ACT STATE OF THE ENVIRONMENT REPORT 2011

AIR THEME PAPER

Introduction to Theme

Air quality affects the condition of the environment and has an impact on human health and amenity. There is a legislative requirement for jurisdictions to monitor outdoor air quality in areas with large populations to ensure it meets the ambient air quality National Environment Protection Measure (NEPM).

Two Indicator clusters are drawn on for the Air theme, namely:

- *Local air quality*
- *Indoor air quality*

Context

Canberra's good outdoor air quality has not changed significantly during the last two State of the Environment (SoE) reporting periods. As highlighted in the 2003 and 2007–08 SoE Report, bushfires and duststorms can occasionally create short term increases in pollutants, especially particulate matter, in the air.

On a day-to-day basis, emissions from motor vehicles and winter smoke from wood-burning fires have been highlighted in the two previous SoE reports as key sources of air pollution in the ACT. Action to reduce woodsmoke emissions has contributed to a reduction in particulate matter in the air.

Recommendations to encourage low emission vehicles and publically report air quality data have been implemented. Expectations of extra nephelometers to be used for campaign or mobile monitoring of smoke pollution, related to ambient air quality, noted in the 2003 SoE, have not been met due to calibration, set up and data gathering requirements. Their use for this purpose needs to be clarified.

Both the 2003 and 2007–08 SoE Reports highlighted a lack of knowledge of indoor air quality with several recommendations to improve information. These recommendations have not been implemented and knowledge of indoor air quality in the ACT remains limited.

Many of these issues remain relevant in this reporting period and *recommendations* are provided at the end of this paper to assist progress.

Source: ACT Government

Theme summary: Key issues and outcomes

Local air quality

As in previous reporting periods, Canberra has relatively clean air with few exceedances of standards.

Motor vehicles are still the dominant source of outdoor air pollution in the ACT. The good air quality enjoyed in the ACT is, in large part, due to the lack of other common sources such as heavy industry and concentrated high-density urban development, and because the ACT still has a relatively small population.

As noted in previous reporting periods, monitoring indicates that particulate matter is the only outdoor ambient air quality pollutant of concern in Canberra's air. Particulate matter exceedances are generally caused by woodsmoke from point sources in an area, and do not affect the whole ACT airshed. However, the whole airshed can be affected by events such as bushfires and duststorms.

In 2009, particulate matter (PM10) measured at the Monash performance monitoring station in the southern part of Canberra exceeded the NEPM standard. Compliance with the NEPM goal is achieved if there are 5 or fewer days per year when PM10 exceeds the NEPM standard. This goal was not met in 2009, with 9 exceedances recorded at the Monash site.

During the reporting period, the ACT population increased, triggering the requirement for a second outdoor air performance monitoring station for reporting under the NEPM (EPA 2010). A performance monitoring station at Civic, in central Canberra, whilst not NEPM compliant is currently providing limited data until a more suitable performance monitoring station can be established, possibly in the north of the ACT.

Air quality depends not only on rates of emission but also on prevailing weather conditions and local topography. On a windy day, contaminants can be dispersed quickly and concentrations from a given emission source can be lower than on days when there is little wind to move them. In the ACT, atmospheric inversions such as can occur on a calm still night may cause contaminants to be trapped by the landscape and consequently reach higher concentrations.

While there are no specific data on direct health impacts of air pollution in the ACT, a number of national and international studies have identified key health impacts of air pollutants. The most common of these are respiratory and cardiovascular disorders (both chronic and acute). However, understanding the health effects of air pollutants is complex because individuals vary greatly in their sensitivity to air quality. A concentration which may cause symptoms in one person may have no discernible effect on another.

The NEPM aims to reduce the health impact of airborne pollutants by setting standards to protect the community from adverse health impacts. Continuing to meet outdoor air quality standards in the ACT should help in managing the risk of health impacts associated with *local air quality*.

Indoor air quality

Little information is available on the quality or impacts of pollutants in indoor air. There is no specific information on indoor air quality publicly available in the ACT, although some private organisations may be able to provide data from years of monitoring. As with outdoor air quality, the quality of indoor air will depend on the sources of and nature of contaminants, the air flow in the area and the rate at which the contaminant is emitted.

Indoor air quality can be affected by:

- outdoor air entering and being distributed around the building;
- emissions from processes and equipment in the building (e.g. cleaning substances, furniture, printers);
- emissions from occupants (e.g. environmental tobacco smoke); and
- emissions from construction and finishing materials (e.g. foam insulation, asbestos).

A number of potential health impacts are associated with indoor air pollution, particularly respiratory disorders. However, as with outdoor air pollution, the linkages between indoor air pollution and human health are complex. Despite recommendations in several previous ACT State of the Environment Reports, there remains a lack of knowledge and data on indoor air pollution in the ACT.

Source: ACT Government

Responses and effectiveness

Following a recommendation in the *2007–08 ACT State of the Environment Report*, the ACT Environment Protection Authority released the first annual outdoor ambient ACT Air Quality Report in July 2010 (EPA 2010). That report provides information on air quality monitoring in the ACT, and the Territory's compliance with the NEPM for ambient air quality.

Mobile monitoring of ambient air quality has been recommended in several previous ACT State of the Environment Reports, for hotspots such as road intersections. However, as yet that recommendation has not been implemented.

There are national and ACT programs aimed at improving air quality. National work currently focuses on emissions of particles and the reagents that form ozone, from sources including wood heaters, small engines, surface coatings and non-road engines. National legislation governs standards for emissions from car exhausts. The introduction of the Green Vehicle Guide website (Commonwealth of Australia 2010) gives consumers information on cars' air contaminant emissions as well as their 'greenhouse gas' impacts.

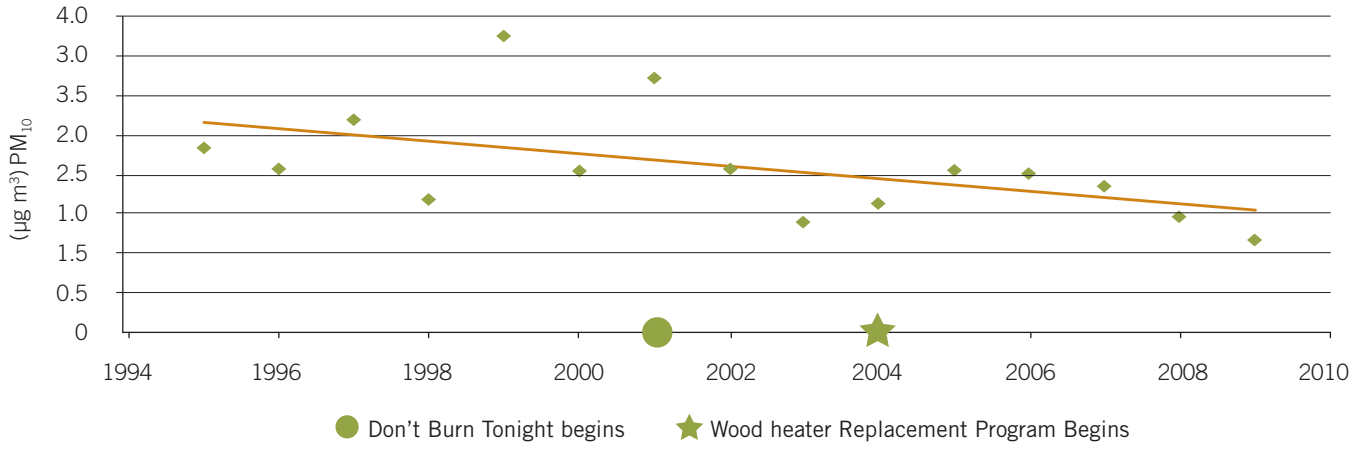
In the ACT, education and enforcement programs are in place to address the emissions of air pollutants from motor vehicles and wood heaters including:

- ACT Green Vehicles Duty Scheme – offers differential stamp duty costs for new vehicles based on their performance in relation to air pollution (and greenhouse gas emissions) (ACT Government 2008);
- Don't Burn Tonight – a campaign that encourages Canberrans to use alternative heating on cold still nights when smoke from household wood fires is unlikely to clear quickly;
- Wood Heater Replacement Program – a subsidy offered to eligible householders for replacing wood heaters with new mains-supplied gas heating.

Small reductions in carbon monoxide emissions over the reporting period are likely to be a result of the focus on lowering emissions from individual cars. However, total emissions are dependent on the number of vehicles on the road and the total distances travelled. Actions to reduce reliance on motor vehicles (see *Transport* indicator cluster for more information) are also likely to help improve outdoor air quality in the ACT.

Reduced particulate matter (PM10) has been noted in the long-term trend for the Tuggeranong Valley beginning in 2002 (Bridgman 2009).

Figure 1. Average daily particulate matter (PM10) emissions during winter, 1995–2009 (micrograms per cubic metre of air)



Source: Adapted from Bridgman 2009

The ACT Environment Protection Authority (EPA) recently reviewed existing programs aimed at reducing wood smoke in the ambient air of the Tuggeranong Valley. The review found that more could be done to reduce total emissions of smoke from household wood heaters. There is an Australian and New Zealand standard for particle emissions factors (AS/NZS 4013 – Determination of particle emissions factors), currently enforced in Tasmania, which makes it illegal under the Building Regulations for a dwelling to operate a non-certified wood heater. Implementation of such a regulation in ACT would expedite the removal of non-certified wood heaters and reduce the emission of wood smoke.

Air quality measurements for all new greenfield developments in the ACT can help ensure that potential future air pollutant issues can be identified and managed proactively. In some instances where this has been implemented, air quality management initiatives have been integrated with planning and development. For instance, crown leases in East O'Malley and Dunlop require written approval by the ACT Government for installation or use of solid fuel heating systems.

For *Indoor air quality*, a continuing lack of data for the ACT is limiting potential management of contaminants in workplaces and homes. ACT legislation now in place, banning cigarette-smoking in public buildings and licensed premises, can be assumed to have reduced environmental cigarette smoke concentrations and improved indoor air quality for many people. Contamination of indoor air in the workplace is managed under occupational health and safety legislation, but there is no equivalent legislation to address indoor air pollution in non-workplace environments. Structural elements and materials used in buildings in the ACT will also play a role in indoor air quality.

Emerging issues

The recent *Review of the National Environment Protection (Ambient Air Quality) Measure Discussion Paper Air Quality Standards* (NEPC 2010) improves the amount of information available on health effects of outdoor air pollution. Of concern are Australian studies identified in that report which indicate that health effects can occur when carbon monoxide, oxides of nitrogen, and ozone are at concentrations lower than the current NEPM Ambient Air Quality standards. For health effects in relation to particulate matter also, the report identifies that there is no threshold below which various health effects are not observed. This poses a significant challenge for proposing standards for particulate matter which would protect the community from potential health effects. This Report is soon to be reviewed by the Environment Protection and Heritage Council, and the review's recommendations will be prioritised and responded to through the development of the National Plan for Clean Air.

The good air quality enjoyed in the ACT is, in large part, because of the lack of heavy industry and concentrated high-density urban development, the relatively small population, and wind factors. Future increases in population and housing density have the potential to impact on the air quality in the ACT. Future climate scenarios with increased risk of fire and drought will also potentially affect the air quality of the ACT (see *Climate vulnerability* indicator cluster paper).

For *Indoor air quality,* the design and construction of modern buildings often make them better sealed than older buildings, with less air exchange between indoors and outdoors. Air or heat exchanges can improve indoor air quality, but there are currently no minimum air-flow standards.

Recommendations

1. To improve knowledge of our indoor air quality, the Chief Health Officer should consider the health impact of indoor air quality in the ACT in the 2014 Chief Health Officer Report.
2. Improve local air quality outdoors through:
   a. requiring air quality assessments in all new greenfield developments, to identify and manage air emissions potentially detrimental to human health and the environment;
   b. installing and operating a second performance air monitoring station to ensure the ACT is compliant with NEPM standards; and
   c. determining the feasibility, including costs, of mobile monitoring of appropriate ambient air quality NEPM standards at locations in and around Canberra.

References

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Other data sources

In addition to these published reports, data for this paper were also sourced from:

Environment Protection Authority, ACT Department of Environment, Climate Change, Energy and Water (DECCEW) – now Environment and Sustainable Development Directorate (ESDD).