

Proposal to vary the National Environment Protection (Ambient Air Quality) Measure in relation to the standards for ozone, nitrogen dioxide and sulfur dioxide

Question and answer fact sheet

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Australia's air quality

Q1. What is the current status of Australia's air quality?

Australia's air quality is good by international standards and annual average concentrations of ambient pollutants are generally below current air quality limits. Improvements to Australia's air quality over the past decade have been achieved through strengthening ambient air quality standards, fuel quality standards, vehicle emission standards and state-based action, such as controls on industry.

It is still important to minimise air emissions and exposure to air pollution. The latest science shows that health impacts from some pollutants can occur at lower concentrations than previously thought.

Q2. Are further air improvements necessary given that we already enjoy relatively good air quality in Australia?

Recent international studies show that the effects of air pollution on human health are observed below current pollutant concentration levels. Further reducing ambient air pollution will result in substantial health and economic benefits.

Over the past few decades ambient concentrations of some pollutants have decreased in most jurisdictions. However, this is likely to be reversed in the future due to growth in Australia's population, economic activity, and a warming and drying climate. Any increase in population exposure will increase the incidence of adverse health outcomes and the associated economic costs of air pollution to society.

Ambient Air Quality National Environment Protection Measure (AAQ NEPM)

Q3. What is the AAQ NEPM?

The AAQ NEPM is an instrument established in 1998 under the *National Environment Protection Act (1994)* (NEPC Act) to provide a nationally consistent framework for monitoring and reporting on six common ambient air pollutants – carbon monoxide (CO), lead, nitrogen dioxide (NO₂), photochemical oxidants (ozone or O₃), sulfur dioxide (SO₂) and coarse and fine particulate matter (PM₁₀ and PM_{2.5}). It was varied in 2016 to strengthen particulate matter standards.

Jurisdictions monitor and report against the air quality standards and goals for each of the pollutants. The standards and goals aim to guide policy formulation that allows for the adequate protection of human health and wellbeing.

However, the AAQ NEPM does not compel or direct pollution control measures – it is up to each jurisdiction to determine what these should be. Each jurisdiction implements the AAQ NEPM through its own legislation, is required to allocate sufficient resources to enact the AAQ NEPM and must report annually on its implementation.

Q4. Why do we need the AAQ NEPM?

The AAQ NEPM provides a harmonised national framework for all Australian jurisdictions to monitor and publicly report on common ambient air pollutants. It ensures people enjoy equivalent protection from air pollution and removes potential conflicts or inconsistencies between individual state and territory-based approaches, as all jurisdictions are subject to identical criteria.

Jurisdictions may use the AAQ NEPM standards in legislation or guidance (e.g. design goals, licence conditions, planning instruments) to manage air quality and emissions from specific sources.

The AAQ NEPM standards are based on health evidence of the impacts of air pollutants available when they are set. They are designed to minimise the risk of adverse health impacts from exposure to air pollution, while being realistically achievable in jurisdictions with a focus on metropolitan regions, where the majority of Australia's population resides.

AAQ NEPM review

Q5. Why is the AAQ NEPM being reviewed again when it was recently reviewed for particles?

Standards need to be periodically reviewed to consider the latest scientific evidence as health research on the impacts of pollutants continues to evolve and new findings emerge.

The particle standards (PM₁₀ and PM_{2.5}) in the AAQ NEPM were recently reviewed and varied to reflect the latest scientific evidence at that time. The particle standards were prioritised first given the strong evidence associating particle exposure with adverse human health impacts and that there is no clear particle pollution concentration below which health effects do not occur.

Environment Ministers agreed that the next priority is the review of the O₃, NO₂ and SO₂ standards.

Q6. When will the lead standard be reviewed?

The AAQ NEPM was reviewed and a report released by Environment Ministers in 2011. This recommended removing the ambient air quality standard for lead from the AAQ NEPM and putting it into the Air Toxics NEPM (when it was next revised).

Lead no longer meets the definition of 'criteria' pollutant. Following the removal of lead from motor vehicle petrol there have been significant reductions of lead in ambient air and it is no longer widespread in the environment. It remains a potential risk at some specific industrial sites, which are addressed through jurisdictional controls such as licence conditions.

Q7. When will the carbon monoxide standard be reviewed?

The 2011 Australian State of the Environment Report indicates that:

- Apart from vegetation burning and wildfires, motor vehicles are the main source of carbon monoxide (CO);
- levels of CO have declined significantly over the last two decades due primarily to strengthened vehicle standards requiring the fitting of catalytic converters to exhaust systems of new vehicles and legislated phase-out of leaded fuel; and
- current peak CO levels in all regions are less than one-third to one-fifth of the national standard.

The current AAQ NEPM standard for CO is 9ppm with an 8-hour average which is below the current World Health Organisation (WHO) guideline of 10ppm.

WHO is in the process of updating its Air Quality Guidelines and anticipates updated numerical concentration limits for PM₁₀, PM_{2.5}, O₃, NO₂, SO₂ and CO¹. Environment ministers will determine whether to further review AAQ NEPM standards, including for CO, following the release of the WHO guidelines later this year.

¹ WHO 2017, Evolution of WHO air quality guidelines: past, present and future, p27, http://www.euro.who.int/__data/assets/pdf_file/0019/331660/Evolution-air-quality.pdf?ua=1

Q8. The AAQ NEPM standards for O₃, NO₂ and SO₂ were first established in 1998. Why has it taken so long to review them?

The review process is comprehensive and carefully assesses economic, environmental and health impacts of changing standards. It includes the development of and public comment on a comprehensive Impact Statement detailing these outcomes.

Reviewing particle standards was prioritised first given the strong evidence associating particle exposure with adverse human health outcomes and that there is no clear threshold of particle pollution below which health effects do not occur.

The review of the O₃, NO₂ and SO₂ standards commenced immediately after the particle review was completed in early 2015.

Q9. What is the purpose of the Impact Statement to vary the AAQ NEPM O₃, NO₂ and SO₂ standards?

The Impact Statement is required as part of the statutory process to vary a NEPM and provides an opportunity for the community to review and comment on the supporting evidence to vary the AAQ NEPM O₃, NO₂ and SO₂ standards. It presents options for tighter national monitoring and reporting standards for these pollutants.

Online submissions are preferred and can be made via: nepc@environment.gov.au

Written submissions may also be sent to:

Adam Carlon, NEPC Executive Officer
National Environment Protection Council
Department of the Environment and Energy
GPO Box 787
Canberra ACT 2601

The closing date for submissions is Wednesday 7 August 2019.

The submissions will be considered when developing the final recommendation to NEPC to vary the AAQ NEPM. A summary of submissions will be prepared considering all responses and made available via the NEPC website.

O₃, NO₂ and SO₂ standards

Q10. What does the Impact Statement propose for the O₃, NO₂ and SO₂ standards?

The Impact Statement outlines, for public consideration, options for changes to the AAQ NEPM. The major proposed changes relate to:

- Modernising the outcome and goal of the AAQ NEPM;
- Introducing an O₃ 8-hour standard and strengthening four NO₂ and SO₂ standards; now, and again in 2025 for three of the standards;
- Removing three existing standards, which are not necessary to adequately protect human health;
- Introducing an exposure reduction framework for NO₂ and ozone to drive reductions in population exposure and health risk; and
- an exceptional events rule for O₃ to reflect its production in bushfires.

The recommended standards have been identified by considering health impacts, other leading international standards including WHO, the achievability of the standards, any regional differences and economic and societal costs and benefits of meeting the standards.

Summary of recommendations

Aspect	Metric	To be included in AAQ NEPM?	Current numerical value	Numerical value commencement of varied NEPM	Future standard by 2025	Form of standard
Air quality standards	SO ₂ – 10 minute	No	–	–	–	–
	SO ₂ – 1 hour	Yes	200ppb	100ppb	75ppb	No allowable exceedances
	SO ₂ 24 hour	Yes	80ppb	20ppb	–	No allowable exceedances
	SO ₂ annual	No	20ppb	–	–	–
	NO ₂ – 1 hour	Yes	120ppb	90 ppb	80 ppb	No allowable exceedances
	NO ₂ - annual	Yes	30ppb	19 ppb	15 ppb	No allowable exceedances
	O ₃ – 1 hour	No	100 ppb	–	–	–
	O ₃ – 4 hour	No	80 ppb	–	–	–
	O ₃ - 8 hour	Yes	–	65 ppb	–	No allowable exceedances

Recommendations related to the AAQ NEPM

1	Environmental outcome	The desired environmental outcome of the AAQ NEPM should be revised to 'minimise the risk of adverse health impacts from exposure to air pollution for all people, wherever they may live'.
2	Environmental goal	The goal of the AAQ NEPM should be revised to make reference to the air quality standards and incorporation of exposure-reduction targets for priority pollutants.
16, 24	Annual reporting of population exposure	Jurisdictions should also commence reporting on population exposure to NO ₂ annually from the commencement of a varied AAQ NEPM. Jurisdictions should commence reporting on population exposure to O ₃ from the commencement of a varied AAQ NEPM.
18	Record and report 1 – hour O ₃ concentrations	Jurisdictions should continue to record and report 1-hour O ₃ concentrations.
20	8 – hour O ₃ standard review in 2025	The 8-hour standard should be reviewed in 2025, with the option of reducing it once there is a better understanding of O ₃ generation in capital city airsheds.
22	Exceptional event rule for O ₃	An exceptional event rule should be implemented for O ₃ , defined in a way that is consistent with the approach for PM ₁₀ and PM _{2.5} in the AAQ NEPM.
23	Exposure reduction framework for O ₃	An exposure-reduction framework, in the form of a long-term goal for O ₃ , should be considered to reduce population exposure and associated health risk once there is a better understanding of O ₃ generation in capital city airsheds.

Further details are available in Chapter 10 of the Impact Statement.

Q11. Why is it recommended to remove the annual SO₂ and 1 and 4 - hour O₃ standards?

The main health effects from SO₂ are short-term. WHO advises an annual guideline is not needed since compliance with a 24-hour level will assure low annual average levels. Many international jurisdictions have already revoked this standard and are focusing on implementing shorter-term standards.

The 1 and 4-hour O₃ standards are not recommended by WHO or used in most international jurisdictions. The 8-hour standard appropriately represents daily exposure levels and risks. WHO has not found any evidence that setting a 1-hour standard provides any additional health protection and advises that the 8-hour guideline would also protect against acute 1-hour exposures.

Q12. Are the recommendations for the SO₂, NO₂ and O₃ standards in line with international standards?

A comparison of recommended standards with WHO and a range of international standards is provided in the Table below. More detail is provided in [Appendix A](#).

Standard	International standards (ppb)	Current standard (ppb)	Recommended standards (ppb)	
			At commencement of varied NEPM	Future standard by 2025
SO ₂ 1-hour	USEPA 75 Canada 70a, 65b EU 124	200	100	75
SO ₂ 24-hour	WHO 7 EU 44 UK 44	80	20	–
SO ₂ 1-year	Canada 5a, 4b	20	No standard	
NO ₂ 1-hour	WHO 97 USEPA 100 EU 97 UK 97	120	90	80
NO ₂ 1-year	WHO 19 USEPA 53 EU 19 UK 19	30	19	15
O ₃ 1-hour	NZ 70	100	No standard	
O ₃ 4-hour	None	80	No standard	
8-hour	WHO 47 USEPA 70 Canada 63a, 62b EU 56 UK 47	No current standard	65	–

Q13. What will the revised SO₂, NO₂ and O₃ standards mean for public health?

This Impact Statement found that there are health effects arising from exposure to O₃, NO₂ and SO₂ in Australian cities at the current concentrations. The associated combined health costs due to mortality and hospitalisation over 2010-2014 were of the order of \$562 million to \$2,405 million.

The Impact Statement shows there are material health benefits associated with meeting the recommended standards.

Q14. What other changes to the AAQ NEPM are proposed in the impact statement?

Changes to clause 14 (number of performance monitoring stations) and some additional definitions for *population at risk* and *high risk areas* are proposed to provide a strengthened focus on risk. Further information on this change can be found in Chapter 1.5.3.2.

Removal of the maximum allowable exceedances for CO is also proposed, as:

- allowable exceedances for O₃, NO₂ and SO₂ are proposed to be removed
- The levels of CO across Australia have been continuously low over the past decade and allowable exceedances have not been needed.
- CO is likely to remain low for the foreseeable future.

Q15. I live in an area that is impacted by air pollution. How will changes to the AAQ NEPM improve air quality for me?

The AAQ NEPM provides national standards for jurisdictions to monitor and publicly report on air pollution. Changes to the standards will provide more stringent targets, which jurisdictions may consider implementing.

Proposed changes to the AAQ NEPM are based on the latest scientific evidence and are intended to drive reduced population exposure to these pollutants and thereby reduce the risk of health impacts.

The proposed exposure reduction framework for NO₂ and O₃ seeks a continued reduction in exposure to air pollution, even if standards are met, to continually drive air quality improvement across all communities.

Emissions from point sources, such as industrial facilities, that affect a localised area are addressed by state based arrangements, such as works approvals or licence conditions imposed on industry to keep emissions at acceptable levels.

Air quality standards generally

Q16. Why aren't the Australian standards made enforceable?

Performance against the AAQ NEPM is not enforced by NEPC.

Australia's air quality is relatively good. This good air quality result is achieved through the current AAQ NEPM arrangement. Its lack of enforceability is not an impediment to further air quality improvement.

Q17. How are jurisdictions held accountable for poor air quality?

Under the NEPC Act, accountability for meeting the standards lies in public reporting. Jurisdictions are required under the AAQ NEPM to report on the implementation and effectiveness of the AAQ NEPM to the National Environment Protection Council (NEPC) each year. Reports must include an evaluation of performance at each monitoring station against the AAQ NEPM standards and goals, comprising an analysis of the extent to which the standards are met, a statement of progress made towards achieving the goal, and a description of the circumstances that led to any exceedances of the standards, including the influence of natural events and fire management.

Exceptional events

Q18. The Impact Statement considers excluding 'exceptional events' when assessing compliance with the ozone standards. How are exceptional events being defined?

An 'exceptional events' rule was introduced with the particles review and allows jurisdictions to exclude natural events like bushfires and dust storms when assessing compliance with air quality standards so that attention could be focused on air pollution sources that can be realistically managed.

An exceptional event is an occurrence that adversely affects air quality at a particular location, and causes an exceedance of 1-day average particles standards in 8-hour O₃ standards excess of normal historical fluctuations and background levels,

It is directly related to bushfire; jurisdiction authorised hazard reduction burning; or continental scale windblown dust.

Bushfires are a natural source of O₃ precursors (nitrogen oxides and volatile organic compounds) that can react to form O₃ at concentrations that exceed the current standards. Bushfires can have a significant impact on ozone concentration exceedances.

Q19. Why are exceptional events not proposed for SO₂ or NO₂ exceedances?

There is no evidence that bushfires, hazard reduction burns or agricultural burning lead to elevated SO₂ or NO₂ levels.

Emissions reduction measures

Q20. How will the revised SO₂, NO₂ and O₃ standards be achieved?

Meeting the standards requires consideration of the introduction of new abatement measures at both national and jurisdictional levels. Abatement measures can reduce emissions, ambient concentrations and/or exposure.

Nationally, measures to reduce emissions from non-road spark ignition engines (as used in lawnmowers, handheld garden equipment and outboard marine engines) have recently been introduced and target reductions in precursors of O₃.

New measures to improve fuel standards to ensure access to the latest vehicles and health benefits to the community from cleaner air have been announced. This will include reducing sulfur in petrol to 10 parts per million from 1 July 2027.

The potential for a national approach to manage non-road diesel engine emissions is being evaluated under the National Clean Air Agreement. Non-road diesel engines (as used in construction and mining equipment, cranes, forklifts, generators, etc) contribute to PM and NO_x emissions.

Shipping is a major source of sulphur dioxide emissions. From 2020, international convention limits of 0.5 per cent sulphur limit will apply, further decreasing sulphur dioxide emissions and providing cleaner air in the environs of ports and shipping lanes.

Appendix A: Comparison of recommended standards with international standards and guidelines

The World Health Organisation (WHO) has established health-based air quality guidelines for the most common ambient air pollutants. These guidelines provide for an adequate level of human health protection and are based solely on health considerations. WHO recognises that individual countries will need to balance health risks, technological feasibility, economic and social considerations when converting the guidelines to standards.

The options for standards presented in the Impact Statement are based on international guidance (e.g. from the WHO, United States Environmental Protection Agency) but are informed by Australian conditions, including natural background and current air quality trends.

WHO has 10 minute and 24-hour guideline values for SO₂ of 175 ppb and 7 ppb respectively. It is not intended to introduce a 10-minute SO₂ ambient standard in the AAQ NEPM. Air quality data in Australia indicate that, in general, SO₂ levels are low, with short-term peaks only experienced at locations close to major sources of SO₂ that are not covered by the AAQ NEPM. A similar situation exists in other leading countries, and a number of international agencies have not set a 10-minute standard. Based on the weight-of-evidence approach, it is therefore considered appropriate to retain the status quo, with the 10-minute SO₂ standard being excluded from the AAQ NEPM, and with concentrations being managed through State environment legislation and frameworks.

WHO does not have a 1-hour SO₂ guideline but the recommended value of 100ppb when the AAQ NEPM variation commences with a reduction to 75ppb in 2025 is consistent with other international agencies.

The 7 ppb 24-hour SO₂ guideline was assessed in the impact statement and was found to have relatively low additional health benefits and be very uneconomic to achieve. The recommended standard of 20ppb is likely to be achievable, be significantly more stringent than international standards and will have material health benefits.

The recommendation to remove the annual SO₂ standard is consistent with WHO advice that an annual guideline is not needed since compliance with a 24-hour level will assure low annual average levels.

WHO has a 1-hour NO₂ guideline of 97 ppb and an annual NO₂ guideline of 19 ppb. The recommendations for NO₂ in the Impact Statement are more stringent or equal to the WHO guideline and more stringent than leading international agencies. The recommendations for the 1-hour NO₂ standard are 90 ppb when the AAQ NEPM is varied moving to a 1-hour standard of 80 ppb in 2025. The recommendation for the annual standard is for 19 ppb when the AAQ NEPM is varied moving to an annual standard of 15 ppb in 2025.

As O₃ forms in the presence of sunlight, tighter O₃ standards are more likely to be adopted in colder climate countries where O₃ formation potential is lower. WHO has an 8-hour O₃ standard of 47 ppb. The AAQ NEPM currently has O₃ standards with averaging periods of 1 and 4 hour. The recommendations are consistent with WHO – to have an 8-hour O₃ standard only. The numerical value proposed (65 ppb) is higher than the WHO guideline and EU and UK standard, similar to Canada and stricter than the US. The difference between these standards also reduces once the form of the standard and allowable exceedances is considered.

All mainland jurisdictions do not always meet the existing two O₃ reporting standards during summer. The proposed revised ozone standard sets a single reporting standard in line with WHO guidance and leading jurisdictions. However, all mainland jurisdictions, will likely continue exceed the recommended O₃ standard, particularly during summer. To address this issue, the report recommends better understanding of O₃ generation in capital city airsheds to enable improved O₃ mitigation strategies. Continued pursuit of the recommended standard is warranted to drive achievable improvements in health.

It is also recommended that jurisdictions continue to record and report 1-hour O₃ concentrations in the future and use this information to provide quick community health alerts in conjunction with an 8-hour standard.

It is not straightforward to interpret numerical comparisons of standards and they do not necessarily mean Australian standards are more stringent. For example, to a large degree, the lower standards in Australia are made possible by relatively low natural background concentrations and the absence of significant trans-boundary pollution which is a major issue in Europe.