

Power station NO₂ emissions and paediatric asthma in Central Coast, Hunter Valley and Sydney Local Government Areas

Briefing note by Dr Ben Ewald*, January 2021

Asthma is a common paediatric illness that has many causes, one of which is nitrogen dioxide (NO₂), a pollutant that comes from power stations and road vehicles.

Across the Greater Metropolitan Region (GMR), 46% of NO₂ comes from power stations, 15% from road vehicles, with the road pollution being released closer to where many people live.

Modellers at the University of Exeter in the United Kingdom used CALPUFF, an advanced, integrated modelling system for the simulation of atmospheric pollution dispersion, to estimate the proportion of ground-level NO₂ that originated from NSW coal-fired power stations (CFPS) across Local Government Areas. CALPUFF is the NSW Environmental Protection Authority's approved method for modelling and assessing air pollutants.

Publicly available health and population data was used to determine the number of children in Local Government Areas on the Central Coast and in Sydney and the Hunter Valley who have asthma, and the proportion that is attributable to NO₂ emitted by CFPSs (see Table 1 below).

Analysis found 6% of asthmatic children in Lake Macquarie LGA suffered the condition due to power station NO₂ emissions, while the figure was 5% for the Central Coast, Cessnock and Muswellbrook.

Emissions of NO₂ from NSW CFPSs could be significantly reduced using existing technologies, such as scrubbers, and by applying stricter air pollution standards.

All countries in North America, Europe or North Asia require power stations to have scrubbers that remove noxious gases from the chimney before they escape into the atmosphere.

The NO₂ emissions standards for CFPSs in other countries are significantly more stringent than those that apply in NSW.

While the NSW power stations comply with their licences, the emissions standards contained within those licences are decades old and do not reflect world's best practice.

For example, Vales Point power station in NSW is allowed 1500 mg/m³ NO₂ whereas the standard for existing plants in Europe is 150 mg/m³ and 57 mg/m³ in Japan.

*Dr Benjamin Ewald is Conjoint Senior Lecturer, School of Medicine and Public Health, University of Newcastle, and a member of Doctors for the Environment Australia.

Table. Ground-level NO₂ concentrations (PPB) in Sydney, Central Coast and Hunter Valley Local Government Areas. Number of children aged 2-14 with asthma attributable to CFPS NO₂ emissions. The percentage of all asthma cases attributable to CFPS NO₂ emissions.

LGA	NO ₂ PPB	Cases	95% ci Lower	95% ci Upper	% of all cases
Lake Macquarie	2.50	320.7	132.3	439.5	6
Central Coast	2.21	334.5	137.7	459.1	5
Cessnock	2.21	88.8	36.6	121.9	5
Muswellbrook	2.07	26.7	11.0	36.7	5
Maitland	1.81	108.6	44.6	149.4	4
Newcastle	1.62	150.2	61.6	206.6	4
Singleton	1.55	27.0	11.1	37.1	4
Hornsby	1.18	107.6	44.0	148.4	3
Upper Hunter	1.03	10.9	4.5	15.0	2
Northern Beaches	1.02	166.5	68.0	229.8	2
The Hills Shire	0.93	34.1	13.9	47.0	2
Port Stephens	0.92	42.1	17.2	58.1	2
Ku-ring-gai	0.90	72.5	29.6	100.0	2
Willoughby	0.82	38.4	15.7	53.1	2
Edward River	0.82	6.8	2.8	9.3	2
Mosman	0.78	13.1	5.3	18.1	2
Hawkesbury	0.76	38.0	15.5	52.5	2
Ryde	0.76	46.3	18.9	63.9	2
North Sydney	0.76	20.4	8.3	28.1	2
Woollahra	0.74	12.5	5.1	17.2	2
Lane Cove	0.74	15.8	6.4	21.8	2
Waverley	0.72	14.9	6.1	20.6	2
Blacktown	0.71	57.1	23.3	78.9	2
Parramatta	0.70	30.0	12.2	41.4	2
Sydney	0.69	23.0	9.4	31.8	2
Hunters Hill	0.69	6.1	2.5	8.5	2
Randwick	0.67	27.2	11.1	37.6	2

Notes

[1] The definition for asthma is 12-month period prevalence, i.e., children who have been wheezy or required asthma medications in the last 12 months.

[2] Asthma prevalence was derived from the NSW health survey, and population data from the Australian Bureau of Statistics.

[3] The risk estimate is from a meta-analysis published by Khreis, H., et. al, 2017. Exposure to traffic-related air pollution and risk of development of childhood asthma: A systematic review and meta-analysis, Environment International Volume 100, March 2017, Pages 1-31