

**Senate Inquiry on the impacts on health of air quality in Australia**

**Submission by the**

**Department of Sustainability, Environment, Water, Population and Communities**

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## **Overview**

Ambient air quality in Australia is generally good but there remains concern about particles and ozone in some regional and urban areas.

Australia's strategy for managing air pollution over the last decade has resulted in significant improvements in air quality for many pollutants. Air quality issues are primarily addressed through the National Environment Protection (Ambient Air Quality) Measure, national fuel quality and motor vehicle emission standards.

Although air pollution can harm vegetation and wildlife and erode the facades of historic stone buildings, the key focus of public concern regarding air pollution in Australia is its short-term and long-term effects on human health. Poor urban air quality can adversely impact on human health (in particular cardiovascular and respiratory health), especially on the health of susceptible individuals.

In 2011, the Council of Australian Governments (COAG) identified air quality as a *Priority Issue of National Significance*. A National Plan for Clean Air is being developed by the COAG Standing Council on Environment and Water and is due to be delivered to COAG by the end of 2014.

### ***The department's role***

The Department of Sustainability, Environment, Water, Population and Communities develops and implements national policy, programs and legislation to protect and conserve Australia's environment, water, heritage and communities. The department's role with respect to air quality is captured in Outcome 2: Sustainable Population and Communities which is one of five departmental outcomes. This outcome aims to achieve improved sustainability of Australia's population, communities and environment through coordination and development of sustainable population and communities policies; and the reduction and regulation of waste, pollutants and hazardous substances.

More information on the department's outcome and program structure can be found in the *Department of Sustainability, Environment, Water, Population and Communities Annual Report 2011–12* which is available at

<http://www.environment.gov.au/about/publications/annual-report/11-12/pubs/annual-report-2011-2012.pdf>.

### ***What is air quality?***

The term air quality refers to the state of the air around us. Clean, unpolluted air is important for human and environmental health. An air pollutant is a contaminant in the air that can harm humans and/or the environment (that is wildlife, vegetation, soil and water). The six key air pollutants (often called 'criteria' pollutants) considered to be of concern to Australians are particulate matter, ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. Air pollutants can be generated from both natural processes, such as bushfires and dust storms, as well as anthropogenic activities, such as industrial activities. Air pollutants may be either emitted into the atmosphere (primary air pollutants) or formed within the atmosphere itself (secondary air pollutants). Conventional air pollutants, such as ozone and particulate matter, can have significant impacts on the Earth's climate, both directly and indirectly. Managing air quality is important to reduce the adverse impacts to human health, the natural environment and the Earth's climate that are associated with air pollution.

Assessing air quality involves considering the impact of pollutants on three main areas: the stratospheric ozone layer (the layer of the atmosphere between around 10 and 50 kilometres above Earth's surface); indoor air, and ambient (outdoor) air.

Stratospheric ozone is important in limiting the amount of harmful ultraviolet B (UVB) light that passes through to lower layers of the atmosphere. The ozone layer has a vital role in protecting life on Earth, as increased levels of UVB may result in damage to a range of

biological systems, including human health and the ability of many plant species to photosynthesise. Note that ozone in the stratosphere is protective of human health; whereas ozone near the ground, where it can be breathed in, is a pollutant and harmful to health.

Some air pollutants, principally chlorofluorocarbons and halons, which were widely used in refrigerators, air conditioners, fire extinguishers and electronic equipment, can damage and deplete the ozone layer. Since peaking in the mid-1990s, concentrations of ozone depleting substances in the atmosphere have been decreasing due to the success of the rigorous controls established under the Montreal Protocol. However, many of these substances are long lived and will continue to affect stratospheric ozone for some decades. This has important implications for the climate, since most ozone depleting substances are powerful greenhouse gases, and the gradual recovery of the ozone layer is expected to interact with climate change through a complex series of linkages. For more information, refer to Chapter 3 of the *Australia State of the Environment 2011* report which is available at

<http://www.environment.gov.au/soe/2011/report/atmosphere/pubs/soe2011-report-atmosphere.pdf>.

Most Australians spend more than 90 per cent of their time indoors. The quality of indoor air is affected by many factors, including building materials (particularly volatile materials like glues and paints), ventilation, furnishings and appliances (particularly unflued gas appliances), environmental tobacco smoke and cleaning agents. Poor indoor air quality can cause a range of health effects from mild symptoms such as headaches, to more severe effects such as aggravation of asthma and allergic responses. However, data on indoor air quality in Australia are limited, providing no firm basis upon which to form assessments of overall status and trends.

The Department of Health and Ageing publication, *Healthy Homes—A guide to indoor air quality in the home for buyers, builders and renovators*, provides information about air pollutants that may be found inside the home. It is available at

[http://www.health.gov.au/internet/main/publishing.nsf/Content/B9252301BA2F6A4ECA2573CB0082ABD1/\\$File/healthyhomes.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/B9252301BA2F6A4ECA2573CB0082ABD1/$File/healthyhomes.pdf).

Assessing the state of Australia's air quality largely focuses on ambient air. Although air pollution can harm vegetation and wildlife and erode the facades of historic stone buildings, the key focus of public concern regarding air pollution in Australia is its short-term and long-term effects on human health. The effect of air pollution on communities is discussed further below.

## ***The state of ambient air quality in Australia***

Over the last decade, there have been significant decreases in the levels of some air pollutants in Australia. Carbon monoxide, nitrogen dioxide, sulfur dioxide and lead levels have all declined in urban air to levels significantly below national air quality standards. The air quality rating for all these pollutants is 'good' or 'very good' in most regions, apart from in a few mining and industrial centres. These improvements are largely due to the progressive tightening of national vehicle emission and fuel standards over the past 20 years, and the management of industrial, commercial and domestic sources of air pollution. According to the *Australia State of the Environment 2011* report, Australia's good air quality is likely to continue despite the pressures associated with population and economic growth.

International assessments also reflect Australia's good air quality ratings. For example, a ranking released by the World Health Organization in 2011 has Australia tied with Canada for third place based on its overall air quality. The data for this ranking is available at [http://www.who.int/phe/health\\_topics/outdoorair/databases/OAP\\_database\\_8\\_2011.xls](http://www.who.int/phe/health_topics/outdoorair/databases/OAP_database_8_2011.xls). Australia's good air quality is also supported by the *OECD Environmental Performance Reviews: Australia 2007* report which concluded that air quality in Australia remains good overall with some urban areas and local hotspots of concern. The report can be accessed at [http://www.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-australia-2007\\_9789264039612-en](http://www.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-australia-2007_9789264039612-en).

The *State of the Air in Australia 1999–2008* report notes that particulate matter and secondary pollutant ozone are of particular concern in Australia. Levels of ground level ozone and particulate matter have not decreased over the last ten years. Over this period, peak ozone levels occasionally approached or exceeded the national standards in some Australian cities; while peak particulate matter levels frequently exceeded the standards in nearly all regions. The report also notes that particle levels tend to be slightly higher in regional cities in south-eastern Australia than in the capital cities. Note that particulate matter can be emitted from many sources, both natural and anthropogenic, and that peak particle levels tend to be seasonal and are often associated with summer dust storms, bushfires and prescribed burning.

For further information on the state of ambient air quality in Australia, see the *State of the Air in Australia 1999–2008* (available at <http://www.environment.gov.au/atmosphere/publications/state-of-the-air/pubs/state-of-the-air.pdf>) and Chapter 3 of the *Australia State of the Environment 2011* report (available at <http://www.environment.gov.au/soe/2011/report/atmosphere/pubs/soe2011-report-atmosphere.pdf>).

## ***Particulate matter***

Particulate matter, or particles, is a term used to define solid or liquid particles that may be suspended in the atmosphere. The total of all particles suspended in the air is referred to as total suspended particulates. Particle size is important to the behaviour of particles in the atmosphere and the human body, and affects the potential for entry and absorption of particles in the lungs. Particles are often described in terms of their size. PM<sub>10</sub> (coarse particles) refers to particulate matter with an aerodynamic diameter of 10 micrometers (µm) or less. PM<sub>2.5</sub> (fine particles) is particulate matter with an aerodynamic diameter of 2.5 µm or less.

Particles, as with other air pollutants, may be classified as primary or secondary depending on their formation mechanism. Primary particles are emitted directly from sources. These may be emitted from a wide range of natural sources and human activities. Natural sources include windblown dust, pollen from plants, sea salt and bushfires. Human activity sources include the combustion of oil, gas and coal, and dust from industrial activities. The main industrial sources of particle pollution are mining (coal and metal ore) and electricity generation. Secondary particles are formed indirectly by the conversion of precursor chemicals through photochemical processes (for example, conversion of gaseous pollutants such as sulfur dioxide and nitrogen oxide emissions).

In summer, windblown dust and sea salt (near the coast) also make up a major component of the coarser particles. In winter, wood smoke from domestic heating contributes a significant amount of particulate pollution in some regions. The main non-industrial sources of PM<sub>10</sub> in Australia are vegetation burning, dust, solid fuel burning (wood fires) and motor vehicles. Motor vehicle emissions and secondary particle production appear to be the main sources of particle pollution in urban air.

## ***Air quality and communities***

Despite the generally good quality of urban air in Australia, the impact of urban air quality on health is still a matter of concern. Research in Australia and overseas has shown that urban air pollution continues to be a significant cause of death and illness in the community. *The burden of disease and injury in Australia 2003* report, which is available at <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442459747>, estimates that there were approximately 3000 deaths in Australia due to urban air pollution in 2003—nearly twice the national road toll in the same year.

According to the *Australia State of the Environment 2011* report, there is clear evidence that periods of poor urban air quality can adversely impact on human health, particularly on the health of susceptible individuals. The World Health Organisation air quality guidelines identify air pollution as posing a significant threat to health worldwide. The guidelines are available at [http://www.euro.who.int/\\_data/assets/pdf\\_file/0005/78638/E90038.pdf](http://www.euro.who.int/_data/assets/pdf_file/0005/78638/E90038.pdf). Groups considered most vulnerable to the adverse effects of air pollution include people with pre-existing respiratory conditions (for example asthma) and cardiovascular diseases, young children and the elderly.

Particles and ozone, the ambient air levels of which have not decreased over the past ten years, are known to impact on cardiovascular and respiratory health. Epidemiological research into the health effects of particles and ozone, along with other key pollutants such as sulfur dioxide, indicates that there is no clear threshold level below which health effects would not be observed. This means that sensitive individuals—such as asthmatics and people with respiratory or cardiovascular disease—may be affected even when air quality standards are met.

As there are many and varied types of particulate matter, its effect on the environment is not always the same and can be worse in some areas than others. The more the air is polluted, the greater the effect on the environment. People may be exposed to particulate matter in the following ways:

- breathing in ambient air
- living in or near cities and industrial areas
- living near busy and dusty roads and/or
- working in an area in which particulate matter is produced, for example a quarry or brickworks.

Particles may affect animals in the same way that they affect humans. Particles in general (not specifically PM<sub>10</sub> or PM<sub>2.5</sub>) also affect the aesthetics and utility of areas through visibility reduction and may affect buildings and vegetation. The specific effect of particles depends on their composition, concentration and the presence of other pollutants such as acid forming gases. The Australian Government's National Pollutant Inventory website provides further information on particles, including the factors that may influence the health effects related to exposure to particles. See <http://www.npi.gov.au/substances/particulate-matter/index.html> for further information.

## ***Air quality management in Australia***

State, territory and local governments have direct responsibility for the management of air quality in their jurisdictions. All Australian states and territories have legislation that relates to ambient air quality, with specific policies or protocols associated with minimising generation of particulate matter. State authorities conduct air quality monitoring; regulate industrial emissions through licensing and compliance, and have procedures in place to respond to concerns relating to ambient air pollution.

The Australian Government plays a role in air quality management where there are benefits in a national approach, including through legislative action on reducing emissions from priority emissions sources.

In Australia, air quality is assessed against the national ambient air quality standards set for pollutants in the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM). The desired environmental outcome of the AAQ NEPM is to continuously improve air quality to minimise risk to the health of the Australian population. The AAQ NEPM air quality standards and its five schedules provide the national framework for air quality management in Australia. See <http://www.scew.gov.au/nepms/ambient-air-quality.html> for more information.

Under the AAQ NEPM framework, state and territory governments have primary responsibility for implementing measures to ensure ambient air quality standards are met. Jurisdictions are required to report annually on the implementation of NEPMs. The jurisdictions' annual reports for 2010 can be accessed at <http://www.scew.gov.au/nepms/reports.html#aaq-review>. From time to time, Ministers may decide to vary an existing NEPM or make a new one. Before this can happen an extensive consultation process is undertaken.

The National Environment Protection Council, which is part of the Council of Australian Governments Standing Council for Environment and Water, released the review of the AAQ NEPM in September 2011, noting that the review's recommendations will be prioritised and responded to through the development of a National Plan for Clean Air. The report is available at <http://www.scew.gov.au/publications/pubs/aaq-nepm/aaq-review-report-2011.pdf>.

The AAQ NEPM review report identifies that implementing the AAQ NEPM has led to a greater understanding of air quality in Australia which has, in turn, led to an improved understanding about the health impacts of air pollution on the community. There has also been a marked reduction in emissions of some pollutants since the NEPM was made. The report notes that it is timely to move beyond only complying with the standards, to a focus on reducing population risk which is consistent with international air quality policy development.



The National Environment Protection (Diesel Vehicle Emissions) Measure (Diesel NEPM) and the National Environment Protection (Air Toxics) Measure (Air Toxics) are also part of national air quality management. The Diesel NEPM provides guidelines for developing programs to minimise the deterioration in exhaust emissions performance, or improve exhaust emissions performance, from diesel vehicles. Information relating to the Diesel NEPM can be found at <http://www.scew.gov.au/nepms/diesel-vehicle-emissions.html>. The Air Toxics NEPM goal is to improve the information base regarding air toxics to facilitate the possible development of national standards. Information relating to the Air Toxics NEPM can be found at <http://www.scew.gov.au/nepms/air-toxics.html>.

The Australian Government's National Pollutant Inventory provides a publicly accessible database compiled in partnership with state and territory governments. The inventory aims to raise public awareness about pollution issues, encourages cleaner production by industries, and provides the community with information about emissions in their local area. The inventory includes data on 93 substances, including lead, emitted into air, land and water. Emissions from non-industry sources and more than 4200 industrial facilities are published on the National Pollutant Inventory website <http://www.npi.gov.au/>.

Economic activity such as increased transport and energy demand are primarily addressed through the AAQ NEPM, the motor vehicle emission standards (<http://www.infrastructure.gov.au/roads/environment/emission/index.aspx>) and the national fuel quality standards (<http://www.environment.gov.au/atmosphere/fuelquality/standards/index.html>).

Motor vehicles are major contributors to air pollution in urban areas and reducing their emissions through fuel quality and emissions standards has been a major success story of national air quality management strategies. Improved fuel quality standards have resulted in significant improvements in vehicle emissions and improvements are expected to continue as old cars are replaced by newer ones. Switching from high-sulfur fuel to low-sulfur fuel has resulted in lower emissions of sulfur dioxide and particle pollution from motor vehicles. Sulfur levels in diesel are currently capped at 10 ppm which is international best practice. Low-sulfur fuel has additional air quality benefits as many low emissions technologies in motor vehicles require low or ultra-low sulfur fuels, and all catalyst-based technologies perform better with low-sulfur fuel.

The Australian Government is also working with states and territories to develop a National Plan for Clean Air.

## ***National Plan for Clean Air***

In 2011, the Council of Australian Governments (COAG) identified air quality as a *Priority Issue of National Significance* and agreed that the COAG Standing Council on Environment and Water (SCEW) would develop a National Plan for Clean Air to improve air quality and community health and well being. The plan is due to be delivered to COAG by the end of 2014.

The plan will bring together Commonwealth, state and territory action to reduce the risk of health impacts from air pollution. The priority for the first stage of the development of a National Plan for Clean Air is on particle pollution. This priority recognises that current population exposure to particulate matter needs to be addressed and that significant health benefits can be achieved.

It is envisaged that a National Plan for Clean Air will include the revision of air quality standards, the development of an exposure reduction framework, and a robust framework for identifying cost effective actions and implementation arrangements to reduce air pollution.

The SCEW public statement on the development of a National Plan for Clean Air can be accessed at <http://www.scew.gov.au/publications/pubs/air/national-plan-for-clean-air-public-statement.pdf>.

## ***Commonwealth environmental regulation***

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as matters of national environmental significance. The eight matters of national environmental significance protected under the EPBC Act are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park and
- nuclear actions (including uranium mines).

In addition, the EPBC Act confers jurisdiction over actions that have a significant impact on the environment where the actions affect, or are taken on, Commonwealth land, or are carried out by a Commonwealth agency (even if that significant impact is not on one of the eight matters of 'national environmental significance').

Under the EPBC Act, actions that have, will have or are likely to have, a significant impact on a matter of national environmental significance or where the actions affect, or are taken on, Commonwealth land, or are carried out by a Commonwealth agency will require approval from the Minister for Sustainability, Environment, Water, Population and Communities. The Minister will decide whether assessment and approval is required under the EPBC Act.

For example, if a proposed action will result in a change to the air quality and the changed air quality will have a significant impact on a listed threatened species then the action must be referred and assessed in accordance with the EPBC Act.

The *Matters of National Environmental Significance Significant Impact Guidelines* provide overarching guidance on determining whether an action is likely to have a significant impact on a matter protected under the EPBC Act. These guidelines are available at <http://www.environment.gov.au/epbc/publications/pubs/nes-guidelines.pdf>.

### ***Air quality and sustainability***

According to *Sustainable Australia – Sustainable Communities*, a sustainable population strategy for Australia released by the Australian Government in 2011, “a sustainable Australia is a nation of sustainable communities which have the right mix of services, job and education opportunities, affordable housing, amenity and natural environment that make them places where people want to work, live and build a future”. The strategy also notes that to build a sustainable Australia improved information about our economy, environment and society, and the linkages between them is needed, to better inform decisions and policy making.

*Sustainable Australia – Sustainable Communities* is available at <http://www.environment.gov.au/sustainability/population/publications/pubs/population-strategy.pdf>.

One of the measures under *Sustainable Australia – Sustainable Communities* is the Measuring Sustainability program, which offers a comprehensive and integrated approach to measuring and monitoring sustainability in Australia. The National Sustainability Council and a set of sustainability indicators for Australia have been established under the program. The council was established by the Australian Government in October 2012 as an independent, expert body to provide advice on sustainability issues. The council's key role is to deliver a

public report against a set of sustainability indicators for Australia every two years. The council can also provide interim, targeted advice on sustainability issues as well as advice on potential improvements to the sustainability indicators over time as new data and methodologies become available.

The Australian Government has developed a set of sustainability indicators for Australia that will provide information about:

- social and human capital (skills and education; health; employment; security; institutions, governance and community engagement)
- natural capital (climate and atmosphere; land, ecosystems and biodiversity; natural resources; water; and waste) and
- economic capital (wealth and income, housing, transport and infrastructure, productivity and innovation).

The Measuring Sustainability Program recognises air quality as a key aspect of sustainability, with direct impacts on community liveability and human health and subsidiary economic and environmental implications. Air quality indicators are included as part of the Climate and Atmosphere theme.

The public report to be produced by the National Sustainability Council will highlight key trends and emerging issues across the dimensions of sustainability to support decision-making and planning by governments, business and communities. More information on the Measuring Sustainability program, including the council and the sustainability indicators, is available at <http://www.environment.gov.au/sustainability/measuring/index.html>.

The Australian Government report *Our Cities, Our Future* also identifies air quality—together with access to green and open space, water quality, pleasant streetscapes, and opportunities for recreation and social interaction—as contributing to the amenity of a neighbourhood and the overall wellbeing of a community. *Our Cities, Our Future* is available at [http://www.infrastructure.gov.au/infrastructure/mcu/files/Our\\_Cities\\_National\\_Urban\\_Policy\\_Paper\\_2011.pdf](http://www.infrastructure.gov.au/infrastructure/mcu/files/Our_Cities_National_Urban_Policy_Paper_2011.pdf).