

**CLEAN AIR FOR NSW  
CONSULTATION PAPER  
NSW MINERALS COUNCIL  
SUBMISSION**

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**NSW MINERALS COUNCIL**



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## Executive Summary

The NSW Minerals Council (NSWMC) is the peak industry association representing the NSW minerals industry. NSWMC has carefully reviewed the *Clean Air for NSW* Consultation Paper released by the NSW Government and has prepared this submission in consultation with member companies.

Australia, including NSW, has some of the best air quality in the world and some of the most stringent air quality standards. Air quality management at mining operations is a major focus for the industry. The industry recognises it has a role in contributing to the achievement of air quality goals and directs considerable resources to meeting the air quality conditions set by the Government. Deloitte Access Economics has estimated that the industry spends \$168 million per annum complying with existing air quality regulation.

In recent years, the Government has responded to community interest in air quality in mining regions by commissioning a range of air quality studies and monitoring networks, including comprehensive industry-funded monitoring networks in the Upper and Lower Hunter Valley. As a result of this research, the community, industry and government all have a much better understanding of the broad range of contributors to particle pollution in these regions and the fact that there are other more significant sources of particulate matter exposure, such as wood smoke from domestic heating.

The preparation of a long-term plan is a positive development for the management of air quality in NSW. In recent years there have been a range of regulatory initiatives relating to particulate matter emissions from mining operations, however an integrated, evidence based plan to support these actions, together with actions directed at other sources of particulate matter, has been lacking. It is important that actions are driven by a solid evidence base rather than by assumptions or community perceptions about the impact of mining.

The Clean Air for NSW Consultation Paper presents an opportunity to strategically review the state of air quality in NSW and the most cost effective actions that can be taken to achieve air quality goals. The Consultation Paper begins to undertake this task, however NSWMC believes that further work is required to ensure that the plan will deliver the best air quality and health outcomes for the entire NSW population.

NSWMC's main comments include:

- The focus on the 'Greater Metropolitan Region' limits the analysis of air quality issues in regional towns outside this largely arbitrary boundary. There are many significant towns outside this area, some of which have potentially greater population exposure to air pollution than regional towns within the Greater Metropolitan Region, that have not been assessed. Given this is a plan for the entire NSW population, it is important that it captures these regions.
- Greater context is required around the presentation of air emission inventory data. Emissions estimation techniques used to compile the inventory have several limitations, including inherent uncertainties in some estimation techniques and the fact that the dispersion of emissions can minimise population exposure particularly where emission sources are located away from population centres. Population exposure data, rather than emissions estimation data, should be the primary source of information that guides air quality actions.
- The Consultation Paper does not assess how each priority action will address the air quality issues outlined in Section 2 of the Consultation Paper, or how it meets the objectives to "*Target emissions sources that have large impacts on air quality and human health*" and "*have the potential to provide the most cost-effective responses...*" In the case of the mining-related actions identified, the priority actions appear to be a list of initiatives already underway rather than using the plan as an opportunity to strategically review whether these are priority actions. It is doubtful that some meet the stated objectives. The proposed Clean Air Metric that the Office of Environment and Heritage is developing could help inform priorities.

NSWMC appreciates that this is the first stage of consultation on the Clean Air for NSW plan and looks forward to ongoing engagement as the consultation progresses.

#### **Recommendations – Clean Air Metric**

- OEH should progress the development of the Clean Air Metric to inform Government priorities for air quality policy, while considering the following issues:
  - OEH should be wary of the complexities in developing a single metric for a range of air pollutants. If the complexities cannot be overcome, population weighted indicators for individual pollutants should be considered.
  - OEH should consider how gaps in the monitoring network (e.g. in some regional centres) will be accounted for in determining population-weighted exposure.
  - Monitors that are not linked to population (e.g. diagnostic monitors in the Upper Hunter Air Quality Monitoring Network) should not be used in the calculation of population-weighted exposure for a region.

#### **Recommendations – Air quality issues in NSW**

- The Clean Air Plan should extend its focus beyond the Greater Metropolitan Region boundary to capture significant regional towns and emission sources that lie outside the Greater Metropolitan Region boundary.
- The Clean Air Plan should prioritise the use of population exposure data over emissions inventory data to guide priority actions, given the limitations of air emissions estimations.

#### **Recommendations – Priorities to reduce emissions and exposure**

- The Clean Air for NSW plan should provide detailed justification for each priority action as to how it meets the objectives to “*Target emissions sources that have large impacts on air quality and human health*” and “*have the potential to provide the most cost-effective responses...*” Several priority actions in the Consultation Paper would not meet these objectives.
- The Government should firstly clarify the framework for identifying priority actions so that the full range of potential actions can be objectively assessed and prioritised, rather than the apparent preference for measures already underway.
- The Government should commit to early consultation on any major air policy initiatives, including providing opportunities to provide input into the assumptions of economic studies.

# 1 Introduction

## 1.1 About the NSW Minerals Council

The NSW Minerals Council (NSWMC) is the peak industry association representing the NSW minerals industry. NSWMC represents around 90 member companies including mining operators, mineral explorers and associated service providers. NSWMC does not represent the coal seam gas industry.

NSWMC has carefully reviewed the *Clean Air for NSW Consultation Paper* (Consultation Paper) released by the NSW Government and has prepared this submission in consultation with member companies.

## 1.2 Air quality and the NSW mining industry

The primary air quality issue associated with mining operations is the emission of particulate matter, or PM. Airborne particulate matter includes all types of airborne particles from sources such as vehicle exhausts, bushfires, power stations, domestic wood heaters, mining, agriculture, industrial furnaces, sea spray and windblown dust.

At mining operations, particulate matter is generated through the handling of soil, rock, ore and coal, blasting activities, windblown dust from exposed areas, and the use of diesel fuel in mining equipment. For each of these sources, mines have measures in place to reduce particulate matter emissions and the potential effects on air quality in local communities.

The size of airborne particulate matter is classified as shown in Table 1. Research indicates that it is the size of particulate matter that is of primary importance from a human health perspective, with the smallest particles – known as PM<sub>2.5</sub> – having the greatest health impact since they can be inhaled deep into the lungs and absorbed into the bloodstream. Figure 1 demonstrates the relative size of different particles.

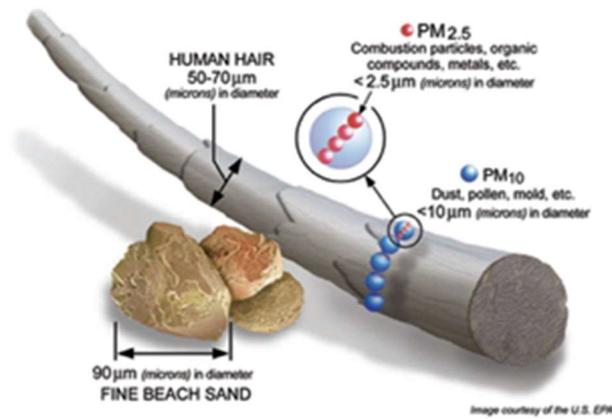
PM<sub>2.5</sub> particles are mainly produced by combustion processes such as vehicle exhaust, fires and power generation. Because most PM at mines is derived from mechanical (i.e. crushing) rather than combustion processes, the dust generated by mining activities is less likely to contribute significantly to PM<sub>2.5</sub> emissions.

**Table 1: Particle size classifications and descriptions** <sup>1</sup>

Particle Size	Description
<b>TSP</b>	Total Suspended Particulate Matter (TSP) refers to the total of all particles suspended in the air. Even the largest of these particles is barely half the width of a human hair.
<b>"Larger than"PM<sub>10</sub></b>	A subset of TSP, and refers to all particles of size 10 µm in diameter and greater.
<b>PM<sub>10</sub></b>	Also a subset of TSP, and includes all particles smaller than 10 µm in diameter (smaller than 1/7th of a hair width). Particles in the size range 2.5 µm to 10 µm in diameter are referred to as coarse particles (PM <sub>2.5-10</sub> ).
<b>PM<sub>2.5</sub></b>	A subset of both PM <sub>10</sub> and TSP categories and refers to all particles less than 2.5µm in diameter. PM <sub>2.5</sub> is referred to as fine particles and is mainly produced from combustion processes such as vehicle exhaust.

<sup>1</sup> NSW Health (2010), Mine Dust and You Fact Sheet, <http://www.health.nsw.gov.au/environment/factsheets/Pages/mine-dust.aspx>; MEM (2015), Meeting of Environment Ministers Agreed Statement, 15 December 2015 <https://www.environment.gov.au/system/files/pages/4f59b654-53aa-43df-b9d1-b21f9caa500c/files/mem-meeting4-statement.pdf>

**Figure 1: Relative size of particulate matter**



### 1.3 Australia has some of the most stringent ambient air quality standards in the world

There is a range of ambient air quality standards that apply in NSW. Standards are designed to protect either population health or to provide acceptable levels of amenity. Different standards apply to different size particles and different averaging periods (i.e. 24 hours, monthly or annually). The range of air quality standards for particulate matter that apply in NSW are outlined in Table 2.

**Table 2: Air quality standards for particulate matter that apply in NSW <sup>2</sup>**

Pollutant	Averaging period	Concentration standard	Source of standard
<b>TSP</b>	Annual	90 μg/m <sup>3</sup>	NSW EPA
<b>PM10</b>	1 day (24h)	50 μg/m <sup>3</sup>	National standard
	Annual	25 μg/m <sup>3</sup>	National standard
<b>PM2.5</b>	1 day (24h)	25 μg/m <sup>3</sup>	National standard
	Annual	8 μg/m <sup>3</sup>	National standard
<b>Dust deposition</b>	Month (total)	4g/m <sup>2</sup>	NSW EPA
	Month (increase)	2g/m <sup>2</sup>	NSW EPA

Australia has some of the most stringent ambient air quality standards in the world. The Australian national standards were reviewed and strengthened in February 2016. For comparison, the most recent revision to ambient air quality standards for particulate matter internationally occurred in the United States. In comparison to the updated US EPA standards:

- Australia's PM<sub>10</sub> 24 hour health standard is three times as strict (50 μg/m<sup>3</sup> vs 150 μg/m<sup>3</sup>)
- Australia's PM<sub>2.5</sub> 24 hour health standard is 40% more strict (25 μg/m<sup>3</sup> vs 35 μg/m<sup>3</sup>)
- Australia's PM<sub>2.5</sub> annual average health standard is 50% more strict (8 μg/m<sup>3</sup> vs 12 μg/m<sup>3</sup>).

<sup>2</sup> NSW Health (2010), Mine Dust and You Fact Sheet, <http://www.health.nsw.gov.au/environment/factsheets/Pages/mine-dust.aspx>

## 1.4 The mining industry is heavily regulated in relation to air quality

There is strict regulation of mining operations in relation to their impacts on air quality. The regulatory framework includes:

- Requirements to conduct detailed air quality assessments for any proposed mine so that the potential impacts on air quality can be comprehensively assessed.
- The setting of air quality criteria for approved mines to protect air quality in the surrounding communities.
- Requirements for mines to purchase properties, upon the owner's request, should certain air quality criteria be exceeded.
- Requirements to establish air quality management plans that outline how mines will meet their conditions of approval.
- Requirements to reduce dust emissions through Pollution Reduction Programs contained in mines' Environmental Protection Licence conditions.
- Requirements for mandatory environmental auditing and reporting to assess compliance with approval conditions.
- Requirements to fund the operation of the Upper Hunter Air Quality Monitoring Network, together with the Upper Hunter coal fired power generators.

Deloitte Access Economics has estimated that the cost of complying with existing air quality regulation for the NSW coal industry is **\$168 million annually**.

## 1.5 Working with the community on air quality issues

Since 2010 the NSW Minerals Council has coordinated a community engagement program named the Upper Hunter Mining Dialogue (UHMD). The Dialogue was established to facilitate a coordinated industry consultation process with the Upper Hunter community to address the cumulative impacts of mining in the region and complements the community engagement activities of the individual mine sites.

The UHMD Emissions & Health Joint Working Group, which includes community representatives, has helped to develop and deliver projects to improve operational practices and provide the community with information about air quality and health in the Upper Hunter region, including:

- A weather forecasting project to ensure that all open cut mining operations in the Upper Hunter are accessing and using weather forecasts in a systematic way to help them prepare for adverse weather conditions that may lead to increased dust generation.
- A communications strategy to ensure regular information sharing between government, industry and the community about air quality and health, which has included community information sessions with speakers from NSW Health, the NSW EPA and the Department of Planning and Environment.
- Advocacy for the establishment of a community air quality forecast, similar to that already in place for Sydney.

## 1.6 The Clean Air for NSW Consultation Paper

The Clean Air for NSW Consultation Paper aims to set out actions to meet the government's goal of improving average air quality across NSW over the 10 year period from 2017-27.

The preparation of a long-term plan is a positive development for the management of air quality in NSW. In the mining industry's experience, there has been a range of regulatory initiatives relating to

particulate matter emissions from mining operations, however an integrated, evidence based plan to support these actions, together with actions relating to other sources of particulate matter, has been lacking.

The Clean Air for NSW Consultation Paper presents an opportunity to strategically review the state of air quality in NSW and the most cost effective actions that can be taken to achieve air quality goals. The Consultation Paper begins to undertake this task, however NSWMC believes that further work is required to ensure that the plan will deliver the best air quality and health outcomes for the whole of the NSW community.

## **1.7 Structure of this submission**

This submission outlines NSWMC's position in the following sections:

- Section 2 – comments on the proposed 'Clean Air Metric' that is being developed by the Office of Environment and Heritage.
- Section 3 – reviews the Consultation Paper's assessment of air quality issues in NSW.
- Section 4 – reviews the Consultation Paper's proposed priorities to reduce emissions and exposure.
- Section 5 – outlines NSWMC's conclusions and recommendations.

## 2 The proposed Clean Air Metric

### 2.1 NSWMC supports the development of more accurate indicators of population exposure

As acknowledged in the Consultation Paper, “the greatest public health gains will come from reducing long-term exposure of large populations to air pollution” (p8). The proposed Clean Air Metric (CAM) could provide useful data to inform how the greatest public health gains could be achieved, thereby informing the priorities for the Clean Air for NSW plan.

Currently, all air quality monitors are assessed against the national air quality standards despite wide differences in the populations where they are located. While the performance monitoring framework for the national air quality standards focuses on populations of 25,000 people or greater, there are many monitors in the OEH public air quality monitoring network that do not meet this population threshold and some monitors are representative of exposure of much larger populations.

For example, in the Upper Hunter Air Quality Monitoring Network, there are several monitors that are classified as ‘background’ or ‘diagnostic’ monitors and are not intended to measure population exposure. Instead, they are intended to provide data to allow analysis of air quality patterns and dispersion throughout the region. Despite this, air quality alerts are issued when these monitors exceed the national standards. There are also examples of community members simply adding up the number of exceedances from every air quality monitor in the Hunter Valley to generate large numbers of exceedances<sup>3</sup>, when really this is a result of the Hunter region having the benefit of being one of the most densely monitored areas in Australia, if not the world, along with some monitors being deliberately located close to pollution sources rather than population centres.

The CAM could help to provide a greater insight into population exposure than the existing approach to performance monitoring and NSWMC therefore supports this additional metric being added to the existing measures of air quality across the state to inform the development of air quality policy.

There are several issues that the Government should consider as the Clean Air Metric is developed, which are outlined in further detail below.

### 2.2 Factors to consider in the development of the Clean Air Metric

Page 14 of the Consultation Paper states:

*“The CAM will combine annual average, multi-pollutant assessments of air pollution levels across NSW similarly to the AQI, but will also weight the measured air pollution levels by population. This will help track our progress in ensuring that our management of air quality delivers the most positive health outcomes for the people of NSW.”*

While multi-pollutant indicators such as the NSW Air Quality Index (AQI) are often used to communicate risks to the public, and population weighted measures are often used for single pollutants, NSWMC is unaware of any precedent of a similar multi-pollutant, population weighted metric for the assessment of air quality performance. The only exception is the South Africa National Air Quality Indicator; however, this is limited to annual average particulate matter and sulphur dioxide monitoring.

The key factors to consider when constructing the CAM include the use of:

- the maximum index value where multiple pollutants are measured.

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<sup>3</sup> <http://www.singletonargus.com.au/story/2007387/more-needs-to-be-done-on-air-quality/>

- the maximum monitoring location where several monitors are present within a region.
- annual average statistics for assessing performance relative to either threshold-based and/or acute health risks.

For the CAM to be aligned with the performance of air quality policy objectives, the metric would need to represent a measure of total population exposure across all monitored pollutants, with a consideration of human health risk that addresses:

- the relative priority of both threshold and non-threshold pollutant health effects (as consistent with those identified in the section 'Review of National Air Quality Standards').
- the relative priority of short-term and annual average monitoring results (as relevant to both acute and chronic health endpoints).
- the potential cumulative and non-overlapping health outcomes where multiple pollutants are monitored.
- the influences of environmental factors that are not relevant to policy objectives (such as bushfires, dust storms, climatic variability, El Niño/La Niña).

### 2.3 The Clean Air Metric has the potential for selection bias

The construction of a robust population-weighted CAM requires data on pollutant levels that are representative of those experienced across the population. NSWMC does not believe that the current OEH monitoring network adequately captures the NSW population. For example, there are several regional towns of reasonable size that are not part of the OEH monitoring network but may well have air quality issues associated with sources such as woodsmoke, agriculture or other emissions sources.

In the absence of significant monitoring datasets for regional locations, there is the potential for elevated particulate matter concentrations to be specifically associated with mining regions where monitoring is in place, and for the broader importance of regional wood smoke and agricultural emissions to be under recognised in prioritisation of air quality issues.

Furthermore, while the national air quality standards' performance monitoring framework<sup>4</sup> is based around population magnitude (intended to be focused on populations greater than 25,000), this objective is different to that applied in establishing the Upper Hunter Air Quality Monitoring Network (UHAQMN). The UHAQMN includes monitors that are classed as 'diagnostic' and 'background' monitors that are not intended to indicate population exposure but to inform the understanding of particulate matter dispersion through the region.

Accordingly, the formulation and application of the CAM in prioritising air emission reduction opportunities should be mindful of the potential biases where monitoring network objectives are not population-based (e.g. are targeted to specific industries), and where monitoring coverage is not comprehensive. A specific consideration is the treatment of variability and sample size (i.e. number of monitoring locations) in the context of applying the maximum index value to an entire region, whereby variability and susceptibility to localised siting influences has the potential to produce higher CAM values for areas with a high number of stations (i.e. higher than would be present if monitoring networks are sized in accordance with population density alone).

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<sup>4</sup> As applied in the NSW air quality monitoring network (EPA, 2001), (NEPC, 1998).

### **Recommendations – Clean Air Metric**

- OEH should progress the development of the Clean Air Metric to inform Government priorities for air quality policy, while considering the following issues:
  - OEH should be wary of the complexities in developing a single metric for a range of air pollutants. If the complexities cannot be overcome, population weighted indicators for individual pollutants should be considered.
  - OEH should consider how gaps in the monitoring network (e.g. in some regional centres) will be accounted for in determining population-weighted exposure.
  - Monitors that are not linked to population (e.g. diagnostic monitors in the Upper Hunter Air Quality Monitoring Network) should not be used in the calculation of population-weighted exposure for a region.

## 3 Air quality issues in NSW

The Consultation Paper outlines a summary of current and future air quality issues in NSW, which is intended to identify the priority air quality issues that need to be addressed throughout the state. NSWMC has identified the following issues that require further consideration.

### 3.1 Air quality analysis should extend beyond the Greater Metropolitan Region

The primary focus of the Consultation Paper is on air quality within the Greater Metropolitan Region, which represents a rectangular region 210 km (east-west) by 273 km (north-south) spanning from south of Wollongong up to (and including) Muswellbrook in the north.

According to the NSW EPA, approximately 75% of the NSW population lives in the GMR<sup>5</sup>. While the GMR contains the majority of the NSW population, the justification for the boundary and the almost exclusive focus that the Consultation Paper has on this region is unclear.

There are many significant regional towns that lie outside the GMR boundary including Coffs Harbour, Wagga Wagga, Orange, Dubbo and Armidale. Despite air quality monitors being present in some of these towns, there is little to no analysis of the air quality in these towns, despite many of them being larger than the regional towns within the GMR boundary.

For example, the population of Wagga Wagga is approximately twice that of Muswellbrook and Singleton combined<sup>6</sup>, but is excluded from the analysis assumedly because it lies outside the boundary of the GMR. Wagga Wagga is documented within OEH<sup>7</sup> to be the only NSW location that did not comply with the NEPM AAQ standards in 2014 and to be impacted by broad-scale agricultural activities, so the potential for a relatively large population to be exposed to elevated levels of particulate matter in Wagga Wagga is significant.

The relevance of the GMR emissions inventory (Figure 5 of the Consultation Paper) to population exposure is questionable. While fugitive dust emissions from coal mining, for example, are recorded as being significant in the GMR air emissions inventory, their effect on population exposure has been shown to be relatively minor in comparison to other sources of particulate matter. This is discussed further in the following section.

NSWMC notes that unlike Figure 6 of the Consultation Paper, which describes the top emission sources for the Sydney Region, Figure 5 does not include emissions from naturally occurring emission sources. The inclusion of these emissions sources would provide useful context around the scale of prospective emission reduction opportunities as relevant to regional air quality.

### 3.2 Mining is one of many sources of particulate matter that require attention

Over the last five years, the level of knowledge about air quality in mining regions has improved significantly as a result of both industry and government research.

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<sup>5</sup> <http://www.epa.nsw.gov.au/air/airinventory.htm>

<sup>6</sup> Based on Significant Urban Area (SUA) populations. Source:

[http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2011/quickstat/1034?opendocument&navpos=220](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/1034?opendocument&navpos=220)

[http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2011/quickstat/1028?opendocument&navpos=220](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/1028?opendocument&navpos=220) (accessed 06/01/2017)

<sup>7</sup> OEH (2016b) NSW Annual Compliance Report 2014, National Environment Protection (Ambient Air Quality) Measure, NSW Office of Environment and Heritage, 2016.

<http://www.environment.nsw.gov.au/resources/air/ambient-air-compliance-report-2014-160218.pdf>

Prior to this, in the absence of high quality data, it was often assumed that mining and coal transportation had the most significant impact on air quality in areas such as the Hunter Valley and Newcastle. The NSW EPA's 2013 *Upper Hunter Air Particles Action Plan*<sup>8</sup> reflected this assumption. While focusing on meeting a PM<sub>2.5</sub> annual average of 8µg/m<sup>3</sup>, the action plan has ten actions directed at mining emissions and only two addressing other emission sources.

Since the plan was developed, mining emissions have now been shown to be just one of many sources of particulate matter emissions that effect population exposure in the major population centres, with other sources being more significant. In the Upper Hunter Valley Particle Characterisation Study<sup>9</sup> the contribution of woodsmoke to PM<sub>2.5</sub> levels in Muswellbrook, for example, was shown to contribute 30% of PM<sub>2.5</sub> on average over the year of sampling and 62% during the winter months.

Similarly, in the Lower Hunter, despite claims of coal dust from rail transport and coal handling facilities at the Port of Newcastle<sup>10</sup> having a substantial impact on air quality, the Lower Hunter Particle Characterisation Study<sup>11</sup>, led by CSIRO and ANSTO, analysed the sources of PM<sub>2.5</sub> and the larger PM<sub>2.5-10</sub> particles at two monitoring stations. The study found that coal could contribute at most 10% of the larger PM<sub>2.5-10</sub> particles, with further investigations need to quantify the contribution. No coal was specifically detected in the PM<sub>2.5</sub> samples - the smallest particle size of greatest health concern.

The improvements in information about air quality and the sources of particle exposure in recent years demonstrates the importance of priority actions being based on evidence rather than assumptions or in response to unsupported claims that are sometimes made by opponents of the mining industry.

### 3.3 The air emissions inventory is poor indicator of population exposure

The NSW EPA's air emissions inventory for the Greater Metropolitan Region requires further context in the Clean Air for NSW plan. The inventory is a poor indicator of the impact of mining-related emissions and needs to be used with caution when guiding air policy for several reasons:

- Emissions estimations for fugitive dust are subject to inherent uncertainty – Unlike 'end of pipe' emissions (e.g. exhaust stacks) that can be directly measured, emissions estimations for fugitive dust emissions at mining operations are inherently uncertain. This is because they are generated from large areas of land and are influenced by a wide range of variables in meteorology and the type of material. They cannot be directly measured and therefore formulas are applied to estimate emissions. These emissions estimations generally use very conservative assumptions and methods that result in an overestimation of emissions. The NSW EPA's air emissions inventory provides a very coarse indication of emissions from mining projects.
- Emissions alone are a poor indicator of impacts – The Consultation Paper directs little attention to the distinction between emissions and impacts. A given quantity of particulate emissions in the mining sector will generally have a lower impact than the same quantity of emissions as industrial facilities in urban areas due to the greater distances between mining operations and population

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<sup>8</sup> NSW Environment Protection Authority, Upper Hunter Air Particles Action Plan (Apr 2014)

<http://www.epa.nsw.gov.au/resources/aqms/130158uphunta.pdf>

<sup>9</sup> NSW Office of Environment and Heritage and NSW Department of Health, Upper Hunter Valley Particle Characterization Study (Sept 2013) <http://www.environment.nsw.gov.au/resources/aqms/UHFPCSFinal.pdf>

<sup>10</sup> Coal Terminal Action Group and Health Steering Group, Coal dust in our suburbs (Mar 2013)

<http://www.abc.net.au/cm/lb/5045958/data/dust-data.pdf>

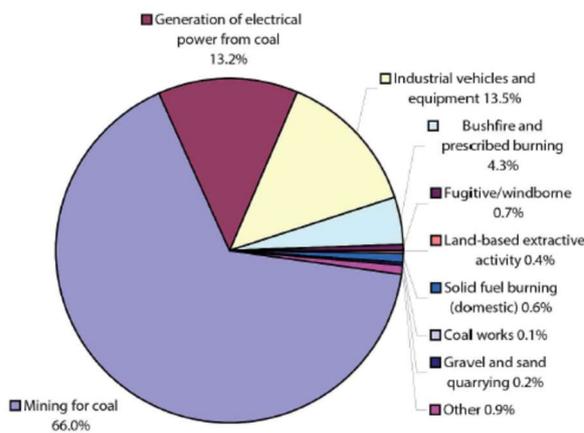
<sup>11</sup> NSW Environment Protection Authority, Lower Hunter Particle Characterisation Study (Apr 2016)

<http://www.environment.nsw.gov.au/resources/air/lower-hunter-particle-report-160243.pdf>

centres. Some dust emissions from mining projects will not even leave the site boundary and/or buffer lands or will fall on properties owned by the mining operation.

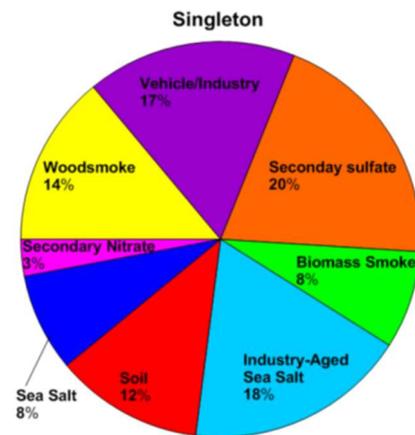
The two charts in Figure 2 demonstrate the significant difference between estimated emissions and population exposure. The 2008 EPA air emissions inventory estimates that fugitive dust emissions from mining make up 66% of PM<sub>2.5</sub> emissions in the Upper Hunter region, while domestic solid fuel burning makes up 0.6%. However, these figures are vastly different to the actual measurements of population exposure to PM<sub>2.5</sub> taken by the CSIRO in its particle characterisation study. The particle characterisation study measured 'soil' (which includes fugitive dust emissions from mines as well as other sources of soil) making up 12% of PM<sub>2.5</sub> exposure in Singleton while smoke from domestic woodsmoke comprised 14% of PM<sub>2.5</sub><sup>12</sup>. Given the significant increase in coal production between 2008 (when the air emissions inventory was compiled) and 2012 (when the CSIRO undertook sampling for its study) one could assume that the EPA's estimated emissions would be even greater for 2012, further broadening the gap between estimated emissions and exposure.

**EPA estimated PM<sub>2.5</sub> fugitive dust emissions from coal mining in the Upper Hunter – 66%**



Source: EPA 2008 Air Emissions Inventory Upper Hunter

**CSIRO measurement of ambient air PM<sub>2.5</sub> soil particles in the Upper Hunter – 12%**



Source: CSIRO 2013 Particle Characterisation Study

**Figure 2 - Comparison of emissions estimates vs population exposure in the Upper Hunter**

The analysis within the Consultation Paper appears to indicate an associative link between PM<sub>2.5</sub> emissions from mining, and PM<sub>2.5</sub> levels in metropolitan areas such as Sydney. Modelling results documented within the 2014 Upper Hunter Air Quality Particle Model indicate the contribution of mining-related emissions to annual average PM<sub>2.5</sub> to be approximately 0.1 µg/m<sup>3</sup> at Cessnock Monitoring Station, which is located approximately 25 km from mining sources, and in alignment with the Hunter Valley drainage flows. It would be expected that concentrations of mining-related PM<sub>2.5</sub> at more distant metropolitan areas would be lower than these predictions, and hence negligible in the context of air quality in large population centres.

The significant differences between emissions estimates and population exposure could be explained by a) inaccuracies in the air emissions inventory and/or b) the relatively larger distances between mines and the major population centres. In any case, emissions inventories, while part of the picture, do not provide an accurate indication of population exposure.

<sup>12</sup> The corresponding figures for Muswellbrook in the CSIRO study were: soil – 11% woodsmoke – 30%.

### **Recommendations – Air quality issues in NSW**

- The Clean Air Plan should extend its focus beyond the Greater Metropolitan Region boundary to capture significant regional towns and emission sources that lie outside the Greater Metropolitan Region boundary.
- The Clean Air Plan should prioritise the use of population exposure data over emissions inventory data to guide priority actions, given the limitations of air emissions estimations.

## 4 Priorities to reduce emissions and exposure

### 4.1 An explicit link between the priority actions and the available evidence is required

The Consultation Paper notes that:

*“Most importantly, Clean Air for NSW will also present the framework and principles that could form the basis for developing the actions necessary to achieve gains for air and health over the next 10 years, and the actions the NSW Government will deliver as immediate priorities” (p8).*

The Consultation Paper does not provide significant detail on this proposed framework and principles other than noting that actions have been prioritised for further investigation on the basis they (p.27):

- *“Target emissions sources that have large impacts on air quality and human health, based on the evidence, and*
- *have the potential to provide the most cost-effective responses to identified pollution and health issues and deliver the best net gains for the community, based on the findings from economic studies”.*

NSWMC supports this evidence-based approach to the identification of priority actions. However, the Consultation Paper does not make an explicit link as to how the priority actions that are subsequently identified meet these objectives and address the air quality issues previously identified. In the case of the mining-related actions, it appears that the Consultation Paper simply presents the range of actions that have been in train for some time, rather than strategically re-evaluating the range of actions that should be taken to deliver the greatest benefits at least cost. While NSWMC understands that the EPA must respond to community concerns in relation to air quality, the priority assigned to emissions from mining and rail transportation must be evidence based. Gaps in knowledge should be addressed through further research and do not necessitate making a source of emissions a priority.

As a result, there is a risk that the priority actions have been arrived at prematurely and that:

- Some measures contained in this list would not be the most appropriate with regards to the framework that the NSW EPA intends to develop.
- There are other measures that have been unnecessarily excluded from this list, which could be more appropriate with regards to the framework.

Although some justification is provided for each measure, these links should be more clearly established and if there is not enough evidence to support them then their removal from the document should be considered.

The EPA should therefore not limit itself to a select set of measures for further investigation. Instead, the EPA should clarify the framework, consider the full range of possible measures, and short-list measures for further investigation only if these are found to be the most appropriate based on the established framework, and the research tools detailed in Figure 1 of the Consultation Paper.

### 4.2 Priorities relevant to mining

Several of the priority actions proposed in the Consultation Paper are relevant to the mining industry. The subsections below assess the extent to which the justification for inclusion provided in the Consultation Paper is consistent with the stated principles.

#### 4.2.1 Review the EPA Load-Based Licensing scheme

The Consultation Paper notes that the EPA’s Load-Based Licensing (LBL) scheme is being reviewed and will consider the pollutants, industries and geographical priority areas covered by the scheme and

look at providing additional incentives to reduce emissions for facilities with high impacts, particularly in areas with cumulative impacts.

Subsequent to the release of the Consultation Paper, a *Review of the Load Based Licensing Scheme Issues Paper* was released for public consultation<sup>13</sup>. The Issues Paper raises the potential for a broadening of the LBL scheme to capture additional industries that are not currently included in the scheme, such as mining.

NSWMC has made a separate submission on the LBL Issues Paper. NSWMC believes that the LBL Issues Paper does not provide justification for extending the LBL scheme to include mining. Existing regulatory tools have been demonstrated to effectively manage emissions from mining operations and the application of LBL to mining would be complex, inefficient and largely ineffective in further reducing emissions. As a result, the ability of LBL to contribute to cost effective improvements in air quality in relation to the mining industry is likely to be limited.

A copy of NSWMC's full submission on the LBL Issues Paper is available on the NSWMC website<sup>14</sup>.

#### **4.2.2 Strengthening the mining rehabilitation framework**

The Consultation Paper discusses potential updates to the rehabilitation framework, but provides little explanation as to why and how this could deliver improvements in air quality.

NSWMC supports moves to clarify the expectations on post-mining land use, including voids. However, the objective of this initiative is to deliver beneficial uses of rehabilitated land once mining is complete, rather than deliver air quality improvements.

Mines are already required to progressively rehabilitate disturbed land and ensure all land is safe and stable once mining is complete. While an updated rehabilitation framework may be able to achieve some improvements to progressive rehabilitation, it is unclear to what extent this would reduce emissions and improve air quality. The Upper Hunter Valley Particle Characterisation Study showed that 'soil' contributed around 11%-12% to PM<sub>2.5</sub> exposure in Singleton and Muswellbrook<sup>15</sup>, which would include fugitive dust emissions from areas awaiting rehabilitation; fugitive dust emissions from operational areas; fugitive dust emissions from agricultural activities and other windblown dust sources. The effect of marginal improvements in progressive rehabilitation on air quality is questionable.

The reference to 'exploration' projects managing their emissions across the project lifecycle is unnecessary. The impact of particulate emissions from exploration activities would be so small as to be immeasurable and would have much less impact than many day to day farming activities.

The lack of analysis of this action and the lack of an explanation as to the air quality improvements it would deliver is concerning given that it has been categorised as a "priority". This reinforces NSWMC's broader concern that priorities included in the Consultation Paper have not been adequately justified.

#### **4.2.3 Manage dust emissions in the Hunter rail corridor**

Minimising exposure to dust emissions in the Hunter rail corridor has been included as a priority action, without a robust justification. The Consultation Paper makes reference to studies undertaken

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<sup>13</sup> NSW Environment Protection Authority, Review of Load Based Licensing Scheme Issues Paper (Oct 2016) <http://www.epa.nsw.gov.au/resources/licensing/bl/load-based-licensing-review-issues-paper-150397.pdf>

<sup>14</sup> NSW Minerals Council Submission on NSW EPA Load Based Licensing Issues Paper (Dec 2016) <http://www.nswmining.com.au/NSWMining/media/NSW-Mining/Attachments/Load-Based-Licensing-Scheme-Review-Issues-Paper-NSWMC-Submission.pdf>

<sup>15</sup> NSW Office of Environment and Heritage and NSW Department of Health, Upper Hunter Valley Particle Characterization Study (Sept 2013) <http://www.environment.nsw.gov.au/resources/aqms/UHFPCSFinal.pdf>

by the NSW Chief Scientist and Engineer. There have also been several other relevant studies completed including the Lower Hunter Particle Characterisation Study<sup>16</sup> and the Lower Hunter Dust Deposition Study<sup>17</sup>. None of these studies has indicated long term average air quality (the focus of Clean Air for NSW) is different to other parts of the region, however, as stated in the Consultation Paper, the Chief Scientist concluded that *“further targeted studies are need to better understand the nature and distribution of particles along rail corridors and industry”*.

The coal industry supports these further studies and would like to work constructively with the NSW Government as it responds to the Chief Scientist’s recommendations. However, in the absence of evidence suggesting there is an air quality issue around the rail corridor, the inclusion of a priority action to ‘Manage dust emissions in the Hunter Rail corridor’ is unjustified. It is not demonstrated that this action will *“deliver the best net gains for the community, based on the findings from economic studies.”*

The proposal for further monitoring around the rail corridor should instead form part of any revised air quality monitoring strategies rather than being a standalone priority action, which may give the impression that there is evidence that demonstrates the rail corridor is a significant source of particulates.

#### **4.2.4 Non-road diesel measures**

The mining industry is already engaging with the NSW EPA on its proposals to regulate diesel exhaust emissions from equipment operating at NSW coal mines, such as haul trucks, excavators and bulldozers.

The regulatory proposals are outlined in a cost benefit analysis the EPA prepared that assesses a range of technologies to reduce particulate emissions, such as retrofitting exhaust filters to existing equipment and upgrading equipment to meet more stringent emissions standards. Based on the results of the cost benefit analysis the EPA proposes to require mines to reduce emissions from existing equipment by 25% over a four-year period and require all new equipment to meet the latest U.S. Tier 4 emission standards.

NSWMC and individual member companies have expressed concerns with the EPA’s cost benefit analysis and the impact that the regulatory proposals could have on the industry. Some of the industry’s concerns include:

- The significant overestimation of the health costs of non-road diesel emissions and the benefits of emissions reductions options, due to the application of a methodology designed for use in urban environments.
- An underestimation of the practical difficulties and costs in retrofitting particulate filters to existing equipment.
- Disregarding the fact that the industry has already demonstrated that it adopts better performing equipment over time in the absence of regulation.
- Uncertainty around the availability, performance and cost of Tier 4 certified equipment, which will not be widely available until 2018, and the fact that if the EPA’s assumptions about the operational cost savings from adopting Tier 4 equipment are correct, then the industry will adopt this equipment voluntarily.

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<sup>16</sup> NSW Environment Protection Authority, Lower Hunter Particle Characterisation Study (Apr 2016) <http://www.environment.nsw.gov.au/resources/air/lower-hunter-particle-report-160243.pdf>

<sup>17</sup> NSW Environment Protection Authority, Lower Hunter Dust Deposition Study (Feb 2016) <http://www.epa.nsw.gov.au/resources/air/lower-hunter-dust-study-report.pdf>

Overall, NSWMC believes that the EPA has overstated the benefits and understated the costs of its proposals. The industry's concerns were supported by an independent review of the cost benefit analysis completed by Deloitte Access Economics<sup>18</sup>.

While emissions from non-road diesel equipment are unregulated in Australia, the NSW mining industry has still adopted lower-emission equipment as technology has developed over time. The Consultation Paper states that *"non-road diesel emissions continue to increase in the absence of national standards and regulation"*. In the case of the NSW mining industry, this is not the case. The detailed emissions inventory prepared by the NSW EPA for its cost benefit analysis indicated a 25% reduction in estimated non-road diesel particulate emissions at NSW coal mines, compared to its 2008 Air Emissions Inventory, as a result of the adoption of better performing equipment over time. This occurred in the absence of any regulation and despite a 42% increase in fuel consumption and significant increases in coal production.

The Upper Hunter Air Particle Model that was prepared for the EPA by Pacific Environment<sup>19</sup> estimated that non-road diesel emissions from coal mines in the region contributed around 4%-5% of PM<sub>2.5</sub> exposure in Singleton and Muswellbrook. Given the costs of the proposed regulation, which are expected to be in the order of tens of millions of dollars, it is unclear whether the EPA's proposals are the most cost effective way to reduce population exposure to particulate matter.

The industry has already undertaken significant work to reduce emissions intensity through fuel economy optimisation, engine power optimisation, and operational behaviour and non-HME (heavy mining equipment) fuel savings efforts. This has been an area of focus for the industry and has resulted in significant improvements in fuel economy and corresponding reductions in carbon dioxide emissions intensity, as well reductions in diesel particulate matter (DPM). The industry is open to discussing practical ways in which the industry's demonstrated improvements in emissions performance can continue over the 10 year term of the Clean Air for NSW plan. However, the industry does not believe there is evidence to support onerous regulatory proposals to reduce emissions from existing non-road diesel equipment within a four year period. In contrast, emissions standards have been implemented in the U.S. over a period of decades, with long lead times to ensure a smooth transition.

While on the surface the EPA's approach to non-road diesel emissions regulation for NSW coal mines appears to align with the objective *"to provide the most cost-effective responses to identified pollution and health issues and deliver the best net gains for the community, based on the findings from economic studies"*, the quality of these studies is paramount. The industry's opportunity to comment on the assumptions and methodology used in the cost benefit analysis only came after the report had been drafted, limiting the opportunity to shape the overall approach. In response to the industry's comments and the independent review conducted by Deloitte Access Economics, only minor changes to the sensitivity analysis in the cost benefit analysis have been made.

Furthermore, there is a perception in the industry that the NSW EPA has worked much more closely with equipment suppliers, who have the most to gain from the proposed regulation, as opposed to sitting down with the end users of the equipment – the ultimate regulatory target in this case – who will bear the costs of the regulatory proposals. The two workshops held by the EPA on the proposals were not conducive to constructive discussions.

It is critical that for future regulatory proposals that the industry is engaged early in the process. Ultimately, this will lead to greater acceptance and understanding of the final outcomes, rather than the scepticism of the EPA's proposals on non-road diesel.

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<sup>18</sup> Deloitte Access Economics (2015)

<sup>19</sup> NSW Environment Protection Authority, Upper Hunter Air Quality Particle Model (Oct 2014)  
<http://www.epa.nsw.gov.au/resources/air/upper-hunter-air-particle-report.pdf>

In relation to locomotives, EPA air emissions inventory shows that locomotives are responsible for a negligible portion of PM2.5 emissions and their inclusion as a priority is unjustified. Despite this it should be noted that the industry has already conducted significant proactive work on diesel emissions through the development of an agreed draft national industry standard and associated code of practice for diesel emissions from existing and new locomotives.

The agreed standard is to be approved and introduced through the Rail Industry Safety and Standards Board (RISSB) as AS7512.

This industry-led development of a standard for locomotive emissions demonstrates the commitment of freight rail operators to the improvement of air quality in NSW.

#### **4.2.5 Review of the NSW air quality monitoring network**

NSWMC supports a review of the air quality monitoring networks in NSW. Better air quality data would improve the assessment of priority actions and the robustness of cost benefit analyses.

As discussed earlier in this submission, there are several significant regional centres throughout NSW that do not have the benefit of air quality monitoring in the Government's public network. Establishing monitors in these centres would provide better data to inform air policy and better coverage of the entire NSW population.

It is worth noting that communities in NSW mining regions have some of the best access to air quality data of anywhere in the country. The mining and power generation industries funded the establishment and operation of 14 air quality monitors that make up the Upper Hunter Air Quality Monitoring Network, which provides real time, publicly available air quality data in the region. A similar industry-funded network has been established in the Newcastle region, bringing the total number of monitors in the Hunter to 20 – more than the total in the greater Sydney region. This has been supported by various particle characterisation studies conducted by the NSW Government.

However, the presence of the mining industry in a region should not mean that the mining industry should be the default source of funding for public air quality monitoring networks. The Upper Hunter was a unique case, and since the network was established the high quality data that has been collected has shown many other sources of pollution that have a greater impact on air quality than the mining industry.

In relation to industry monitoring conducted in accordance with approval and licence conditions, industry engagement early in the process is critical.

#### **4.2.6 Air quality forecasting**

The Consultation Paper puts forward potential actions to minimise community exposure to particle pollution (p.36). This includes expanding the scope of, and enhancing the accuracy of, air quality forecasting capabilities.

Through the industry's community engagement program in the Upper Hunter, the Upper Hunter Mining Dialogue, the industry became aware of the community's desire to see a publicly available air quality forecast implemented in the region to complement the real time air quality monitoring network. NSWMC wrote to both the previous and current Minister for the Environment on behalf of the Dialogue members urging them to expand forecasting capabilities to the Upper Hunter.

It is therefore welcome to see the Consultation Paper proposes the development of an air quality forecasting system for the Upper Hunter. However, the exact nature of this system is unclear from the Consultation Paper. NSWMC encourages the EPA and OEH to work with the Upper Hunter Mining Dialogue to ensure that the system meets the needs of the community and industry in the region.

Through commitments by the mining companies in the Upper Hunter Mining Dialogue, each company operating open cut mining operations in the region now uses weather forecasting systems to predict conditions that are more likely to generate dust at their sites, which allows them to plan their operations to minimise dust generation.

### 4.3 Priorities relating to non-mining emissions sources

The Consultation Paper also outlines priorities that relate to non-mining emissions sources. These include:

- Minimise emissions from coal-fired power stations.
- Explore policies and incentives to increase the uptake of electric vehicles by the NSW Government.
- Reduce toxic emission from service stations in regional centres.
- Reduce wood smoke emissions.
- Reduce emissions from domestic small petrol engines.
- Reduce impacts of hazard reduction and open burning on metropolitan and regional NSW communities.
- Achieve co-benefits (i.e. where measures to improve air quality also deliver on other policy objectives such as energy productivity and carbon emissions reductions).

As suggested in the Consultation Paper, CBA should be used to assess whether these priorities are likely to deliver net benefits to the community, and to quantify the magnitude of such benefits. However, based on existing information, the following priorities may be cost effective and deliver large improvements in public health:

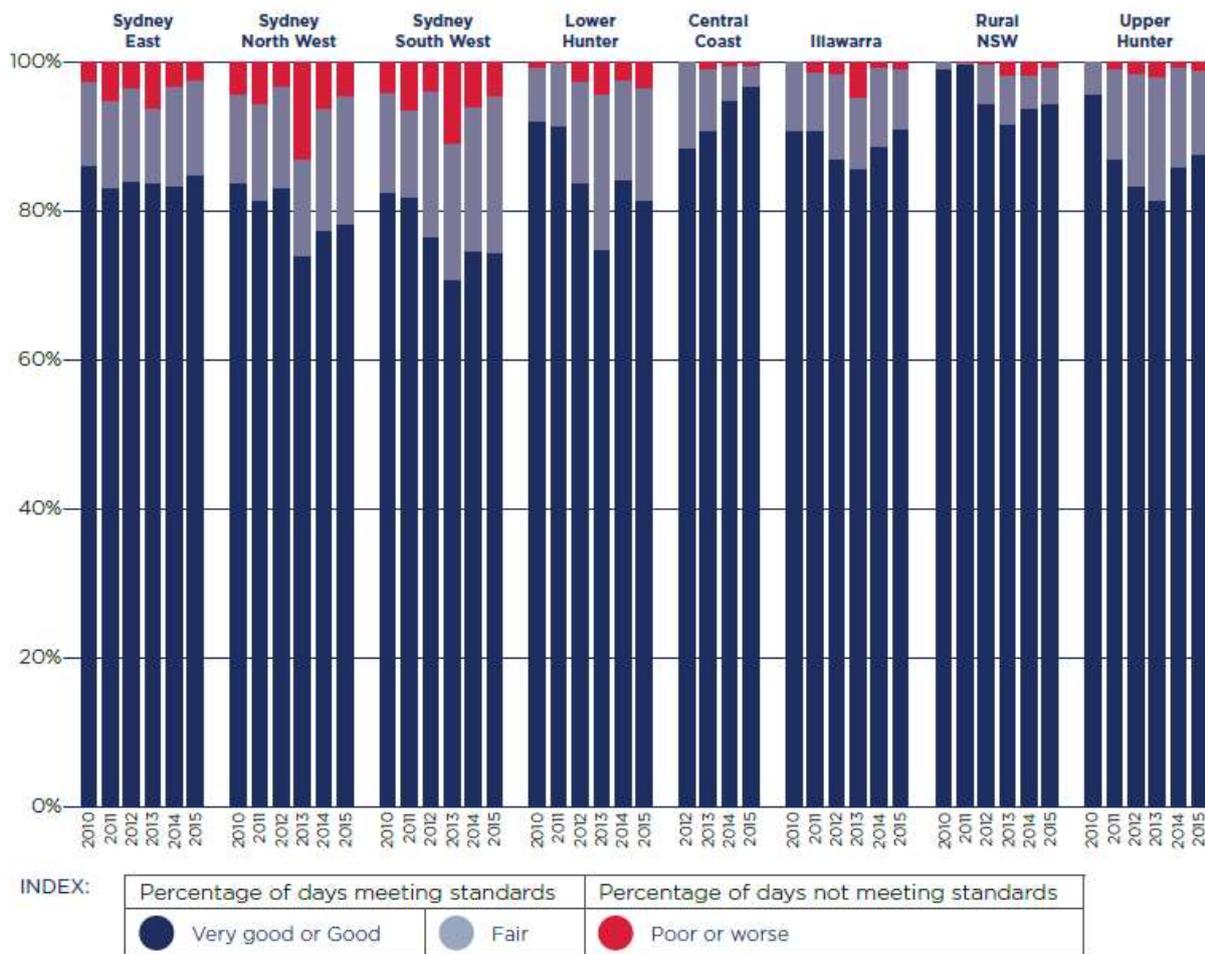
- A number of studies estimate positive benefit-to-cost ratios (BCR) for measures relating to wood-heaters (e.g. BDA Group, 2013; AECOM, 2011; Pacific Environment, 2013).
- This is also true of measures relating to domestic small petrol engines (e.g. Environment Protection and Heritage Council, 2010; Pacific Environment, 2013).
- While there does not appear to be a study that estimates the net benefits of reducing the impacts of hazard reduction burning in metropolitan NSW, this may be an economically efficient measure given that this would benefit a relatively large metropolitan population, and costs may be low.
- AECOM (2009) modelled various options to increase the uptake of electric vehicles, and found that these options were both economically and financially viable, albeit the returns are likely to accrue over the longer term.

Each of these measures relate to emissions reductions in areas with relatively high population densities. By contrast, it is unclear whether measures related to power stations and regional service stations would deliver net benefits. NSWMC is not aware of CBA studies that estimate the net benefits of these measures in the NSW context.

The quantification of co-benefits should be encouraged, as this provides for more robust CBA assessment, and therefore provides insights on the relative merits of potential measures. Equally the quantification of dis-benefits should not be overlooked. For example, if certain measures risk leading to reduced production, higher fuel use, higher carbon emissions, or reduced investment in new facilities – a robust CBA must take these factors into account.

### 4.4 Other potential measures that warrant further investigation

Figure 2 of the Consultation Paper (reproduced below) shows the number of poor air quality days in different NSW subregions.



**Note:** Compared with previous years, NSW experienced poorer air quality during 2013, due mainly to drier and hotter weather through the middle of the year and the impacts of bushfires in September, October and November.

**Figure 0.3: Poor air quality days in NSW sub-regions (after Figure 2, NSW EPA, 2016)**

The data show that over the 2010 to 2015 period, the greatest number of poor air quality days were in:

- Sydney East
- Sydney North West
- Sydney South West.

This data does not appear to contribute to, or directly correlate with, the subsequent identification of priorities. That is, the major sources located in or near the regions with the highest number of poor air quality days do not feature strongly the list of priorities.

Some text is included in the Consultation Paper that could be used to provide a possible justification for this lack of a clear link – “Sources contributing to fine particle concentrations across NSW are similar because these particles can travel a thousand or more kilometres from their source or the source of their precursor gases” (p.17, NSW EPA, 2016). However, this statement appears to somewhat contradict the source apportionment data presented within the Consultation Paper.

Overall, such assertions can be misleading and should not be relied on for priority setting. While particles can travel long distances, the relative contribution to health impacts of a source of particle

emissions thousands of kilometres away is likely to be negligible, relative to a nearby source. That is, reducing a quantum of particle emissions from a nearby source would deliver vastly greater health benefits than reducing the same quantum of particle emissions from a source thousands of kilometres away, by several orders of magnitude. As the Woolcock Institute for Medical Research stated in its December 2015 report for the NSW EPA and NSW Health, *“In order to minimise exposure to total ambient PM, those sources that emit the greatest quantities of PM in close proximity to people should be the focus of emission reduction options.”*<sup>20</sup>

The identification of problem regions warrants greater consideration and investigation of alternative emission reduction measures. For example, the health costs of emissions from road transport in Australia have been estimated to be \$2.7 billion per year (BTRE, 2005). The OECD (2014) estimated that about 50 per cent of the economic cost of air pollution in OECD countries is specifically attributable to road transport. There are likely to be a range of measures available to reduce emissions from transport. For example low emissions zones have proved to be successful, and provide estimated net benefits to society (e.g. **Eliasson, 2009**). As such, such measures should be provided with a suitable level of focus within the *Clean Air for NSW* document.

#### **Recommendations – Priorities to reduce emissions and exposure**

- The Clean Air for NSW plan should provide detailed justification for each priority action as to how it meets the objectives to *“Target emissions sources that have large impacts on air quality and human health”* and *“have the potential to provide the most cost-effective responses...”* Several priority actions in the Consultation Paper would not meet these objectives.
- The Government should firstly clarify the framework for identifying priority actions so that the full range of potential actions can be objectively assessed and prioritised, rather than the apparent preference for measures already underway.
- The Government should commit to early consultation on any major air policy initiatives, including providing opportunities to provide input into the assumptions of economic studies.

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<sup>20</sup> NSW Environment Protection Authority and NSW Ministry of Health (Dec 2015) [http://www.car-cre.org.au/images/content/Health%20impacts%20of%20PM%20report\\_final%20for%20web.pdf](http://www.car-cre.org.au/images/content/Health%20impacts%20of%20PM%20report_final%20for%20web.pdf)

## 5 Conclusions and recommendations

While NSWMC supports the development of an evidence based long term plan for air quality management in NSW, there are a number of matters raised within the Clean Air for NSW Consultation Paper that are particularly concerning to industry. NSWMC believes that the priority areas targeted in the Clean Air Plan for NSW are not evidence based and have not been demonstrated to deliver on the stated objectives of the plan.

NSWMC welcomes involvement in future consultation as the Clean Air for NSW plan continues development. NSWMC provides the following recommendations for the Government to consider in future developments of the Clean Air for NSW Plan.

### Recommendations – Clean Air Metric

- OEH should progress the development of the Clean Air Metric to inform Government priorities for air quality policy, while considering the following issues:
  - OEH should be wary of the complexities in developing a single metric for a range of air pollutants. If the complexities cannot be overcome, population weighted indicators for individual pollutants should be considered.
  - OEH should consider how gaps in the monitoring network (e.g. in some regional centres) will be accounted for in determining population-weighted exposure.
  - Monitors that are not linked to population (e.g. diagnostic monitors in the Upper Hunter Air Quality Monitoring Network) should not be used in the calculation of population-weighted exposure for a region.

### Recommendations – Air quality issues in NSW

- The Clean Air Plan should extend its focus beyond the Greater Metropolitan Region boundary to capture significant regional towns and emission sources that lie outside the Greater Metropolitan Region boundary.
- The Clean Air Plan should prioritise the use of population exposure data over emissions inventory data to guide priority actions, given the limitations of air emissions estimations.

### Recommendations – Priorities to reduce emissions and exposure

- The Clean Air for NSW plan should provide detailed justification for each priority action as to how it meets the objectives to “*Target emissions sources that have large impacts on air quality and human health*” and “*have the potential to provide the most cost-effective responses...*” Several priority actions in the Consultation Paper would not meet these objectives.
- The Government should firstly clarify the framework for identifying priority actions so that the full range of potential actions can be objectively assessed and prioritised, rather than the apparent preference for measures already underway.
- The Government should commit to early consultation on any major air policy initiatives, including providing opportunities to provide input into the assumptions of economic studies.