold and still nights when smoke emissions are poorly dispersed. Reducing wood smoke emissions on such nights is a clear priority and there is strong community support for direct, voluntary action of this kind.

The EPA began the voluntary pilot ‘Don’t Light Tonight’ public information campaign in 1997 in Sydney, targeting open fires and old, uncertified

solid fuel heaters – conveying the information through radio and television weather forecasts. Preliminary indications are that Sydney residents responded positively. The program is now to be continued beyond its pilot phase.

The EPA will continue to work with the industry association and local government to assess the benefits of taking further action including:

- guidelines for wood suppliers to ensure wood for sale is properly seasoned, hard wood
- possible regulatory action by local councils to fix smoky house chimneys
- incentives for owners of old wood heaters to upgrade to certified wood heaters, or to gas or electricity, as an alternative fuel source. Armidale Council is investigating interest-free home loans for this purpose.

Strategy B. Improve energy-efficiency of homes

Energy efficiency in homes is an important element in the overall push for energy efficiency. Our broad environmental objectives are to reduce the emission of pollutants, minimise the burning of fossil fuels, encourage the use of energy from renewable sources and reduce greenhouse gas emissions.

Local government has a major role in promoting energy efficiency through its planning and development responsibilities, and some councils have been very active on this front. It is also a high priority for the NSW Government, involving a number of agencies but largely driven by the Sustainable Energy Development Authority (SEDA). The Department of Energy is responsible for programs with a regulatory focus, including appliance energy labelling and Minimum Energy Performance Standards (MEPS) for refrigerators and electric storage water heaters (from 1999). A national framework for dealing with energy labelling and MEPS has been developed.

Action 5.5. Implement the ‘Energy Smart Homes’ program

SEDA is working through partnerships with local government and the building industry on

implementing its Energy Smart Homes program—designed to reduce the imported energy requirements of new and existing homes for heating, cooling and ventilation. The program will make use of education and public information initiatives, demonstration projects and land-use planning. The overall strategy will be supported by a \$6 million allocation from SEDA over the next three years as well as by contributions from local government.

The targeted outcomes of the Energy Smart Homes program are:

- 60% of new homes granted building applications between mid-1997 and 2002 will have a 'minimum energy performance' rating;
- 90% of new homes and 70% of major retrofits requiring a building application will have at least an 'improved energy performance' rating.

The program is being developed in stages and has a number of elements:

- **Energy Smart councils**
SEDA aims to work with local councils to assist them to reduce their own energy consumption and promote energy-efficient practices in the building sector and broader community. This includes adopting an energy-efficient housing policy: promoting energy conservation to their residents, making their own premises more energy-efficient and considering the purchase of some portion of their electricity through a SEDA-accredited Green Power Scheme.
- **Energy Smart homes policy for councils**
This initiative aims to introduce an 'energy efficiency' housing policy into 50 local governments covering 80% of new homes and home alterations in NSW. It requires councils to do everything that is cost-effective for saving greenhouse gases. These may include improvements to the building envelope, and savings from hot water through more energy-efficient systems and showerheads (saving up to 30% of greenhouse gases from the domestic sector).
- **Energy Smart home builders**
Land developers, home designers and home builders taking part in this scheme must design and build houses to comply with SEDA's minimum requirements for energy efficiency. This includes the supply of energy-efficient

fittings and appliances with a packaged home. Partners in the scheme include:

- land developers who divide up land so as to optimise solar access for future houses
- home designers using passive solar principles that reduce the need for mechanical heating, cooling and lighting
- home builders including specifications of the Energy Smart Designers program, such as wall and ceiling insulation.

Other SEDA residential programs will include Energy Smart Homes Make-Over—a retrofit program promoting insulation, efficient windows, daylighting systems and other energy savers.

Objective 6. Manage the impact of open burning

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

Major reductions in pollution from open burning activities have been achieved during the last decade, particularly in the metropolitan area. The effect of the Clean Air (Control of Burning) Regulation introduced in 1995 has been to prohibit backyard burning in the Sydney and Wollongong metropolitan regions.

The major open burning issue for Sydney air quality now relates to bushfire hazard reduction and forestry management burning. There is also some impact from ecological and bush regeneration burns; and, in regional centres, the problem extends to agricultural open burning. Smoke from these activities can create both nuisance and health effects and, in certain weather conditions, contribute to brown haze. However, they are vital activities in preventing uncontrolled bushfires.

Strategy A. Manage the impact of open burning

The *Rural Fires Act 1997* put in place recommendations responding to the NSW Bushfire Inquiry of 1994. The Act creates a more cohesive and integrated fire-fighting

structure in rural areas and incorporates an enhanced environmental focus. Ecological sustainability is identified as a guiding principle for key bodies, including the NSW Rural Fire Service. The Act also provides for bushfire risk-management plans and operational plans being able to restrict the use of fire in environmentally sensitive areas.

Future actions to minimise the impact of open burning include:

Action 6.1. Release a users' guide to open burning restrictions (March 1998)

A users' guide to open burning restrictions will ensure those responsible for hazard reduction and other open burning fully understand the relevant statutory requirements relating to clean air as well as open burning management.

The EPA and the Department of Rural Fire Services (RFS) are developing clear guidelines to provide a plain-English description of all relevant provisions and implications of the Clean Air and Rural Fires acts. The guidelines will be finalised in early 1988 and made available to all relevant fire control officers in local councils, the RFS, the NSW Fire Brigade, State Forests and the National Parks and Wildlife Service (NPWS), and will also be integrated into future training courses.

Action 6.2. Develop smoke management guidelines for open burning (June 1998)

Smoke management guidelines will help to implement best practice in the management of fires.

Hazard reduction burning must be undertaken to allow maximum control of bushfires. Good forest management, native plant regeneration or agricultural work can also require open burning. But the impact of prescribed burning on air quality can be greatly reduced if best practice in smoke minimisation is understood and implemented. Factors such as fuel moisture content, wind speed and direction, and overall weather conditions can affect the amount of smoke emitted. Smoke-sensitive areas such as schools, retirement villages and hospitals need to be identified and strategies must be put into place to reduce the impact of smoke on these areas. Where appropriate, alternative management options, such as the removal and disposal of hazardous materials by

other means, should be considered.

Smoke management guidelines, setting out best practice, are being developed by the NPWS in consultation with the Department of Rural Fire Services, State Forests and the EPA for release in early 1998. They will be submitted to the Bush Fire Coordination Committee for approval and will be integrated into bushfire risk management and prescribed burning training programs over the following two years.

Action 6.3. Educate the community on open burning restrictions

It is important that the community is aware of the wide-ranging restrictions on open burning and the use of incinerators, and has ready access to clear information on how these restrictions apply in particular locations. Because the controls vary across the State, it is often quite difficult for members of the public to sort out the requirements for their particular locality. The EPA Pollution Line receives regular requests for advice on this issue as do local councils and the fire services.

The EPA will work with local councils, the Department of Bush Fire Services, the Fire Brigades and NPWS to produce a clear community information package for distribution through local councils, Bush Fire Brigade depots, fire stations and Pollution Line. These will be available in early 1998.

Objective 7. Monitor, report on and review air quality

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

Action for Air is a long-term plan based on the best information and resources available in 1997. Because of its 25-year time frame, it is an adaptive plan that will be monitored and evaluated against its own goals. Each new stage of research and planning will take into account the cumulative impact of the strategies of the previous phase.

The final key objective of *Action for Air* is to provide for ongoing monitoring and development of

the Regional Action Plan based on scientific, economic and social information, wide collaboration, and open and full consultation.

The major strategies for achieving this are:

- improving access to air quality monitoring data and modelling results
- ensuring an effective and regular review process for the plan is in place
- reporting regularly on the state of air quality in NSW.

Monitor, report, review

It is the cumulative effect of actions over many areas by government, industry and the community that will maintain and improve our air quality in the future. As a community, we need open and accessible ways of monitoring this cumulative process.

The NSW Government already monitors and reports on air quality in the GMR and assists local government in some regional areas to establish local monitoring programs. The community has daily access to this information through television and newspaper weather reports. In addition, the EPA publishes quarterly reports on air quality. There is considerable community, local government and academic interest in this information.

Action 7.1. Provide Internet access to air quality data by mid-1998

The EPA will upgrade community access to data on air quality by providing Internet access to daily and quarterly reports by mid-1998.

Action 7.2. Set up an air quality modelling interest/advisory group

The Metropolitan Air Quality Study (MAQS) has developed the capacity for sophisticated modelling of long-term air quality trends, including the predicted impact of policy interventions. The Government will open this process to greater industry, community and scientific participation.

The EPA will set up an air quality modelling interest/advisory group with representatives from community interest groups, universities, CSIRO,

industry and government. The group will provide a forum to identify priorities for future modelling work.

Action 7.3. Report on results of the air toxics study

The Government has provided the EPA with \$500,000 to investigate the levels of air toxics in the GMR. This will build on the pilot air toxics study of the Sydney airshed in 1996, and provide a sound basis for assessing the need for specific actions to protect the community from unsafe levels of these toxics.

The EPA will report on the results of its pilot study in early 1998 and on its more comprehensive monitoring data when completed.

Action 7.4. Reconvene key technical committees with industry groups

The joint EPA/Industry Technical Committees will be reconvened to undertake further work. This will include investigating innovative responses to unresolved issues, especially pollution from heavy vehicles, and fuel quality issues.

Action 7.5. Metropolitan Strategy Committee to review environmental matters

The Metropolitan Strategy Committee, a whole-of-government body that coordinates integrated land use, transport and environment planning, will annually review environmental considerations including the achievement of air quality goals. This will provide an important link between urban planning and environmental planning.

Action 7.6. Convene a public forum to report regularly to Government

The NSW State of the Environment Reports must be produced and tabled in parliament every 3 years.

State of the Environment reporting provides an ideal opportunity for public review of the status of our air quality and the effectiveness of air quality strategies. It is an ideal context for identifying emerging issues, new technologies and possible solutions. The EPA will convene a broadly based forum within six months of the publication of each *NSW State of the Environment* report to encourage public input on air quality trends and strategies. The forum's report to the Government will help guide future development of the Action Plan.

The strategies in the Regional Action Plan were selected on the basis of feasibility, community acceptance, and both environmental and economic effectiveness.

Modelling

The photochemical smog strategies were modelled for environmental and economic impact over the 25-year timeframe set for *Action for Air*.

The Metropolitan Air Quality Study (MAQS) provided the tools for the environmental impact modelling, with scenarios ranging from ‘No New Initiatives’ to the ultimate ‘Beyond State of the Art’ in control and management. Modelling allows for the projection of the peak levels of ozone that might occur under worst-case conditions but does not allow for projection of the number of possible exceedences in any one year.

No new initiatives

This scenario provides for no new strategies but assumes existing control programs will continue until 2021. It reveals that gains in air quality will continue using this approach and peak ozone levels will continue to be reduced—although they will not achieve NSW interim or long-term goals. Ongoing reduction of peak ozone levels in this scenario comes through the phasing-in of strategies already agreed upon, particularly relating to new motor vehicle standards such as ADR 37/01.

Beyond state-of-the-art

This scenario incorporates an exhaustive array of state-of-the-art initiatives and an 18% reduction in the total projected VKT in 2021. Many of these strategies are not available for current implementation in NSW—e.g. the development of ultra-low emission vehicles (foreshadowed in California) or extensively reformulated motor fuel. The modelling reveals this level of control may be necessary to ensure the current NHMRC ozone goal is not exceeded by 2021. Even this extensive suite of strategies may not ensure that there are no exceedences of the Government’s long-term ozone goal by 2021. Progressive monitoring of the

effectiveness of strategies will be needed if compliance with the long-term goal is to be achieved.

AQMP package

This scenario estimates the impact of all the smog-management strategies outlined in *Action for Air*. The strategies will ensure substantial improvement in air quality by 2021, but the model indicates the Government’s short-term and long-term ozone goals may still be exceeded on occasion under worst-case conditions. Therefore, ongoing review of the effectiveness of the strategies will be essential.

The strategies will be re-evaluated regularly in the light of new air quality data, trends and technological advances, allowing the Government to augment strategies as needed.

Economic impact analysis

The EPA has undertaken cost-effectiveness analysis of the various strategies, focusing on the cost of reducing the smog precursors NO_x, ROCs and CO. Many of the strategies will also bring about reductions in fine particle emissions, air toxics and greenhouse gases.

Information was gathered from a range of sources. First, the EPA commissioned Peter Ramsey and Associates to collect data on industrial control costs and effectiveness. The resulting report, *Air Pollution Prevention and Control Option Costs* (June 1996) identified a number of cost-effective options for smog-reduction strategies. Some of these were identified as likely to achieve cost savings for industry through cleaner production.

To gain direct local information, joint EPA/Industry Technical Committees were set up across a number of areas: petroleum, natural gas, power generation, surface coatings and adhesives, chemical manufacturing, dry cleaning, printing, bitumen and aerosols. The committees developed local cost data and cost-effectiveness analyses of proposed strategies. Industry, particularly the petroleum industry, made considerable helpful data available; other cost data were gathered from State

and national industry associations. Overseas cost data were collected for comparative purposes and used in some contexts where local data were not available.

The results of this costing analysis for key strategies are summarised in *Appendix 3*.

Although *Action for Air* focuses on air quality at the regional level, the Government recognises that local, regional and global air-quality issues are interconnected, and is committed to action at the global and local levels as well.

Air quality in NSW is improving as a result of existing strategies to control emissions. This section explores the range of initiatives that have already been put in place to alleviate global, regional and local air quality problems.

Global issues

Background

Ozone is present in both the lower and upper atmospheres. In the upper atmosphere (more than 10km above the Earth) ozone plays an essential role in protecting plant and animal life from the harmful effects of ultraviolet radiation.

The *NSW State of the Environment Reports* present information on the depletion of ozone over Australia, and its potential health implications. Scientists have calculated that ozone depletion would result in a 5-10% increase in UV-B radiation in Sydney between 1990 and 2000.

Climate change is the other major problem at the global level. The presence of greenhouse gases in the atmosphere has an insulating effect which leads to warming of the Earth's surface: greenhouse gases such as carbon dioxide, methane and nitrous oxides trap part of the heat being radiated from the Earth back into space. While the 'greenhouse effect' occurs naturally and is essential for sustaining life on Earth, scientists now generally believe that the accumulation in the atmosphere of increased amounts of greenhouse gases produced by human activities—particularly by burning fossil fuels—is intensifying global warming.

Response

Climatic change and greenhouse gases are being tackled through a broad NSW State strategy—set in the context of the National Greenhouse Strategy—which is the key institutional driver for the

development of renewable energy sources, research and development policy, and improved energy efficiency in the community.

The effort is spearheaded by the NSW Sustainable Energy Development Authority (SEDA), established in 1996 to reduce the level of greenhouse gas emissions in NSW by investing in the commercialisation and use of sustainable energy technologies. The NSW strategy also includes proactive legislative reform of the electricity industry, as well as programs to control clearing of native vegetation. Because the transport sector is a major generator of greenhouse gas emissions in NSW, further benefits will flow from implementing *Action for Air*.

The relationship between greenhouse gas abatement and air quality strategies is complex. Although reducing fossil fuel emissions will improve overall air quality, some strategies may put pressure on local and regional air quality. For example, cogeneration results in lower overall greenhouse-gas emissions by improving the efficiency of energy use—but it inevitably creates NO_x. The need for reducing greenhouse gas emissions will have to be balanced with the need to improve regional and local air quality.

Implementation of the NSW Ozone Protection Regulation 1997 has brought NSW in line with national policies on ozone protection and control of hydrochlorofluorocarbons.

Regional issues

Background

The major regional air pollutants in the GMR and their effects on human health have already been discussed (see 'What's The Problem?' p. 9).

Response

An important achievement in regional air quality management is the Metropolitan Air Quality Study (MAQS), which set up a crucial airshed modelling and air quality monitoring system for Sydney, the Illawarra and the Lower Hunter, and generates

important scientific information on smog formation and transportation.

The Health and Air Research Program 1995 examined the health effects of major pollutants in parts of the GMR and provided a key rationale for the development of further strategies to address photochemical and fine-particle air pollution.

Two NSW Government green papers on air quality management were released for public consultation in May 1996. Responses to these significantly shaped the strategies contained in *Action for Air*. Appendix 1 provides details on the responses to the documents.

New, never-to-be-exceeded air quality emission standards for industry and controls on motor vehicles were implemented in revamped Clean Air Regulations in August 1997.

Regulatory and education strategies to reduce fine-particle/brown haze pollution were initiated in 1996 and 1997, including regulations to require new wood heaters to be certified to the Australian Standard and beginning a voluntary 'Don't Light Tonight' alert on high pollution days.

Innovative education programs on air quality have included:

- the successful Small Business and Environmental Solutions to Pollution Program run cooperatively by the EPA, local councils and small business
- the innovative 'Air Watch Breathe Easy' Air Quality Monitoring Program for schools and community groups
- State participation in the National Smogbusters Program.

NSW has actively participated in the following national initiatives on air quality:

- development of the National Environment Protection Measure (NEPM) for air quality, covering ozone, sulfur dioxide, nitrogen dioxide, lead, carbon monoxide and fine particles
- development of the NEPM for a National Pollution Inventory
- the National Inquiry into Urban Air Quality
- national forums to set standards to reduce emissions from motor vehicles.

Local issues

Background

The major air pollutants at the local level are lead, air toxics, carbon monoxide and sulfur dioxide.

Lead is a toxic metal that can damage human health when inhaled or ingested. Recent overseas research indicates a strong correlation between blood lead concentrations in children under four, and lead concentrations in the air. Lead is known to cause learning disabilities and to retard mental development in children.

The main sources of lead in air are cars using leaded petrol, and base-metal works. Concentrations are now well below NHMRC guidelines, even in the Sydney CBD. Occasional exceedences occur in Port Kembla and northern Lake Macquarie.

The Government has signalled lead as a priority issue.

Air toxics are airborne pollutants that can cause cancer or otherwise harm health and the environment. They can be naturally-occurring or of human origin. Nearly 200 hazardous air pollutants have been identified by the US EPA, including benzene, dioxins, cadmium, organochlorides, halogenated ethylenes and PCBs.

Although overseas goals do exist for a few air toxics, there is generally neither good information nor any standard process in Australia for setting goals.

Air toxics have been identified as a priority issue by the NSW Government and nationally.

Carbon monoxide is an asphyxiant that reduces the oxygen-carrying capacity of the blood, placing additional strain on the heart as it increases its output to compensate.

Monitoring of results from the regional network show that the NHMRC goal has not been exceeded except at the monitoring station in the centre of the Sydney CBD. This station is purposely set up to monitor peak concentrations rather than the general exposure of the population. Concentrations at this site are declining.

Sulfur dioxide can irritate the respiratory system, contributing to diseases such as chronic bronchitis. Ambient sulfur dioxide in NSW results

largely from combustion of fossil fuels and smelting of mineral ores containing sulfur. Major sources are power stations, oil refineries and base-metal processing plants.

Exceedence of sulfur dioxide goals is associated with relatively few industrial premises and with power generation from coal. Regional concentration measures by the MAQS network show few instances of any established health goals being exceeded. NSW is fortunate that its fossil fuels are relatively low in sulfur.

Response

In 1996, a Lead Reference Centre was established to coordinate a whole-of-government response to managing all lead hazards, including lead-related air quality programs. There has been a dramatic improvement in the level of lead in our air, and this needs to continue.

Following a pilot study of selected air toxics in Sydney in 1996, the Government has allocated \$500,000 to establish an ongoing air toxics monitoring program to quantify the toxic organic compounds present in the ambient air and develop an inventory of emissions from stationary and diffuse air-pollutant sources.

Integrated programs

The development by local councils in NSW of Local Air Quality Management Plans (LAQMPs) contributes positively to global, regional and local air quality. In 1994, the Sydney Regional Organisation of Councils published a manual on local air quality management (*Innovative Ways of Working Together*), to guide local councils on developing their own LAQMPs. A significant number of councils have begun to develop an LAQMP and others are committed to developing one.

Partnerships with industry and community groups are growing—e.g. the NRMA Clean Air 2000 Task Force. In June 1995, the NRMA launched a Clean Air 2000 campaign designed to reduce air pollution and traffic congestion in the GMR by the year 2000. The campaign's core activities are community education and efforts to mobilise key players. Clean Air 2000 is an important complement to *Action for Air*.

Appendixes

Appendix 1. Community feedback on air quality

Summary of main issues covered by responses to the green papers

The 70 submissions canvassed a wide range of issues with the following issues or recommended actions being mentioned most often:

Issue	No. of mentions
■ Carry out more extensive cost/benefit analysis	17
■ Introduce financial incentives to encourage environmental improvements	16
■ Coordinate all levels of government, industry, community	15
■ Increase public education	15
■ Establish performance measures for implemented strategies	12
■ Increase the provision of public transport	11
■ Employ more extensive long-term urban planning	11
■ Clearly define proposed action	10
■ Ensure whole-of-government approach	9
■ Green papers contain inadequate public transport options	9
■ Ensure enforcement of legislation	9
■ Promote national approach	9
■ AQMP uncertain until verification of Metropolitan Air Quality Study results	8
■ Green papers adequately cover air quality causes, effects, responses	8
■ Ensure strategies foster economic/social equity	8
■ Reduce motor vehicle emissions	8
■ Employ more extensive transport planning	8
■ Ensure strategies avoid financial impost on industry, agriculture	7
■ Increase use of rail freight	7
■ Set ecologically sustainable development, not health, goals	7
■ Increase traffic management	7
■ Encourage decentralisation	6

■ Promote energy efficient building design	6
■ Introduce fuel levy to subsidise environmental improvements	6
■ Introduce vehicle inspection/maintenance program	6
■ Foster motor vehicle/VKT reduction	6
■ Utilise new technology	6
■ Green papers do not assign ownership of proposed actions	6
■ Support local air quality management plan process	6

List of respondents to the AQMP and SAP green papers

Government agencies

- Department of State and Regional Development
- Department of Urban Affairs and Planning
- Environment Protection Agency (now Environment Australia)
- NSW Treasury
- State Rail Authority

Local government

- Botany Bay City Council
- Camden Council
- Dungog Shire Council
- Fairfield City Council
- Ku-ring-gai Municipal Council
- Newcastle City Council
- Penrith City Council
- South Sydney City
- Southern Sydney Regional Organisation of Councils
- Sutherland Shire Council
- Sydney Regional Organisations of Councils
- Western Sydney Regional Organisation of Councils
- Wollongong City Council

Industry

- AGL Gas Co (NSW)
- Ampol
- Australian Chemical Specialties Manufacturers Association
- Australian Institute of Company Directors
- Australian Institute of Petroleum Ltd
- BHP
- BP Aust Ltd
- Catco Australia Pty Ltd
- Exhaust Systems Professional Association
- Macquarie Generation
- NSW Farmers Association
- NSW Minerals Council
- Pacific Power
- PPM Pty Ltd
- Shell Company of Australia Ltd
- State Chamber of Commerce (NSW)
- Telecommuting Australia Pty Ltd
- Waste Contractors and Recyclers Association of NSW
- Environment/community groups
- Bicycle New South Wales
- Clean Air Society of Australia and New Zealand
- NRMA Clean Air 2000
- Total Environment Centre
- Willoughby Environmental Protection Association

Individuals

- Mr A Batton, Moss Vale
- Mr G Borell, Petersham
- Mr R Burgess, Cronulla
- Mr S Clough, Hunters Hill
- Ms B Delaney, Greystanes
- Mr G Duff, Connells Point
- Mr J Fulford, Mittagong
- Ms H Gillett, Mt Warrigal
- Ms J Haim, Greystanes
- Mr W Hawtin, Rozelle
- Mr E Jefferay, Point Clare
- Mr I Jeisman, Yandina, Qld
- Mr M Kachka, Baulkham Hills

- Assoc Prof P Laird, University of Wollongong
- Mr P Lawson, Marsfield
- Ms K McDonnell, Hornsby Heights
- Mr P McKee, Northbridge
- Mr T Mohr, West Ryde
- Mr C Morgan, Chiswick
- Mr P Morison, Double Bay
- Mr P Motbey, Granville
- Mr M Oliver, Collaroy
- Mr D Owers, Dudley
- Mr R Pevely, Alfords Point
- Mr J Platt, Figtree
- Ms M Sinclair, St Marys
- Mr G Walker, Ingleburn
- Anonymous (2)

Appendix 2. Local councils committed to a local air quality management plan

The following councils have indicated that they are committed to a local air quality management plan:

- Bankstown
- Baulkham Hills
- Blacktown
- Botany Bay
- Camden/Campbelltown/Wollondilly
- Canterbury
- Fairfield
- Holroyd
- Kogarah
- Liverpool
- Marrickville
- Mosman
- North Sydney
- Parramatta
- Randwick
- Rockdale
- South Sydney
- Sutherland Shire
- Waverley
- Wollongong

Appendix 3. Estimated cost, effectiveness and cost-effectiveness of Action for Air smog action strategies

Strategy (possible implementation date)	Financial impacts	Average annual emission reductions (tonnes per year)	Cost-effectiveness (\$ per tonne reduced)
<i>National strategies</i>			
New passenger vehicle emission standards (2003)	\$250-\$650 per vehicle	75,200 tonnes (ROC, NO _x & 1/7CO)	\$460-\$1,600
New heavy duty truck emission standards (2003)	\$1,300-\$10,000 per truck	1,800 tonnes (ROC, NO _x & 1/7CO)	\$440-\$3,500
<i>State strategies</i>			
Inspection & maintenance program (1998-2000)	\$20-\$25 per inspection (excluding repairs and fuel savings)	18,800-26,500 tonnes (ROC, NO _x & 1/7CO)	\$1,800-\$5,100
Lower fuel volatility (1998-2001)	Less than \$0.002 per litre (excluding fuel savings)	5,800-8,300 tonnes (ROC, NO _x & 1/7CO)	\$190-\$320
Major industry ROC controls (1998-2003)	\$50-\$100,000 per refinery/petrochemical facility (less product savings)	2,600 tonnes ROC	\$85-\$160
Commercial premises ROC controls			
Printing (1998-2006)	N/A	1,200-2,800 tonnes ROC	\$1,100-\$2,300
Auto repair (1997-2002)	Net savings	315 tonnes ROC	Net savings
Install petrol vapour recovery units at rail loading gantries (1999)	\$1.5m per gantry	310 tonnes ROC	\$820

Notes: ROC = reactive organic compounds. NO_x = oxides of nitrogen CO = Carbon monoxide. The above strategies would be implemented at different times. For example an inspection and maintenance program in Sydney may be operational by 1998 whereas further new passenger vehicle emission standards may not be in effect until 2003.