



Local Government Air Quality Toolkit

Climate change impacts guidance note

Information on climate change impacts that can affect air
quality

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

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Artist and designer Nikita Ridgeway from Aboriginal design agency – Boss Lady Creative Designs, created the People and Community symbol.

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Environment Protection Authority and
Department of Climate Change,
Energy, the Environment and Water
Locked Bag 5022, Parramatta NSW 2124
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment and Heritage enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email info@environment.nsw.gov.au
Website www.environment.nsw.gov.au

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1. Introduction

1.1 Climate change overview and government response

This guidance note provides general information on climate change impacts that can affect air quality. It does not cover greenhouse gas inventory, carbon neutrality, carbon credits, net zero pathways or other aspects of climate change that are not directly related to air quality. However, it does point to some resources that provide information on these areas for councils.

The climate crisis is a global challenge. Efforts are needed at all levels of government, business and civil society to reduce the impacts of climate change through greenhouse gas emission reduction.

The Commonwealth Government takes a leading role in coordination of the national response to climate change.

Australia is party to the Paris Agreement, which came into force in 2016. It aims to strengthen the global response to the threat of climate change by:

- holding the increase in the global average temperature to well below 2°C above pre-industrial levels
- pursuing efforts to limit this temperature increase to 1.5°C.

In 2022, the Australian Government committed to a 2030 target to reduce greenhouse gas emissions by 43% below 2005 levels and to achieving net zero emissions by 2050. The *Climate Change Act 2022* sets out these targets.

In 2023, the NSW Parliament passed the *Climate Change (Net Zero Future) Act 2023*, which enshrines greenhouse gas emissions reduction targets in law in New South Wales, provides for the regulations to set additional interim targets, and also sets out an adaptation objective for New South Wales to be more resilient to a changing climate.

The NSW Climate Change Policy Framework sets out the NSW Government's long-term goal to achieve net zero emissions by 2050 and how it will make New South Wales more resilient and adapted to a changing climate (NSW Government 2024e).

The NSW Government has committed to cut 50% of greenhouse gas emissions by 2030 compared to 2005 levels, and to reach net zero emissions by 2050. These commitments are consistent with emissions reduction targets now enshrined in NSW law. The NSW Net Zero Plan is the foundation for New South Wales's action on climate change and achieving the State's net zero objective (NSW Government 2024c). Stage 1 of the plan (2020–2030) outlines the NSW Government's plan to grow the economy, create jobs and reduce emissions over the next decade. The plan is funded by a landmark \$2 billion agreement between the NSW and Commonwealth governments to reduce emissions and improve the reliability and affordability of electricity in New South Wales.

Adaptation plays a key role in reducing exposure and vulnerability to climate change. The NSW Government has also released the NSW Climate Change Adaptation Strategy (NSW Government 2022), which sets out the NSW Government's strategic approach for managing the impacts of climate change on the state. For further information, including how New South Wales is being affected by climate change, see the *AdaptNSW Climate change in NSW* webpage (AdaptNSW 2024a). The *AdaptNSW Local councils and authorities* webpage (AdaptNSW 2024b) also offers a range of resources, tools and information to help councils and authorities prepare climate change adaptation plans.

The NSW Environment Protection Authority's (EPA) *Climate Change Policy* (EPA 2023b) and *Climate Change Action Plan: 2023–26* (EPA 2023a) outline a comprehensive regulatory approach and set of actions to address the causes and consequences of climate change in New South Wales. They support and build on the NSW Government's climate change policies and initiatives, helping industry to decarbonise and build greater preparedness and resilience to climate change risks. Actions include establishing emission reduction targets for key industry sectors and supporting licensees to prepare and implement climate change mitigation and adaptation plans.

Councils play an important role in supporting the EPA to protect the environment from the threat of climate change, and in supporting the NSW Government's net zero commitments. Councils have many roles – they can be consent authorities, co-regulators of environmental legislation, community leaders and advocates, and licensees (e.g. as operators of waste facilities and sewage treatment plants).

Councils can implement actions to reduce greenhouse gas emissions, such as investing in low-carbon urban infrastructure and services such as energy efficient LED streetlights, electric vehicle charging stations, using low emissions equipment, using recycled road construction materials, enabling cleaner transport such as cycle lanes, and increasing tree canopy coverage. Councils can also implement actions to help build community resilience to a changing climate, such as street tree planting to lower surface temperatures and reduce residential energy consumption, designing or retrofitting playgrounds to be sun safe and heat smart and creating cool refuges in local community centres. Further examples of adaptation actions councils are taking can be found on the Local Government NSW *Climate change case studies* webpage (LGNSW 2023). By integrating climate change adaptation into local council and authority operations now, costly damages to property, infrastructure, farmland, livelihoods and our health and wellbeing can be minimised into the future.

Some councils have set net zero targets and have adaptation plans and are working on strategies to implement them.

1.2 Climate change impacts on air quality

Climate change impacts are many and wide ranging, from ecosystem collapse to sea level rise. Climate change brings an increased frequency and extent of extreme events such as bushfires and dust storms. This will result in significant emissions of smoke, particulates, products of partial combustion, and associated odour that can occur over large areas and populations. Climate projections show that droughts in New South Wales will become more severe and last longer.

One of the most significant climate change related air quality impact events in Australia to date was the 'Black Summer' bushfire season of 2019–2020. The 2019–2020 'Black Summer' bushfires were extreme and unusual, even for a fire-prone region like Australia. These fires were reported to have burnt over 18 million hectares, destroyed over 3,000 homes and were estimated to have contributed to over 400 smoke-related premature deaths across eastern Australia. The fires covered large areas of eastern Australia with smoke, with New South Wales being the worst-affected state (Figure 1). At the time, 2019 was Australia's warmest and driest year on record.

Smoke from bushfires contains a range of pollutants associated with both the complete and incomplete combustion of the biomass. Each of these can have adverse health impacts. These pollutants include carbon monoxide and particulates of varying composition (respirable and inhalable). The fine particles consist of black carbon (that is, soot) and other material formed through the incomplete combustion process of the biomass, such as the group of chemical compounds generally referred to as polycyclic aromatic hydrocarbons (PAHs), which may also adhere to the soot particles.

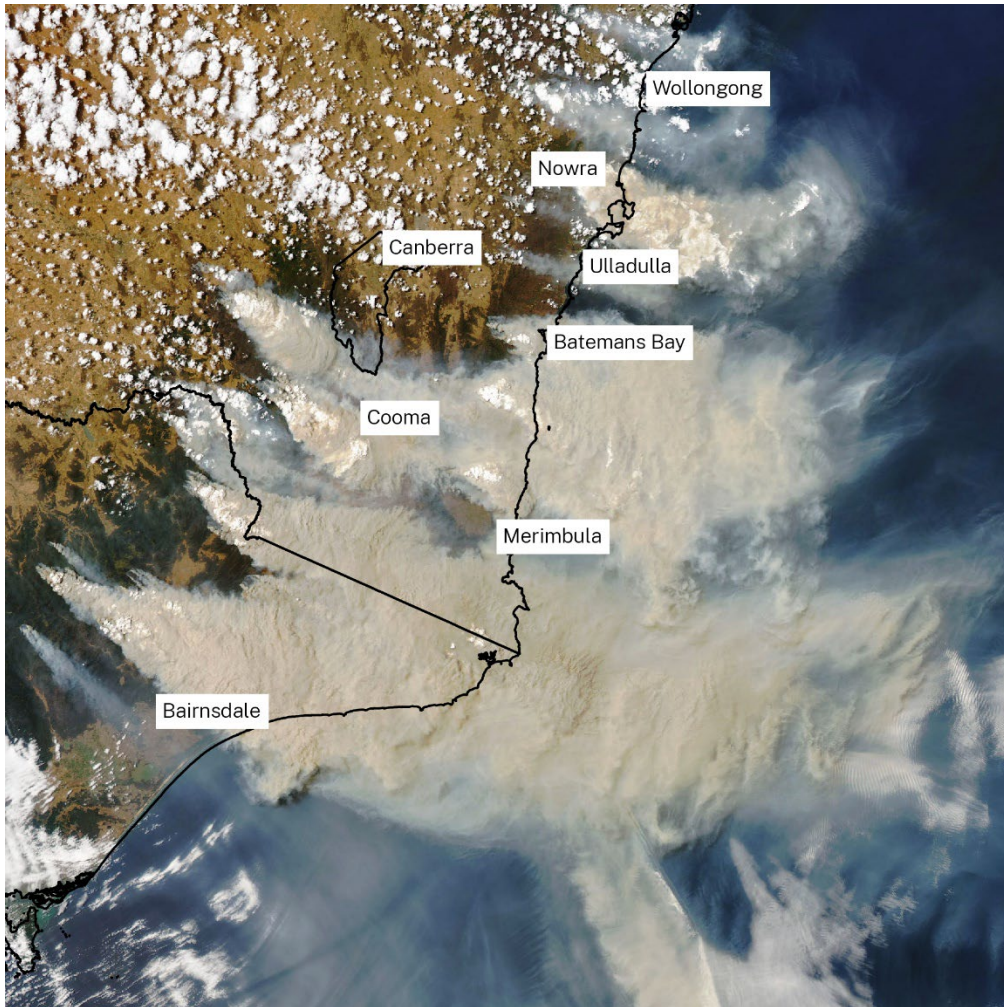


Figure 1 **Satellite imagery of the smoke plumes engulfing south-eastern Australia on 4 January 2020**

Source: NASA Earth Observatory (2020)

Fine particulate emissions from bushfires are linked to adverse health impacts and sensitive groups such as people with asthma, children and older adults may be more affected. Periods of protracted drought can also cause increases in regional particulate matter concentrations and dust management challenges and storms, impacting on health and infrastructure. Longer warm seasons can mean longer pollen seasons, which can increase allergic sensitisations and asthma episodes.

Ground-level ozone (or photochemical smog) is a secondary pollutant formed from chemical reactions of precursors NO_x and VOCs. Oxone is a powerful oxidant that can generate tissue damaging molecules. With increasing temperatures induced by climate change, ground-level ozone concentrations are likely to rise. An increase in ground-level ozone will contribute to incidences of respiratory episodes. Reducing NO_x emissions will help limit the formation of ground-level ozone.

For further information about climate change and health impacts, please refer to the NSW Health *Climate change and health* webpage (NSW Health 2023b).

Actions by state and local governments to support net zero and emissions reduction targets will help deliver air quality benefits through reduced air emissions from power generation, transport, industry and businesses.

2. Managing air pollution exposure

2.1 Management options

Many communities are already addressing climate-sensitive health issues. When it comes to managing the health threats associated with air quality, a variety of effective options are available.

Information and advice to manage community and personal exposure

The NSW Department of Climate Change, Energy, the Environment and Water (the department) operates a state-wide air quality monitoring network that provides up to date information about air quality (NSW Government 2024a), as well as a healthy activity guide that provides general health advice and recommended actions based on the air quality category (NSW Government 2024b). The department's Community DustWatch program uses community volunteers to record data and observations about dust in their local area in regional New South Wales, which provides early warning for dust storms (DCCEEW 2023).

The department also produces an air quality forecast for Sydney's metropolitan region at 4 pm every day, and people can subscribe on the department's website (NSW Government 2024d).

Air quality information and forecasts are important for decision-making on air quality management and can help individuals reduce their exposure by altering the type and location of their physical activity.

NSW Health provides advice on bushfire response and recovery with steps to decrease risk from bushfire smoke, and targeted advice for parents and childcare centres (NSW Health 2023a).

Cleaner air spaces

A cleaner air space (or clean air shelter) is an indoor space that aims to reduce exposure to outdoor air pollution, such as particulate matter produced by bushfire smoke, elevated dust levels or dust storms. Any reduction in exposure can help reduce asthma symptoms or other respiratory issues.

Cleaner air spaces can either be designed within homes, or at a community level.

In a domestic context, a cleaner air space can be made using a well-sealed room with limited doorways or windows to the outside. If air conditioning is present, this should be switched to 'recirculate' so it is not bringing the outside air in.

A portable air cleaner/purifier can help remove particulate matter. Air purifiers that filter a minimum of 95% of particles and have a high-efficiency particulate air (HEPA) filter will be the most effective. Portable air purifiers are generally only effective for use in isolated spaces and cannot clean the air across a whole house.

Alternatively, buildings such as libraries, community centres, shopping centres/malls and schools may be identified by local government as cleaner air spaces to be used as public spaces where people can seek relief from extreme air quality events like bushfires.

As the frequency and duration of climate change related air quality impacts increase, the use of cleaner air spaces is likely to become more mainstream.

3. Considerations for local councils

The NSW Government offers a range of resources, tools and information to help councils consider climate risks and build resilience, which are available via the *AdaptNSW Local councils and authorities* webpage (AdaptNSW 2024b). This includes climate change projections for New South Wales and each region of the state, to understand regionally specific climate change impacts.

A few areas for consideration by councils in relation to climate change and air quality are:

- **Facility and industry** – Dust and odour management guidance notes, such as the Local Government Air Quality Toolkit – *Construction sites guidance note* and *Beef cattle feedlots guidance note*, provide information that may be useful to councils on how to manage dust and odour issues that may also arise due to a drier and hotter climate.
- **Pollution from extreme events** – The department’s air quality data can be used to understand air quality concentrations and respond to local impacts. Identification of cleaner air spaces (see ‘Cleaner air spaces’ above) will help reduce community exposure.
- **Green infrastructure** – Parks, open spaces, tree canopies and other green infrastructure reduce the effect on the community from increasing temperatures due to climate change. They also contribute by reducing air pollution, assisting in climate change adaptation and improving community health and wellbeing.
- **Net zero** – Net zero actions by councils such as cleaner transport and equipment, reduced energy use, and improved built environments can bring air quality co-benefits. Councils should consider and where possible quantify air quality benefits when considering measures to reduce greenhouse gas emissions. For example, City of Sydney has a sustainable fleet management program that will reduce exhaust air emissions through cleaner vehicles and retrofitting older trucks, as well as reduce non-exhaust air emissions through diverting vehicle travel to public transport or bicycles (see *Climate change case studies* webpage (LGNSW 2023)).
- **Soil management** – Soil degradation is not only costly for the economy, it also has significant impacts on air quality through wind erosion, which can be worsened by drought. The Community DustWatch program monitors wind erosion and helps care for land and soil as well as providing information and warnings about dust storms (DCCEEW 2023).
- **Building design** – Proper design of buildings can reduce energy demand and greenhouse gas and associated air emissions; for example, controlling light and heat from the sun to reduce heating and cooling needs. The National Australian Built Environment Rating System (NABERS) provides guidance for estimating and rating environmental performance of buildings (NABERS 2024), while the Building Sustainability Index (BASIX) standards are requirements that apply to all residential dwellings as part of the development application process (BASIX 2024).

The Environmental Health Standing Committee *Guidance for public health agencies* encourages local governments to identify and maintain a list of suitable facilities that could provide cleaner air spaces if needed and to develop plans for communicating and activating their use in periods of poor air quality (enHealth 2022b).

The Victorian State Government has published guidance for local government to support the community when air quality is heavily impacted by smoke, with considerations for councils on cleaner air spaces. The Victorian guidance also acknowledges that local governments could also assist in the planning and development of cool spaces earmarked for respite during periods of extreme heat (Department of Health Victoria 2024).

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All documents and webpages that are part of the Local Government Air Quality Toolkit are available from the EPA website.

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