

# 1 Structure of the Toolkit

This Toolkit consists of:

- this introductory section
- a glossary of terms used in all aspects of air quality management, page 17
- three modules:
  - 1 The science and management of air quality, page 36
  - 2 Legislative and policy framework for air quality management, page 114
  - 3 Guidelines for managing air pollution:
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    - Part 1: Air pollution control techniques, page 173
    - Part 2: Practical regulation of air pollution sources, page 232
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At the end of Module 3 there are individual guidance notes for eleven specific activities and business types that DECC has identified and for which local councils have regulatory responsibility. They are:

- Agricultural stubble burning
- Beef cattle feedlots
- Composite structural products
- Construction sites
- Dairies
- Egg production
- Food outlets
- Meat chicken production
- Piggeries
- Small-scale sawmills
- Spray painting operations

### **Module 3 Visual guides**

- Dust from urban construction sites
- Inspecting a suburban auto repair shop
- Odour complaints from a suburban auto repair shop

## 2 Using the Toolkit

The Toolkit has been prepared with the needs and backgrounds of local government officers in mind. Others may find parts of it helpful on specific topics. However, this is not a design manual nor does it attempt a detailed scientific or engineering treatment of the matters covered.

### 2.1 Readership

Local government officers should be able to readily comprehend the material in the Toolkit and use it for air quality management at the local level.

The treatment assumes that local government people will have general competence in legal, scientific and administrative matters. Officers entering the field over the last twenty years have received tertiary training tailored especially to local government needs. Those entering earlier will have accumulated extensive experience giving an equivalent competence. Some entering from other professions will bring that professional training with them.

A background in science and some general acquaintance with technological matters would be advantages in coming to terms with the material in the Toolkit—**but they are not essential**.

An intelligent and diligent ‘lay’ reader should be able to comprehend the principles and mechanisms described in the Toolkit, both technical and management oriented.

### 2.2 Modules

The level of scientific treatment in Module 1, which sets the broad context for understanding air quality, is primarily descriptive. A few quantitative parameters are given where they are likely to clarify understanding.

**Module 1** has been prepared essentially so that the users of the Toolkit gain an understanding of how the atmosphere ‘works’ in both a clean and polluted state. Once a few principles are understood, experience and inquisitive observation will reinforce and supplement the understanding in real and practical ways.

**Module 2** has been prepared against the background of the more comprehensive Authorised Officers’ training package. It is intended to complement that material with a focus specifically on air quality management.

**Module 3** has been prepared to help the users of the Toolkit gain an understanding of how the various techniques for air pollution prevention and control operate. The principles and key elements of each technique are set out in descriptive terms.

A few key parameters which can be used to assess likely effectiveness of the methods in various situations are provided. However, the treatment does not go to an engineering or technological design level. Rather, it is sufficiently thorough to allow local government officers to make a critical appraisal of proposals by experts to abate or control air pollution in specific situations.

Guidelines for specific types of premises and activities have been prepared for industries and businesses which local government officers are likely to encounter frequently. For general, non-scheduled industry and activities for which there is not a guideline, the principles set out in the introduction to Module 3 can be applied.

## 2.3 The glossary

A comprehensive glossary is provided for quick reference. It includes the terms used in each of the Modules and others which might be encountered in air quality management.

## 2.4 Further information

### Conventional literature

Manuals and text books on air quality management, air pollution control, environmental science and management can be consulted for further background and in-depth analysis. These may appear daunting to the non-specialist, but the Toolkit should provide the necessary competency to tackle selected parts of these texts for information on specific situations.

Some texts of scientific and technical interest include:

- Brimblecombe P, 1986/1996, *Air Composition and Chemistry*, Cambridge University Press, UK
- Buonicore A J, Davis WT (eds), 1992, *Air Pollution Engineering Manual*, Air & Waste Management Association, Van Nostrand, New York
- Elsom D M, 1992, *Atmospheric Pollution: a global problem*, Blackwell, Oxford UK, Cambridge Mass. USA
- Finlayson-Pitts B J, Pitts J N, 1986, *Atmospheric Chemistry: Fundamentals and Experimental Techniques*, Wiley, New York
- Jacobson M Z, 2002, *Atmospheric pollution: history, science, and regulation*, Cambridge University Press, Cambridge, New York
- Manahan S E, 2001, *Fundamentals of Environmental Chemistry*, Lewis, Boca Raton, Fla. USA
- Moussiopoulos N (ed.), 2003, *Air Quality in Cities*, Springer, Berlin
- Seinfeld J H, 1986, *Atmospheric Chemistry and Physics of Air Pollution*, Wiley, New York
- Warneck P, 1988, *Chemistry of the natural atmosphere*, Academic Press, San Diego, CA
- Wayne R P, 1991, *Chemistry of Atmospheres*, Clarendon, Oxford.

A book which is particularly relevant to air pollution in Sydney is

- Carras J N, Johnson G M (eds), 1982, *The Urban Atmosphere—Sydney, a case study* CSIRO, Australia.

### Journals of interest

*Journal of the Air & Waste Management Association*

*Atmospheric Environment*

*Clean Air and Environmental Quality (Journal of Clean Air Society of Aust and NZ)*

*Environmental Science & Technology*

*Journal of atmospheric Chemistry*

*Chemosphere*



## The internet

Much interesting and valuable information is available via the internet. There is also much untested and self-promoting type of material on the internet, which needs to be used cautiously.

Websites of interest include:

- [www.environment.nsw.gov.au](http://www.environment.nsw.gov.au)
- [www.csiro.au](http://www.csiro.au)
- [www.ephc.gov.au](http://www.ephc.gov.au)
- [www.epa.gov](http://www.epa.gov) and [www.epa.gov/ttn](http://www.epa.gov/ttn) (US EPA).

‘Google’ and other searches are always possible, but care should be taken in using information which has not been peer-reviewed or not officially endorsed by reputable public authorities.

## 3 The purpose of the Toolkit

This toolkit is part of the NSW Government’s ongoing commitment to a comprehensive and long-term plan for air quality management across the State. Its purpose is to provide local councils and their officers with an integrated resource for their role in protecting and improving air quality across NSW.

The following sections outline the national, state and local government policy context for air quality management.

## 4 The Ambient Air Quality NEPM

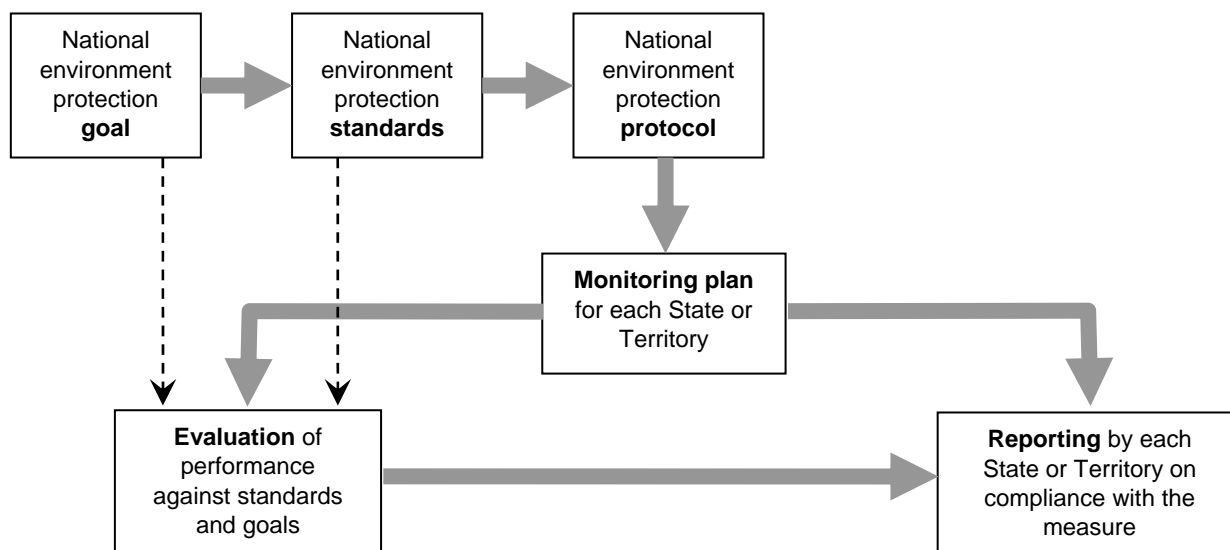
‘Ambient air’ refers only to outdoor air and the NEPM does not deal with indoor air.

In June 1998 the National Environment Protection Council (NEPC) agreed to set uniform air quality standards (or pollutant concentration levels), goals, and monitoring requirements for ambient air quality under the Ambient Air Quality National Environment Protection Measure (AAQ NEPM).

### 4.1 National environment protection standard

A ‘national environment protection standard’ is a quantifiable characteristic of the environment against which environmental quality can be assessed. In the case of air quality each standard is a pollutant concentration level as measured over a defined averaging period.

Each of the NEPM standards is health-based and each is designed to protect the most vulnerable people in the community from the health impacts of the pollutant.



## 4.2 National environment protection goal

A national environment protection goal is a goal that:

- relates to the desired environmental outcome of ‘ambient air quality that allows for the adequate protection of human health and wellbeing’, and
- guides the formulation of strategies for the management of human activities that may affect the environment.

## 4.3 Key pollutants

The NEPM standards and goals provide the benchmark for assessment of ambient air quality experienced by the majority of the population.

The standards are not specifically intended for the assessment of individual sources of pollution such as a major roadway or smelter operation.

The standards contained in the NEPM for ambient air quality are focused on six key pollutants of concern in Australia:

- carbon monoxide (CO)
- nitrogen dioxide (NO<sub>2</sub>)
- ozone (O<sub>3</sub>)
- sulfur dioxide (SO<sub>2</sub>)
- lead
- particles as PM<sub>10</sub>.

A **variation to the NEPM** was introduced by the National Environmental Protection Council in June 2003 with respect to finer particulates (PM<sub>2.5</sub>). The variation incorporates monitoring requirements and **advisory reporting standards** for PM<sub>2.5</sub>.

The PM<sub>2.5</sub> NEPM variation recognises both the growing knowledge about health impacts from PM<sub>2.5</sub> and the need to have a better understanding of PM<sub>2.5</sub> levels in Australia.

#### 4.4 The Ambient Air Quality NEPM goal for 2008

For each standard, the NEPM specifies the period of compliance and the allowed number of days each year that the standard can be exceeded.

**The goal of the NEPM** is that by 2008, for each of the standards, the number of exceedences is not greater than allowed. For example, the goal for the ozone 1-hour standard is an exceedence on no more than one day each year.

**Schedule 2** in *AAQ NEPM as varied in 2003* sets out the ‘Standards and Goal’ for each of the key pollutants, and the advisory reporting standards and goal for particles as PM<sub>2.5</sub>.

Schedule 2 is reproduced on the next page—the full AAQ NEPM can be found at:  
[www.ephc.gov.au/pdf/Air\\_Quality\\_NEPM/air\\_nepm\\_as\\_varied0503scaleplus.pdf](http://www.ephc.gov.au/pdf/Air_Quality_NEPM/air_nepm_as_varied0503scaleplus.pdf)

## 5 Air Toxics NEPM

The Air Toxics NEPM identifies **investigation levels**.

These are not compliance standards but are for use in assessing the significance of the monitored levels of air toxics with respect to protection of human health.

The aim of the Air Toxics NEPM is to provide a framework for monitoring, assessing and reporting ambient concentrations of five air toxics:

- benzene
- formaldehyde
- toluene
- xylenes
- benzo(a)pyrene as a marker for polycyclic aromatic hydrocarbons (PAH).

The Air Toxics NEPM is intended to help with collecting information for the future development of national air quality standards for these pollutants. It is primarily concerned with collecting monitoring data at locations where elevated concentrations are expected to occur and there is a potential that significant population exposure could occur.

The Air Toxics NEPM can be found at [www.ephc.gov.au/pdf/Air\\_Toxics/FinalAirToxicsNEPM.pdf](http://www.ephc.gov.au/pdf/Air_Toxics/FinalAirToxicsNEPM.pdf).

Schedule 2 from AAQ NEPM as varied in 2003:

## Schedule 2 Standards and Goal

Table 1: Standards and Goal for Pollutants other than Particles as PM<sub>2.5</sub>

Column 1 Item	Column 2 Pollutant	Column 3 Averaging period	Column 4 Maximum concentration	Column 5 Goal within 10 years Maximum allowable exceedences
1	Carbon monoxide	8 hours	9.0 ppm	1 day a year
2	Nitrogen dioxide	1 hour 1 year	0.12 ppm 0.03 ppm	1 day a year none
3	Photochemical oxidants (as ozone)	1 hour 4 hours	0.10 ppm 0.08 ppm	1 day a year 1 day a year
4	Sulfur dioxide	1 hour 1 day 1 year	0.20 ppm 0.08 ppm 0.02 ppm	1 day a year 1 day a year none
5	Lead	1 year	0.50 µg/m <sup>3</sup>	none
6	Particles as PM <sub>10</sub>	1 day	50 µg/m <sup>3</sup>	5 days a year

Table 2: Advisory Reporting Standards and Goal for Particles as PM<sub>2.5</sub>

Column 1 Pollutant	Column 2 Averaging Period	Column 3 Maximum Concentration	Column 4 Goal
Particles as PM <sub>2.5</sub>	1 day 1 year	25 µg/m <sup>3</sup> 8 µg/m <sup>3</sup>	Goal is to gather sufficient data nationally to facilitate a review of the Advisory Reporting Standards as part of the review of this Measure scheduled to commence in 2005

For the purposes of this Measure the following definitions shall apply:

- (1) Lead sampling must be carried out for a period of 24 hours at least every sixth day.
- (2) Measurement of lead must be carried out on Total Suspended Particles (TSP) or its equivalent.
- (3) In Column 3, the averaging periods are defined as follows:
  - 1 hour clock hour average
  - 4 hour rolling 4 hour average based on 1 hour averages
  - 8 hour rolling 8 hour average based on 1 hour averages
  - 1 day calendar day average
  - 1 year calendar year average
- (4) In Column 5, the time periods are defined as follows:
  - day calendar day during which the associated standard is exceeded
  - year calendar year.
- (5) All averaging periods of 8 hours or less must be referenced by the end time of the averaging period. This determines the calendar day to which the averaging periods are assigned.
- (6) For the purposes of calculating and reporting 4 and 8 hour averages, the first rolling average in a calendar day ends at 1.00 am, and includes hours from the previous calendar day.
- (7) The concentrations in Column 4, are the arithmetic mean concentrations.

## 6 NEPM for Diesel Vehicle Emissions

The NEPM for Diesel Vehicle Emissions requires States to assess the impact of diesel vehicle emissions and, where necessary, to implement programs to reduce them. The NEPM provides guidelines for programs to reduce emissions from this sector of the vehicle fleet. It is complemented by emissions standards for in-service diesel vehicles established under National Road Transport Commission legislation. These standards provide the benchmark for assessing the emissions performance of in-service diesel vehicles.

## 7 NSW Action for Air

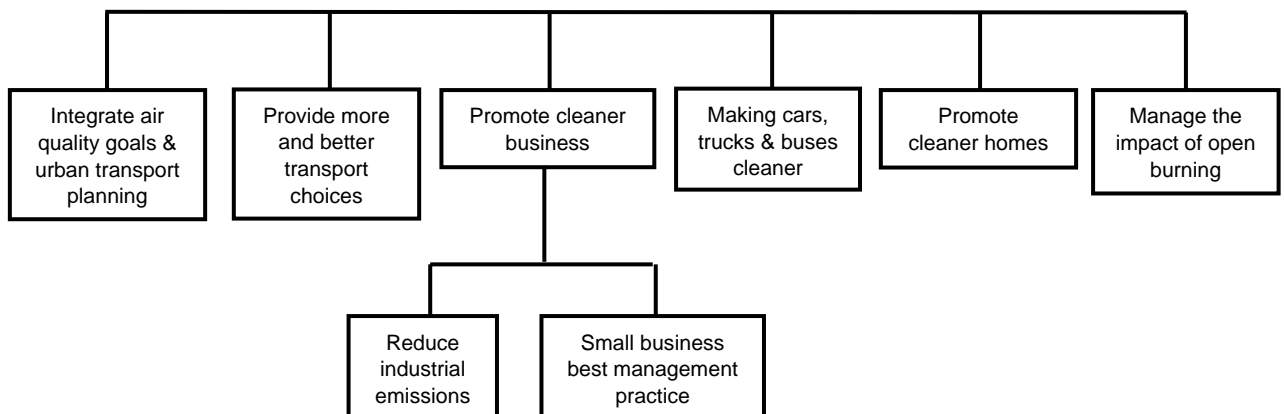
The **global air pollution issues** of greenhouse gas emissions and stratospheric ozone depletion are being addressed in other programs in which all levels of government play a part.

In March 1998 the Environment Protection Authority (EPA) released the NSW Government's 25-year air quality management plan *Action for Air*. Through this document the NSW Government has developed a comprehensive long-term approach to the management of air quality in the Sydney Greater Metropolitan Region which includes Sydney, the Illawarra and the Lower Hunter.

*Action for Air* gives high priority to the **regional air pollution** issues of photochemical smog and fine particle pollution. However, it also addresses the general need to protect air quality for all human and ecological purposes.

Local government is most immediately involved in the management of **local air quality issues** that arise from the impacts of activities and premises on their near neighbours. However they can also play an important part in managing **regional air quality issues**.

Amongst the seven key objectives that are identified in *Action for Air*<sup>1</sup> several have associated actions that fall within the responsibility and capability of local government authorities, whether or not within the Greater Metropolitan Region. Each of these also has importance for local government management of local air quality issues:



<sup>1</sup> For the full chart see Figure 12 on p18 of *Action for Air*.

## 8 NSW and the Ambient Air Quality NEPM Goals <sup>2</sup>

In the 2003 reporting year NSW met the requirements of the AAQ NEPM for most pollutants. Non-compliance occurred for ozone in Sydney and the Illawarra Region, and for particles as PM<sub>10</sub> in all regions except the Lower Hunter.

### 8.1 Ozone

Given pressures from a growing population, urban expansion and the associated increase in motor vehicle use, meeting the AAQ NEPM goal for ozone will be a challenge for the major urban areas of NSW. Ozone is the primary indicator of photochemical air pollution, which is a complex mixture of gaseous and particulate pollution. The precursor pollutants for photochemical pollution are volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>).

In NSW a broad range of strategies to reduce precursor pollutants are in place or being developed under the 25-year air quality management plan *Action for Air*. These include the requirement for Stage 1 vapour controls at service stations in Sydney and the *NSW Cleaner Vehicles Action Plan*.

In addition, there are initiatives under the *Industry Partnership Program* and the *Clean Air Fund* focusing on reducing precursor emissions from smaller commercial and industrial sources and also domestic sources.

### 8.2 Particulates

Over and above the impacts of drought, bushfires and dust storms, meeting the AAQ NEPM for particles, measured as PM<sub>10</sub>, also presents a challenge in NSW. This is particularly the case in rural population centres where a combination of topography, climate, and relatively high use of solid fuel heaters on top of agricultural burning, all combine to produce elevated levels of particles in winter.

To help councils implement community education programs that target woodsmoke, DECC has available on its woodsmoke web page ([www.environment.nsw.gov.au/woodsmoke](http://www.environment.nsw.gov.au/woodsmoke)) educational material tailored for a range of media including radio, TV and newspapers, as well as checklists for developing a community education program. These include suggestions for community surveys, displays, media opportunities, special events, school programs and the like.

The woodsmoke webpage also has information about 'smoke abatement notices' that may be issued by council officers where excessive smoke is being emitted from residential premises.

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<sup>2</sup> This section has been adapted from the *NSW Annual Compliance Report on the National Environment Protection (Ambient Air Quality) Measure 2003*.

## 9 The local government role in meeting national air quality standards

The effective management of emissions from activities within the jurisdiction of local government is becoming an important focus for meeting the national air quality standards.

In Sydney and the greater metropolitan region **commercial and domestic activities are a significant source of volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>), the precursors to ozone**. Controlling them is an important part of managing ozone levels here.

Local councils in NSW play an important part in initiatives to reduce emissions and in helping to meet the NEPM goal for ozone in the longer term.

Likewise, wood heaters are a major source of particulate pollution in winter in some regional areas as well as a significant source in winter in Sydney.

Under the *Protection of the Environment Operations Act 1997* (POEO Act) councils have the power to take action against people creating excessive smoke from wood heaters. Under the State's planning legislation councils have the power to limit or ban the installation of wood heaters. These powers are described in Module 2 of the Toolkit.