

Submission to the New South Wales Environment Protection Agency on the Mt Piper Power Station License Review

December 2018



67 Payneham Road
College Park SA 5069
P 0422 974 857
E admin@dea.org.au
W www.dea.org.au

Healthy planet, **healthy people.**

DEA Scientific Committee

Prof Peter Doherty AC
Prof Stephen Leeder AO
Prof Lidia Morawska
Prof Hugh Possingham
Dr Rosemary Stanton OAM

Prof Stephen Boyden AM
Prof Michael Kidd AM
Prof Ian Lowe AO
Prof Peter Newman AO
Prof Lawrie Powell AC
Dr Norman Swan

Prof Emeritus Chris Burrell AO
Prof David de Kretser AC
Prof Robyn McDermott
Prof Emeritus Sir Gustav Nossal AC
Prof Fiona Stanley AC

Doctors for the Environment Australia is a non-profit group of doctors and medical students concerned with protecting health through protecting the environment. We welcome the opportunity to make a submission to the review of Environmental Protection Licenses (EPL) for NSW power stations. The submission covers SO₂, NO_x, mercury and primary particles. This does not suggest that the other pollutants have no effect on health.

The science of air pollution effects on health, and on the transport of air pollutants over long distances has advanced in recent years, revealing serious health burdens that were previously not recognised. An increase of 10µg/m³ of fine particle pollution in the 2.5 microns size class is known to increase the risk of all-cause mortality by 6%, the risk of low birth weight in babies by 39%, and the risk of new onset type 2 diabetes by 15%.² These effects have been demonstrated in large high-quality cohort studies and in meta analyses of such studies.^{3, 4} Because everyone is exposed, the health burden on the population is significant.

The transport of gases and secondary particles into the Sydney basin has been studied by scientists from Australia's Nuclear Science and Technology Organisation (ANSTO), demonstrating the relative contributions to Sydney's air from the three power station clusters in the Hunter, Central Coast, and Lithgow. This work by Crawford published in June 2018⁵ gives unprecedented insights into the health burden placed on the people of NSW by the combustion products from coal fired electricity. Meteorological backtracking was performed hourly on data from 1,420 days to see if air at Richmond had recently been over one of the power stations. On 800 days the back trajectory crossed over at least one of the power stations. Fifty percent of these were from the Central Coast, 34% from Lithgow, and 16% from the Muswellbrook generators.

The original expectations that by locating power stations distant from Sydney, the majority of the NSW population would be protected from pollution has not been fulfilled. Secondary particles from SO₂ released by coal combustion form an important part of the PM_{2.5} in Sydney, and a higher proportion of the fine particles in the regions where the power stations are located.⁶

An estimate of the health burden from these power stations has been published⁷ by Environmental Justice Australia and the resulting annual health burdens are listed in table 1.

Table 1: Annual health burdens attributable to fine particle air pollution from each coal fired generator in NSW.

	Mortality	Years of life lost	Low birth weight	Diabetes
Bayswater	40	376	34	50
Liddell	27	250	22	34
Eraring	87	815	76	113
Vales Point	46	427	40	59
Mt Piper	36	340	35	47

These are substantial health burdens that impose a significant cost on the community and could be prevented by better environmental regulation. If current lax licencing conditions are continued, the community will suffer these health effects every year of continued operation.

Mercury: Australia has signed and hopefully will soon ratify the Minamatta Convention for the control of environmental releases of mercury. As power stations are substantial emitters of mercury and the convention specifies measures that must be taken to reduce mercury release it would be prudent for the current license review to ensure the NSW power stations will be compliant with Australia's obligations under that treaty.

Bringing pollution control technologies up to date

NSW power stations all have fabric filters to control primary particles, and when maintained properly these are very effective. Two power stations, Liddell in 2008 and Vales Point in 2007 were required to install these as retrofits, replacing the less effective electrostatic precipitators. This is an important precedent that as science and technology advances, industrial plant with long operational lives can be required to update production processes to modern standards. Health benefits can accrue from this. The new information about creation and transport of secondary particles from SO₂ emissions means it is now time to take a similar step with SO₂ controls.

Post combustion control of SO₂ and NO₂ is feasible and is required technology in most developed countries.

The most appropriate comparison when examining international standards is the limits being mandated for existing plants of over 300MW capacity that burn black coal. The European Union made a

decision in April 2017 on new standards that must be complied with by 2021. As can be seen in table 2 the European Union concentration limits for existing power plants are set as annual averages, not as maximum permissible concentrations. Current NSW concentration limits are 9.7 times higher than the maximum permissible European value. As in NSW average current stack emissions are about half the concentration limit, the new European standards would allow only about 1/5 of current pollution.

Table 2. EPL limits for NSW power stations and selected international jurisdictions.

	SO ₂ mg/m ³	NO _x mg/m ³ equivalent NO ₂	Mercury mg/m ³	Total Particles mg/m ³
Bayswater	1760	1500	1	100
Liddell	1760	1500	1	100
Eraring	1760	1100	0.2	50
Vales Point	1760	1500	1	100
Mt Piper	No limit	1500	0.2	50
European Comply by 2021	Existing plant 20-180. New plant 20- 75 annual average.	Existing plant 85-150. New plant 50-85 annual average. Pre-2014 plant allowed 175.	Existing plant, coal 0.001 to 0.004, lignite 0.001 to 0.007	
South Korea	142	102		
Japan	68	57		

The form of the regulation

It should be noted that the NSW EPL sets a maximum concentration value that should not be exceeded, but that average values are generally well below this. For instance, Bayswater periodic NO_x measurements over the period 2011-2016 had the average value of 659 mg/m³ and maximum value of 940 mg/m³ while the license limit was 1,500. This method of setting license limits does not match what we know about the health impacts. The health effects are proportional to total annual NO₂ released, some of which will form secondary fine particles, and some will lead to ozone formation which cause the majority of the health impact, so are much more closely related to the average value than the maximum value. To protect health, it makes better sense to set a license limit for the annual average than for the worst day of the year.

Concentration limits or emission intensity?

What predominantly matters to public health is the total environmental burden of the pollutants. This suggests regulation of the total load rather than concentration in flu gases. This is especially true as the concentration can be artificially reduced by blowing more air up the chimney, as is standard operating procedure for at least one power station when the concentration limit is approached. A more logical approach is to set an allowable emission intensity of Kg of pollutant per MWh produced. This is the form of regulation adopted in the US, and Table 3 shows the current emission intensities and the applicable limit value from the US.

Table 3: Emission intensities: 2016-17 NPI emissions divided by production figures from the Australian Energy Market Operator.

	SO ₂ Kg/MWh	NO ₂ Kg/MWh	Mercury mg/MWh	PM _{2.5} g/MWh
Bayswater	3.15	2.02	4.6	18
Liddell	3.52	1.96	4.4	19
Eraring	2.04	1.24	0.1	10
Vales Point	1.97	2.58	0.7	9
Mt Piper	4.23	2.91	3.8	8
US rule 2012	0.68	0.45	5.9	

DEA supports the setting of EPL limits as annual average emission intensities at levels that will require the installation of best available pollution technology to the fleet of coal fired generators. The only exception should be for plants that have announced closure within 4 years. The American levels of 0.68 Kg SO₂ per MWh and 0.45 Kg NO₂ per MWh are achievable so should be adopted here.

Recommendations

1. That the operating license for Vales Point, Eraring and Mount Piper power stations be amended to specify annual average emissions intensity of no more than 0.68 Kg SO₂, 0.45 Kg NO₂ and 5 mg mercury per MWh of electric power dispatched.
2. That the operating licenses continue to require the operation of fabric filters to control primary particle emissions, and that the annual emissions intensity limit for PM_{2.5} be 10 g/MWh which all power stations under review are currently achieving.

3. That continuous monitoring of stack emissions be installed and published on line in real time and as searchable retrospective data covering SO₂, NO_x, PM_{2.5} and mercury.
4. That publicly available ambient air monitoring be installed at Lithgow and Wyee.
5. That generators have until December 2019 to design how they will comply, and that pollution control technology must be in place by December 2021.
6. That the NSW load-based licensing system be revised so that the fees match the full health externality cost of the air pollution, and that this fee applies to residual emissions after best available retrofit technology has been installed.

References

¹ <https://www.epa.nsw.gov.au/>

² Krewski, D., M. Jerrett, R.T. Burnett, R. Ma, E. Hughes (2009). Extended Follow-Up and Spatial Analysis of the American Cancer Society Study Linking Particulate Air Pollution and Mortality. Cambridge, Health Effects Institute, Report Number 140.

³ Bowe, B., et al. (2018). "The 2016 global and national burden of diabetes mellitus attributable to PM_{2.5} air pollution." *Lancet Planetary Health* **2**: e301.

⁴ Pedersen, M. (2013). "Ambient air pollution and low birthweight: a European cohort study (ESCAPE)." *Lancet Respiratory Medicine* **1**(9): 695-704.

⁵ Crawford, J., et al. (2018). "The impact of closure of coal-fired power stations on aerosol concentrations in the Sydney Basin." *Atmospheric Pollution Research*.

⁶ Mark Hibberd, M. K., Paul Selleck, David Cohen, Ed Stelcer, Armand Atanacio (2013). Upper Hunter Particle Characterisation Study, NSW Office of Environment & Heritage.

⁷ https://www.envirojustice.org.au/wp-content/uploads/2018/11/Ewald_B_2018_The_health_burden_of_fine_particle_pollution_from_electricity_generation_in_NSW.pdf