



THE UNIVERSITY OF  
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Air Quality Coordinator  
Department of Environment, Land, Water and Planning  
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Dear Sir/Madam,

I am pleased to be able to make a submission in response to Victoria's Air Quality Statement. I am an academic in Chemical Engineering at The University of Melbourne, working primarily on the chemistry of air pollution. I am an internationally recognised expert in my field, having published over 100 peer reviewed articles, given invited talks at major international conferences, and been awarded a prestigious ARC Future Fellowship to work on air pollution chemistry. I am also passionate about air quality and environmental science, and am devoted to working on these issues through research, teaching, and public outreach.

Please find my submission below. This submission focuses on what I see as some of the greatest and most under-recognised threats to Victorians accessing the clean and safe air that we all deserve, based on the latest science of air pollution.

Please do not hesitate to contact me if you would like to discuss this further.

Yours Sincerely,

Dr. Gabriel da Silva

## Submission in Response to Victoria's Air Quality Statement 2018

Exposure to unsafe air is a threat to all Victorians. It is a threat that comes from many sources and is largely invisible, and exposure to it is usually outside a person's control. Air pollution impacts upon the health of tens of thousands of Australians and is responsible for over three thousand deaths a year<sup>1</sup>. This places air pollution above car accidents and suicides as preventable causes of death<sup>2</sup>. These issues are all of national significance, and our goal should be to reduce their toll to zero. Premature deaths due to unhealthy air are a significant drain on our health system and on the nation's productivity. Not only do the benefits of cleaner air include better health and productivity, international examples have shown that improving air quality adds value to the economy. For example, it was forecast that rigorous implementation of the *Clean Air Act* in the United States would result in estimated savings of US\$2 trillion on an investment of US\$65 billion<sup>3</sup>: a return-on-investment of better than 30 to 1. A strong air quality strategy is required to protect Victorians from unhealthy air which could also have the added benefit of strengthening the state economy.

Victoria's Air Quality Statement (2018) highlights good work that is being implemented to tackle the state's air pollution problems, however, it provides little detail about the negative impacts of Victoria's current air quality and the need for improvement. For example, the Statement does not address the current adverse impact and potential costs on productivity and on human health of polluted air that typically meets air quality standards. The Statement also has a focus on known threats to air quality, which form the basis of the EPA-CSIRO assessment up to 2030. However, I would like to highlight that this analysis cannot incorporate the "unknown unknowns" that can develop to threaten air quality in a growing state and changing world. New pollutants and incidents can and will emerge, presenting new challenges to public health. An effective strategy to combatting air pollution needs to be rigorous and flexible in order to respond to such challenges. We should not be complacent because we believe that we breathe "great" air. Finally, the Statement neglects to address CO<sub>2</sub> and ozone depleting substances; air pollutants that our state contributes to which have the potential to significantly impact life in Victoria. They degrade the quality of our air and must be incorporated into a comprehensive air quality strategy.

National ambient air quality standards under the National Environment Protection Measure (NEPM) need to be tightened now. The 2015 variation to the NEPM aims to bring 2.5 µm particulate matter (PM2.5) standards in line with World Health Organization (WHO) guidelines<sup>4</sup>, but not until 2025.

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<sup>1</sup> Australian Institute of Health and Welfare, Australian Burden of Disease study: Impact and causes of illness and death in Australia, 2011. <https://www.aihw.gov.au/reports/burden-of-disease/abds-impact-and-causes-of-illness-death-2011>.

<sup>2</sup> Australian Bureau of Statistics, Australia's Leading Causes of Death, 2016. <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/3303.0~2016~Main%20Features~Australia's%20leading%20causes%20of%20death,%202016~3>.

<sup>3</sup> United States Environmental Protection Agency, Benefits and Costs of the Clean Air Act 1990 – 2020, the Second Prospective Study, 2011. <https://www.epa.gov/clean-air-act-overview/benefits-and-costs-clean-air-act-1990-2020-second-prospective-study>.

<sup>4</sup> World Health Organization, WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide, 2005. [http://www.who.int/phe/health\\_topics/outdoorair/outdoorair\\_agg/en/](http://www.who.int/phe/health_topics/outdoorair/outdoorair_agg/en/).

Additionally, the annual average standard for PM<sub>10</sub>, set at 25 µg/m<sup>3</sup>, is significantly above the WHO guideline of 20 µg/m<sup>3</sup>. There is no known safe level for PM<sub>2.5</sub> exposure, and the state government should advocate hard for tighter standards to be enacted sooner. Furthermore, enforceable standards that meet or exceed the WHO guidelines for O<sub>3</sub> (100 µg/m<sup>3</sup> 8-hour mean), NO<sub>2</sub> (40 µg/m<sup>3</sup> annual and 200 µg/m<sup>3</sup> 1-hour means), and SO<sub>2</sub> (20 µg/m<sup>3</sup> annual and 500 µg/m<sup>3</sup> 1-hour means) should be a priority. There are many mechanisms by which to go about routinely meeting these tight standards across the state once enacted – eliminating coal fired power stations and restricting diesel vehicles just to mention two – but without strict standards in place these actions will be all the more difficult to take.

A major source of air pollution in Victoria is smoke. It has many sources, and they all produce toxic particulate matter. The latest research also shows that smoke, from bushfires to cigarettes, produces isocyanic acid<sup>5</sup> (or HNCO), which is dangerous to human health at levels of even 1 part per billion. Wood-fired heaters are one major smoke source, known to contribute to poor winter air quality in Victoria and throughout Australia. Monitoring wood smoke pollution and developing a strategy to reduce it is paramount to securing safe air in the state. Many major air pollution events in this state in recent years have also been associated with largescale fires. These include the Hazelwood coal mine fire (2014), the Broadmeadows tyre fire (2016), the Coolaroo recycling plant (2017) and Knox Transfer Station (2018) waste fires, and the Cobrico peat fires (2018). These unpredictable incidents come on top of annual controlled fuel reduction and logging debris burns and uncontrolled bushfires. The improved capability to monitor major smoke events in the wake of the Hazelwood mine fire is welcomed, but increased monitoring should just be the start. Controlled burns can be better planned to minimise air pollution, particularly burns at logging coupes that are solely for commercial purposes. The ability to stockpile flammable material, from coal to recyclables, needs to be considered an air quality threat and managed accordingly. The storage of recyclable waste is a particularly pressing problem given China's current ban on waste importation, coming on top of a significant waste fire every year since 2016 in this state.

In addition to monitoring and controlling for the standard suite of ambient air pollutants (PM, O<sub>3</sub>, NO<sub>x</sub>, SO<sub>x</sub>), a robust air quality strategy needs to consider air toxics: those gases that are harmful to human health at low concentrations in what might otherwise be considered clean air. One example is isocyanic acid, which as mentioned above can be produced by biomass burning, but is also an atmospheric by-product of nicotine<sup>6</sup> (whether smoked or vaped) and is formed by diesel vehicles<sup>7</sup>. The Air Toxics NEPM needs to be flexible enough to respond to emerging pollutants of concern such as this, and the state government should take a leading role in achieving this end or developing an alternative solution. Regulatory frameworks outside of the *National Environment Protection Council Act* are already available to limit exposure to certain air toxics. One such example is methyl bromide, which is used in Victoria for fumigation purposes, and is also regulated under the *Montreal Protocol*

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<sup>5</sup> J. M. Roberts et al., Isocyanic Acid in the Atmosphere and its Possible Link to Smoke-Related Health Effects, Proceedings of the National Academy of Sciences USA, 108, 8966-8971, 2011.

<sup>6</sup> N. Borduas et al., Gas Phase Oxidation of Nicotine by OH Radicals: Kinetics, Mechanisms, and Formation of HNCO, Environmental Science and Technology Letters, 3, 327-331, 2016.

<sup>7</sup> S. H. Jathar et al., Investigating Diesel Engines as an Atmospheric Source of Isocyanic Acid in Urban Areas, Atmospheric Chemistry and Physics, 17, 8959-8970, 2017.

as an ozone depleting substance. The latest community exposure limits recommended for methyl bromide are only 2 parts per billion<sup>8</sup>, and it is presently being investigated as the cause of a motor neuron disease cluster in New Zealand<sup>9</sup>. Fumigant emissions can be captured or destroyed, and a legal mechanism is presently in place to enforce this.

Based upon my research and the evidence presented above, I recommend the following be considered as priorities under an air quality strategy that would move Victoria towards cleaner, healthier air for all:

- Enforceable standards on ambient air pollutants that meet or exceed WHO guidelines, either within or outside of the NEPM framework.
- Action against the greatest contributors to ambient air pollutants, including coal fired power stations and diesel trucks, as well as restrictions on future expansion of such activities.
- Major efforts to tackle smoke pollution, from individual wood fireplaces to large industrial and forest fires.
- A re-evaluation of the way in which air toxics are regulated, so that the Government is empowered to rapidly respond to emerging threats from highly toxic air pollutants.
- Regulation of CO<sub>2</sub> and ozone depleting substances as air pollutants that impact air quality in Victoria.

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<sup>8</sup> L. T. Budnik et al., Prostate Cancer and Toxicity from Critical Use Exemptions of Methyl Bromide: Environmental Protection Helps Protects Against Human Health Risks, *Environmental Health*, 11, 5, 2012.

<sup>9</sup> I. Shaw, Motor Neurone Disease – A Methyl Bromide Exposure Cluster Points to a Causal Mechanism, *Human and Experimental Toxicology*, 29, 241-242, 2010.