

Submission on Draft Variation to the National Environment Protection (Ambient Air Quality) Measure for PM

Introduction

The Clean Air Society of Australia and New Zealand (CASANZ) is a non-government, non-profit organisation that brings together professionals working across a broad range of air quality management fields.

Formed in 1966, CASANZ members have been intimately involved with the evolving management of air quality in Australia and New Zealand. CASANZ members work in all levels of government, conduct research in Universities and CSIRO, are equipment suppliers and manufacturers, and are air quality consultants.

The Society performs important roles in information and technology transfer, and training. The Society's goals are listed in Appendix 1.

General observations and comments

This submission is based largely on the material provided in the impact statement and supporting documentation. It draws on the Society's members who have expertise and qualifications in relevant aspects of epidemiology, health standards, pollution behaviour, pollution measurement and protective measures.

CASANZ notes and comments as follows:

There is increasing evidence confirming the long held conclusions of health professionals that exposures to ambient levels of PM₁₀ and PM_{2.5} have serious health consequences including premature death. Further, there does not appear to be a threshold of effect and the level of health damage is linearly related to the exposure level. It is therefore not possible to provide total protection from the effects of exposure to anthropogenic emissions of PM since there is a limit to the level of emission controls that are possible and achievable in practice.

It is however possible to limit the health impacts of PM exposure by establishing ambient standards for PM and controlling sources of emissions to achieve the standards. The NEPM standards under review provide the standards for Australia. The PM₁₀ standard was set in 1998 and has not been varied since. The advisory reporting standard for PM_{2.5} was added in 2003 and also has remained static since. A statutory review of the NEPM occurred in 2011 when a number of recommendations were made and a priority for action established. It is clear that altering standards is a lengthy and difficult process and it can therefore be confidently predicted that any varied standard will survive for a long time. It is therefore essential that standards reflect not only what can be immediately achieved, but also what may be achieved with future developments and action.

A number of alternate standards have been ruled out in the impact statement as not being feasible to meet through the application of what are largely national measures, or not possible because of natural background levels as well as the formation of secondary particles. The main rationale for making this assessment is the historical trends in measurements. Other reasons include the potential difficulties for some jurisdictions to meet these standards, the difficulties in applying non-national emission control measures, and reducing secondary aerosols that are not amenable to control by direct particle reduction measures. The cost benefit analysis (CBA) therefore excluded these alternatives.

The logic for excluding these alternate standards from the CBA is questionable, given that local control measures do exist, emission control methodologies are developing, and secondary aerosol reductions to some extent are possible via controls on precursor emissions. Historical trends in measurements are also not a good indicator of what can be achieved in the future if appropriate incentives for action are provided. As an example of trends in standards, the US EPA has lowered the primary standards for NO₂ and ozone in the last few years, and WHO lowered the ozone guideline value in 2005. The likely move to tighten Australian ambient standards for NO₂ and ozone, in line with overseas trends, will require reductions in precursor emissions, and would result in reduced secondary aerosol formation. This would increase the feasibility of achieving more stringent particle standards.

It therefore does not appear warranted at this stage of the process to preclude some potential standards in the absence of a more thorough investigation of control measures that may be available or are in development and may be applied to achieve lower standards, regardless of whether national or jurisdictional controls would be necessary. As an example, phasing out of wood heaters, a measure supported by the NSW Chief Medical Officer for built-up urban areas, has been shown in the CBA report to have large benefits in net present value (NPV) terms when compared to the application of national wood heater efficiency measures only. This has however not been considered in the overall evaluation of costs and benefits.

Cost Benefit Analysis Assumptions

The CBA is stated to be conservative, i.e. the net benefit is likely to be understated for a number of reasons, including assumed constant value for secondary particles, non inclusion of all feasible measures, and ignoring co-benefits of associated emission reductions in other pollutants from measures taken to reduce PM. Of more significance for the “conservatism” in the estimates are some of the assumptions explored in the CBA sensitivity analysis.

The largest sensitivity is to the discount rate used. The CBA has applied a 7% discount rate as the basis for the impact assessment, resulting in a positive NPV of \$6.5 billion from meeting a PM_{2.5} annual standard of 8µg/m³ for example. At a 3% discount rate the NPV benefit would be \$33 billion. Similarly, if the impact pathway method for assessment of health benefits is used instead of the damage cost approach adopted in the CBA, the NPV benefit would increase by more than \$8.6 billion.

The impact pathway method has been used in the UK, Europe and the US but was not used in the current CBA partly because of its “computational intensity”. Based on the sensitivity analysis, one can conclude that the net benefits of implementing proposed standards are likely to have been understated by a large margin.

It is also unfortunate that NPV benefits (positive or negative) of applying measures other than national measures (at least those judged as non feasible) have not been calculated to provide a complete picture of the choices.

Natural Exceptional Events Rule

Natural events can lead to elevated pollutant levels. These events while generally seasonal and predicted to increase due to climate change are also largely unpredictable on a year to year basis. It therefore seems sensible that natural events should be considered in assessing and reporting on progress in achieving ambient air quality standards. Any method of accounting for this by way of a fixed numerical allowance or as a percentile of measured values is however largely arbitrary. A more appropriate assessment would appear to be via a clear definition of natural events and a methodology for accounting for their impact in the assessment of compliance.

Averaging Times

It is suggested that for pollutants that have standards with different averaging times the standards should be set so that, as far as is practicable, they are statistically equivalent, so that one or the other does not become the determining standard, i.e. is more difficult to achieve. Using a percent compliance approach is proposed as a method that assists in reaching this equivalence. In our view, there is no strong reason for the standards with different averaging times to be equivalent, provided that the two standards have independent health effects. The relationship between different averaging times is a function of source distribution and characteristics, and meteorology and these will be different for different regions. Meeting the more statistically stringent standard may make the less stringent standard superfluous in a particular region but this may be reversed in another region. As long as standards with different averaging times are needed, then the fact that they are statistically different in stringency is irrelevant, and varying the percent compliance should not be used to manipulate statistical equivalence.

Monitoring

It is self evident that exposure assessment will require monitoring systems that are representative of population exposure and exposure situations. The current NEPM monitoring requirements appear to focus on making measurements that are representative of the general population. This excludes consideration of a number of exposure situations where higher than average pollutant levels are present and hence higher exposures occur. The most obvious and ubiquitous example is exposures in the vicinity of major roads and freeways where a substantial number of people are exposed to higher pollutant levels. It is not clear that the concept of generally representative upper bound (GRUB) stations adequately covers such situations.

If an exposure reduction approach were to be adopted, a more inclusive assessment of exposure would be necessary. Representative measurements of a variety of exposure situations and estimates of the number of people represented by each would be necessary to determine a population weighted exposure assessment that would provide an accurate picture. The prerequisites for achieving this include:

- Expanded monitoring networks;
- Refined emissions inventories; and
- Regional, sub-regional, and local scale modelling efforts.

Conventional reference instruments are expensive. However, there are a number of low cost instruments that can be used in conjunction with reference instruments, refined instruments, and modelling to reduce the overall costs of operating an effective system for assessing trends in exposure reductions. A number of developments with such instruments is occurring in the US and the UK and CASANZ is anticipating exploring these approaches at its biennial Conference late next year. References can be provided if required, but it is suggested that NEPC may benefit from funding an initial desk-top research project on the subject.

Emissions Inventories

Emission inventories and emission projections form the basis for the CBA, and underpin the assessment of whether any proposed ambient standard could be achieved. The inventory and projections as well as the achievability of some standards have been questioned by some members. It is beyond the scope of this submission to comment on this other than to emphasise that there is ample scope to establish a mechanism for validating or refuting questions about the inventory and projections, and it is suggested that a review of inventories be undertaken.

Jurisdictional complications

CASANZ understands that the status of the current NEPM standards is as follows:

- The standards consist of a numerical value to be determined by monitoring the ambient pollutant levels at a number of locations designated as “performance monitoring stations”.
- The number and location of performance monitoring stations are determined through the application of a monitoring and reporting protocol.
- The performance monitoring stations are to be representative of general exposure, and not of maximum individual exposure. The concept of generally representative upper bound stations is applied in siting performance monitoring stations.
- The goal of the NEPM is to achieve the standard within a specified time frame to a specified degree. In the case of PM₁₀ a goal of 5 exceedences within 10 years has been specified.

It has been pointed out by CASANZ members that there are different ways that jurisdictions apply national standards in assessing industrial emissions to air.

Some jurisdictions, for example, apply the NEPM standards as boundary conditions for assessing industrial emissions. While this is clearly not the intent of the NEPM, it creates some difficulties for CASANZ members in those jurisdictions in assessing the potential impact of changes to standards. There appears to be a case for the development of a nationally consistent protocol for integrating national emission standards within jurisdictional source control programs that complements the monitoring and reporting protocol, and specifically addresses the relationship between modelling assessment criteria and ambient standards.

It would seem appropriate that consideration of changes to national standards be kept separate from considerations of how or if they are used as boundary conditions by jurisdictions as this appears to be beyond the scope and intent of the NEPM.

Summary

- There is no apparent threshold for health effects from PM exposure;
- The process in setting ambient air quality standards is slow to respond to the Increased understanding about the negative impacts of ambient pollutant levels and available methods for controlling contributing source emissions;
- Ambient standards have a long life and need to take both immediate and emerging needs, as well as current and potential improvements in management options into consideration;
- The net economic benefit of reducing exposure to PM is large and probably understated.

CASANZ is therefore of the view that:

- The highest possible standards be adopted as the guiding principle for setting standards.
- The proposed standards are not expected to be achieved immediately but should be achievable within a specific policy time frame.
- Consideration of achievability should include the application of both national mitigation measures as well as additional mitigation measures that are available if required at a jurisdictional level.
- As a corollary, objectives should allow for continuous improvement to be made as available mitigation measures improve over time.
- A process for mid-term review of progress towards achievement of the standards should be specified.
- The standards should be clearly emphasised as ambient monitoring standards and not boundary conditions.

Specific comments and recommendations

There is a variety of views within CASANZ as to the form and the substance of the proposed standards. Specific recommendations on priorities, values, and qualifications are as follow:

Exposure Reduction

There is universal agreement that an exposure reduction framework should be adopted. There is no general agreement on the target or the form of the target however the preferred option is for a 10% reduction in the exposure index based on an annual assessment. For simplicity of understanding, values should be based on a year to year basis, and not averaged over years, and trend analysis undertaken.

This appears to be achievable, by applying all feasible State and National reduction measures based on the CBA analysis (although this is not clear for the NT). It is noted that the combined health benefits of adopting the proposed exposure reduction targets total \$34.5 billion, although as noted before, this is likely to be highly understated. Regular analysis and reporting of exposure reduction trends are recommended.

As noted earlier, current NEPM monitoring requirements do not adequately cover higher exposure situation. CASANZ considers that as a matter of priority, this should be remedied by a substantial increase in the coverage of PM monitoring networks and improved and nationally consistent expanded emissions inventories that provide better temporal and spatial resolution. This would allow for the development and application of models to more accurately assess pollutant exposure and the development of more cost effective and targeted emission reduction measures. The magnitude of the potential health and financial benefits of reducing PM exposure warrants a much expanded monitoring program.

PM_{2.5} annual standard

Conversion to a compliance standard is supported and seen as a priority. There is general support for an 8 µg/m³ standard and some limited support for 6 µg/m³.

PM_{2.5} 24-hour standard

Conversion to a compliance standard is supported and seen as a priority. There is support for 25 µg/m³, but also some support for a 20 µg/m³ standard.

PM₁₀ annual standard

There is some but not universal support for an annual PM₁₀ standard of 20 µg/m³. There is limited support for a 16 µg/m³ standard.

PM₁₀ 24-hour standard

There is support for the 24-hour PM₁₀ standard to remain at 50 µg/m³ but also some support to lower it to 40 µg/m³. However it is not clear how retaining the current standard would be consistent with improved air quality.

Compliance

As indicted above, the 24 hour standards should be adopted as maximum values for both PM_{2.5} and PM₁₀. In assessing compliance and progress, readings that are influenced by special events such as fires and dust storms should be excluded from the assessment but identified and retained in the data base. A set of these circumscribed events should be defined and a protocol established as to how they should be treated.

Finally, although not part of this review, consideration should be given to developing an approach that provides for appropriate sanctions for non compliance. It is suggested that NEPC commission a background discussion paper that would provide the basis for this to be considered.

Appendix 1

The goals of CASANZ are:

1. The objects of the society are to promote the protection of the environment, through advancement of knowledge and practical experience of environmental and air quality science and management.
2. CASANZ is an organisation which gathers and distributes the experience and knowledge of its members, to benefit society members and the public.
3. CASANZ provides lectures, exhibitions, public meetings and conferences as a forum to expand knowledge of environmental matters, especially air quality, including causes, effects, measurement, legislative aspects and control of pollution.
4. CASANZ develops liaisons with organisations with similar interests in Australia and New Zealand, as well as other countries.
5. CASANZ prints and publishes papers, periodical articles, books and information leaflets for the benefit of its members and the public. An example is its Journal, *Air Quality and Climate Change*.
6. CASANZ may provide scholarships, bursaries, monetary grants, awards and prizes to encourage the study and presentation of relevant subjects and disciplines in air quality and climate change.