

The dirty truth


Australia's
most polluted
postcodes



AUSTRALIAN
CONSERVATION
FOUNDATION

The dirty truth:

Air pollution is a
class and climate
issue in Australia.

**90% of the burden
of air pollution
falls on low to
middle income
households** 

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Executive summary

Air pollution is seriously damaging the health of Australians across the country. In Melbourne's west, children breathe in the exhaust from trucks. In the Hunter Region of NSW, families are affected by coal dust. In Morwell, Victoria, people have inhaled fumes from a fire in a major coal mine. In these communities, and others, the toxic toll of pollution falls upon those with the least resources to do something about it. This research report shows that air pollution in Australia is both a class and a climate issue. 90% of the burden of air pollution falls upon low to middle income households, yet only 0.1% of air pollution falls on the highest income households.

Air pollution is killing thousands of Australians. An estimated 3,000 Australians die prematurely from urban air pollution every year.¹ This is more than two-and-a-half times the number of deaths on our roads.² Air pollution results in higher rates of illness such as asthma, emphysema, chronic bronchitis and other chronic pulmonary diseases.³ Yet, the Australian government has no strategy to effectively address the cause of this health crisis.

This report focuses on who is bearing the brunt of the impacts of air pollution in Australia.

It compares current levels of air pollution with the socio-economic distribution of the population. The analysis overlaid emissions data from National Pollutant Inventory (NPI)⁴ with weekly household income distribution data from the Australia Bureau of Statistics (ABS).⁵ It shows middle to low income households are bearing the brunt of air pollution in this country.

This report shows:

- Tens of thousands of lower income families face a disproportionate exposure to air pollution compared to wealthier Australians:
 - 90% of polluting facilities are in low to middle income suburbs (average household income: \$0 to \$2,000 per week).
 - Low-middle income households (income: \$702 – \$1,000 per week) host nearly half of all polluting facilities.

- Wealthier Australians experience a fraction of annual national emissions. Only 0.1% of polluting facilities are in postcodes home to the top 20% of household incomes (average household income >\$3,000 per week).
- 91% of all air pollution in Australia comes from three major industry classes: mining, manufacturing and utilities (electricity, gas, water and waste). These industries are all deeply embedded in existing fossil fuel supply chains and have large carbon footprints.
- Of the five most polluted postal areas in Australia (Newman, Latrobe Valley, Mount Isa, Collie, Hunter Region), coal-fired power stations are the largest emitters in three, while mining operations create the most emissions in the other two.
- People living in Australia's largest cities are generally exposed to higher concentrations of air pollution. This is due to the geographical disbursement of polluting facilities around major urban hubs and the prevalence of other major sources of air pollution such as vehicle emissions. The most polluted urban areas are often located on the fringes of major population centres. Postcodes including the Port of Brisbane, Altona in Melbourne, Botany Bay in Sydney and Port Adelaide are all located within the outer urban suburbs of their respective cities.
- Queensland and Western Australia have a disproportionate number of facilities relative to their share of the Australian population.

Despite the impact of air pollution on Australians' health, and unlike most other countries, Australia has no binding national air pollution standards. Instead, we have non-binding reporting standards that are negotiated between state, territory and federal governments. Harmful impacts can occur from exposure at levels even below our existing air quality standards.⁶ National standards to drive down pollution would ensure a consistent approach applies in every community across Australia.

Air pollutants also exacerbate climate change and, as a result of worsening climate damage, the frequency and impact of extreme air pollution events is increasing.

Tightening Australia's air pollution standards and curbing toxic emissions would enhance national efforts to drive down greenhouse gas emissions.

As a society, we cannot separate the economic gains derived from these facilities from the social cost of the air pollution they generate.

This research adds urgency to the call for governments to develop credible energy transition plans for communities affected by the mining and

burning of harmful fossil fuels. Transitioning to renewable energy and away from fossil fuel power generation will provide communities with long-term economic opportunities and help to reduce the pollution that is causing climate damage. It will also improve the health and wellbeing of these communities by removing the largest sources of toxic air pollution.

Recommendations

All Australians rely on having clean, safe air to breathe. The Australian government has a responsibility to safeguard the health of all Australians and prevent air pollution from damaging and killing people. To deliver this basic but vital need, the Australian government must:

1. Establish new laws and a National Sustainability Commission to set national air pollution standards

Establish an independent commission to introduce ambient air standards and stack emissions standards as part of a new national environment act for highly polluting industries, such as the coal-fired power sector, to ensure a consistent national approach applies to every community across Australia.

2. Establish a national Environment Protection Authority (EPA) to enforce the law

Establish an independent Commonwealth regulator, a national EPA, responsible for monitoring, implementing and enforcing national air pollution standards.

3. Require states and territories to comply with national standards

Develop implementation plans and criteria for the regulation of polluting activities to make sure the new standards are met.

4. Develop an environmental justice framework

In conjunction with state and territory governments, ensure that disadvantaged communities do not continue to bear a higher burden of pollution than other Australians. An environmental justice framework should include requirements on decision-makers to consider environmental justice implications of their decisions, to take action to reduce pollution in disadvantaged areas, and to not approve any new polluting facilities in low-socioeconomic areas.

Figure 1

Top five postcodes for NPI emissions

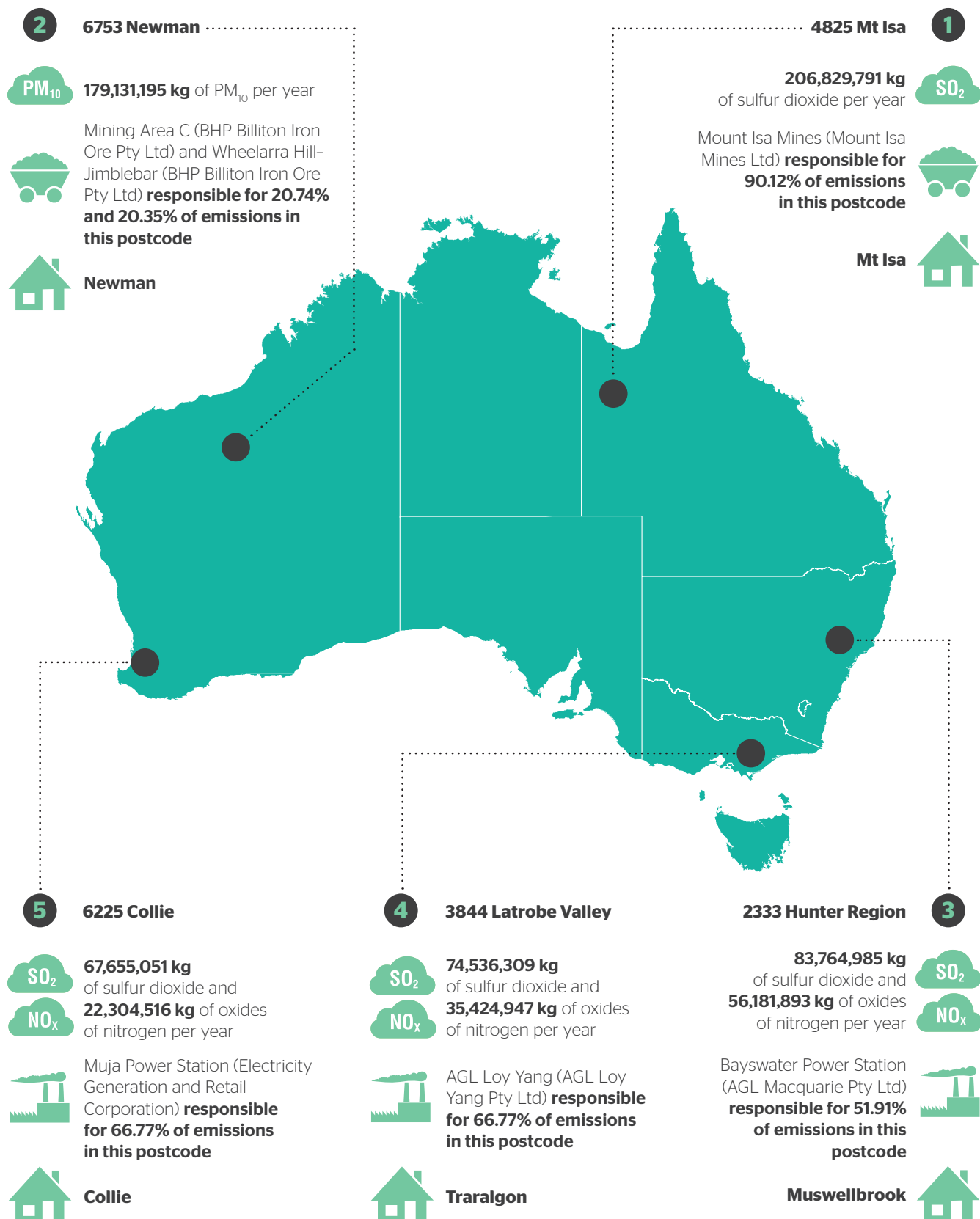










Figure 2

Postcode with highest NPI emissions in each Australian capital city

City	Postal area and major suburbs	Federal electorate	Largest pollutants	Largest facility
1 Sydney NSW	Botany Bay (2019) Botany Banksmeadow	Kingsford Smith Hon Matt Thistlethwaite MP	NO _x -58% SO ₂ -40%	 Refinery Qenos Olefines and Site Utilities Plants (QENOS Pty Ltd) responsible for 82% of emissions in this postcode
2 Melbourne VIC	Altona (3018) Altona Seaholme	Gellibrand Tim Watts MP	NO _x -37% SO ₂ -58%	 Refinery Altona Refinery (Mobil Refining Australia Pty Ltd) responsible for 86% of emissions in this postcode
3 Brisbane QLD	Port of Brisbane (3018) Lindum Lytton Wynnum	Bonner Ross Vasta MP	SO ₂ -80%	 Refinery Caltex Refineries (Caltex Refineries (Qld) Pty Ltd) responsible for 97% of emissions in this postcode
4 Perth WA	Parmelia (6167) Orelia Kwinana Beach Parmelia	Brand Madeleine King MP	SO ₂ -69%	 Refinery BP Refinery (BP Refinery (Kwinana) Pty Ltd) responsible for 78% of emissions in this postcode
5 Adelaide SA	Port Adelaide (5015) Ethelton Glanville Birkenhead	Port Adelaide Hon Mark Butler MP	NO _x -95%	 Cement Plant Birkenhead Plant (Adelaide Brighton Cement Ltd) responsible for 95% of emissions in this postcode
6 Hobart TAS	Moonah (7009) Lutana Derwent Park Moonah	Denison Andrew Wilkie MP	NO _x -40% SO ₂ -57%	 Metal Smelter Nyrstar Hobart (Nyrstar Hobart Pty Ltd) responsible for 100% of emissions in this postcode
7 Canberra ACT	Fyshwick (2609) Pialligo Symonston Fyshwick	Canberra Gai Brodtmann MP	PM ₁₀ -59%	 Quarry Boral Mugga Lane Quarry (Boral Resources Pty Ltd) responsible for 64% of emissions in this postcode
8 Darwin NT	Malak (0812) Anula Marrara Leanyer	Solomon Luke Gosling OAM MP	NO _x -86%	 Waste Management Shoal Bay Waste Management Facility (Darwin City Council) responsible for 78% of emissions in this postcode

Our analysis

This report examined emissions data from the National Pollutant Inventory (NPI) and weekly household income data from the Australia Bureau of Statistics (ABS).

NPI data includes the annual emission volumes of major air pollutants produced by each facility as well as their geographic location. The ABS provides the average weekly household income for every Australian postcode. The postcodes

were then categorised by income level in line with the household income percentiles from the 'ABS Household Income and Wealth Australia: Summary of Results 2015-16.'⁷ This report utilised these categories with a naming structure detailed in Figure 3. By mapping the location of NPI facilities against Australian postcodes, the report was able to draw comparisons between household income and pollution levels within each postcode.



The correlation between income and air pollution

The burden of air pollution rests disproportionately on the shoulders of poorer Australians.

Ninety per cent of polluting facilities reported in the NPI are in Australian postcodes with an average weekly income in the bottom 60% of all Australian households. However, those living in the most prosperous areas of our nation experience a fraction of annual national emissions. Only 0.1% of polluting facilities are located in postcodes in the top 20% of household incomes. Households in the bottom 20% also have a low exposure to polluting facilities – this is primarily due to the tendency for households which earn less than \$701 a week to be located in rural and remote areas.

Low-middle income earners in Australia host nearly half of all polluting facilities recorded in the NPI.

The geographic distribution of polluting facilities manifests in negative health outcomes in communities already experiencing social or economic disadvantage. Individuals in these communities are more vulnerable to the effects of air pollution, particularly the very young, elderly and those with pre-existing health problems. Current air pollution laws do not adequately protect these communities.

In February 2018, Doctors for the Environment Australia released research linking abnormally low birth weights in the Latrobe Valley to the air emissions produced by the region's three large brown coal-fired power stations.⁸ A similar pattern is occurring in vulnerable communities all across Australia.

Figure 3

Number of polluting facilities across Australian postal areas distributed into quintiles based on weekly household income

Income distribution (percentile)	0-20	20-40	40-60	60-80	80-100	ALL
Name	Low income	Low-middle income	Middle income	Middle-high income	High income	
Weekly household income	\$0-\$701	\$702-\$1,258	\$1,259-\$2,000	\$2,001-\$3,097	\$3,097+	
Number of facilities	48	934	913	211	2	2,108
% of total facilities	2.3%	44.3%	43.3%	10.0%	0.1%	100%

Figure 4

Distribution of NPI facilities across ABS household income quintiles



All too often, the most vulnerable bear the highest burden of air pollution, which affects Australians across the country. In Melbourne's west, children breathe in the exhaust from trucks. In the Hunter Region of NSW, families are affected by coal dust. In Morwell, Victoria, people have inhaled fumes from a fire in a major coal mine.

Studies of environmental justice have long revealed that poor and powerless communities bear the burden of pollution.⁹ These communities often live closest to sources of pollution, such as power plants, industrial installations and heavy traffic. In Australia, hazardous dumps, rubbish tips and polluting facilities end up in these neighbourhoods far more often than in affluent suburbs.¹⁰

Communities in Melbourne's western suburbs often feel they are used as the dumping ground for the rest of Melbourne. While rubbish tips in other parts of Australia's fastest-growing city are being progressively closed, the huge landfills in Werribee, Ravenhall and Wollert keep getting bigger and bigger, filled in part by rubbish being trucked across the Westgate Bridge from the more affluent eastern suburbs.¹¹

Do polluting facilities end up in disadvantaged neighbourhoods because it is cheaper to buy land there, or do disadvantaged families move into areas around polluting facilities because it is the only place they can afford to live? It is likely both are true to an extent. The Tullamarine toxic waste dump in Melbourne's northwest is a good example.¹² Regardless of what was there first, marginalised populations are forced to adapt to higher levels of toxic air pollution. Disadvantaged communities experience a greater risk of developing 'diseases of adaptation' – diseases and chronic conditions from living with bad air, polluted water and stress.¹³

In Australia, low-income and minority communities have had few advocates at the national level. Meanwhile, lobby groups representing fossil fuel industries hold significant political power and influence, frequently topping lists of highest political expenditure by third-party groups in Australia.¹⁴ Australia is one of the largest producers of climate pollution per capita in the world.¹⁵ Environmentally hazardous industries such as waste landfills, manufacturing facilities, resource extraction and mining sites – all of which are non-residential activities – pose extreme risks to health and are most prevalent in the low-middle and middle-income communities of Australia.

‘Optimised for profitability, not public health’

‘The pollution from these power stations travels across the Hunter Valley, but it also travels as far as Sydney,’ says Newcastle GP and public health academic Dr Ben Ewald.

‘Even though those power stations are 80 or 100 or 160 kilometres away from Sydney, the pollution travels long distances.’

Dr Ewald says some of the monitoring stations in the Hunter Valley have recorded annual averages for fine particles that are higher than the national standard. ‘Beresfield, near Newcastle, has quite often been over the eight micrograms per cubic metre limit. Muswellbrook, in the Upper Hunter, has been over eight micrograms per cubic metre ever since monitoring commenced.

‘The people up in Muswellbrook have a problem with SO₂ (Sulfur Dioxide) pollution. It doesn’t go past the Australian standard, but the Australian standard is very out of date. It’s ten times higher than what the World Health Organisation thinks should be the standard. If you use the WHO standard, Muswellbrook has already had 20 or 30 exceedances of that daily standard in 2017.

‘Some of the health statistics show high rates of asthma (in Muswellbrook). I think the sulfur dioxide would be contributing towards that.

‘I think there’s a very strong argument that people in the town of Muswellbrook, which hosts large coal mines and coal-fired electricity production industries, should be protected. Especially children in those communities. They’re not making money out of coal. They should be protected from these air pollution exposures that we know are bad for their health.

‘The way these coal-fired power stations and mines are managed is not optimised to look after public health. They are optimised for profitability. If these companies running these facilities had an incentive to run them more cleanly, they could do so.’



Dr Ewald says NSW’s load-based licencing system – which charges fees in proportion to the amount of pollution produced – could be an effective polluter-pays scheme, but the fees are set so low the companies find it cheaper to pay the fee than to clean up their act.

‘If those fees were brought up to a higher level, where it gave companies a real finance incentive to clean up production, I’m sure there’s a lot they could do.

‘I’ve heard one of the power station engineers from Muswellbrook say the first thing they do when the sulfur dioxide at the chimney exceeds the permitted amount is dilute it by blowing a whole lot of air up the chimney. Well of course that doesn’t reduce the amount of pollution, it just adds some air to the mix. The next thing they do is they have a special supply of low sulfur coal that they can throw in the boilers if they have to bring down the pollution level. That obviously begs the question, if you can burn low sulfur coal sometimes, why can’t they burn low sulfur coal all the time? It would be slightly more expensive for them, but I think the health of the community is worth it.’

Case study courtesy Environmental Justice Australia:

www.envirojustice.org.au/powerstations

Interview date 2017

What causes Australia's air pollution?

The vast majority of polluting facilities captured by the NPI come from three major industry classifications:

- Manufacturing
- Mining
- Electricity, gas, water and waste services.

These three industries account for 91% of all facilities recorded in the NPI.

While the mining industry has the most explicit linkages to the extraction and burning of fossil fuels, all three industry classifications contain facilities with significant use of fossil fuels.

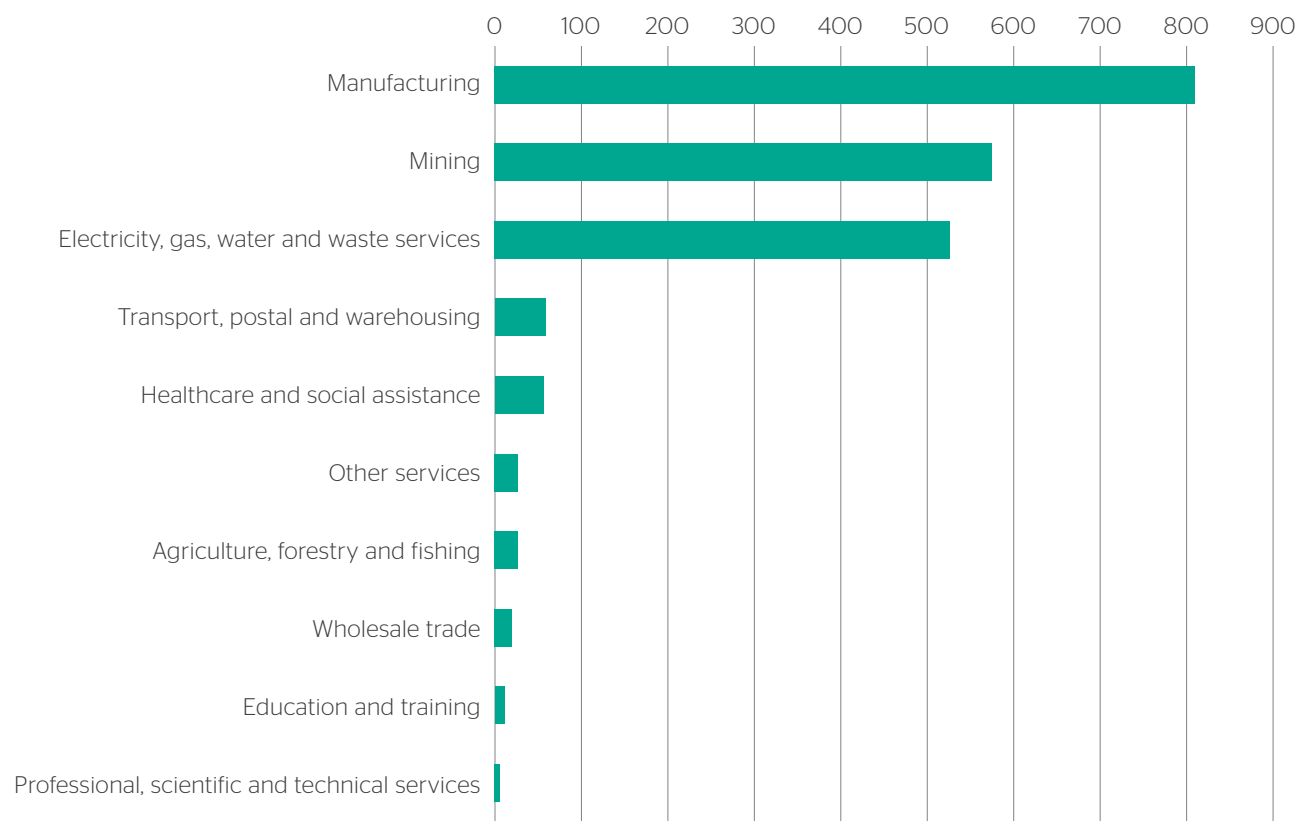
For example, manufacturing facilities in the NPI include facilities engaged in activities such as:

- petroleum and coal product manufacturing;
- basic chemical and chemical product manufacturing; and
- non-metallic mineral (such as sand, gravel, stone etc.) product manufacturing, and more.

Electricity, gas, water and waste services include facilities engaged in fossil fuel power generation such as coal-fired power stations and associated infrastructure. Facilities in these major industries are also predominantly located in lower socio-economic areas.

Figure 5

Breakdown of industry sectors in the NPI data



Manufacturing

The NPI presents emissions data from 811 facilities categorised as 'manufacturing'. These facilities are primarily located in urban and outer metropolitan areas. Low-middle income postcodes – with Australian households in the 20-40 percentile of weekly income – host nearly half of all manufacturing facilities recorded in the NPI. Around 96% of all manufacturing facilities are located in the bottom 60% of incomes – predominately Australian families living in outer-suburban areas of our major cities.

Manufacturing facilities are often more inconspicuous than other facilities easily associated with air pollution such as power generation facilities and mining activity. Nonetheless, their impact is pervasive as many manufacturing facilities operate in regions with higher population densities – exposing more Australians to their pollution.

Mining

The NPI captures a total of 575 facilities engaged in mining activities. These facilities are predominantly located in low-middle and middle-income areas. Eighty-three per cent of the mining facilities are in postcodes in the bottom 60% of household income.

Mining facilities are highly polluting – the highest polluting facility in the NPI is Mount Isa Mines, with almost double the air emissions of the next highest facility.

Electricity, gas, water and waste services

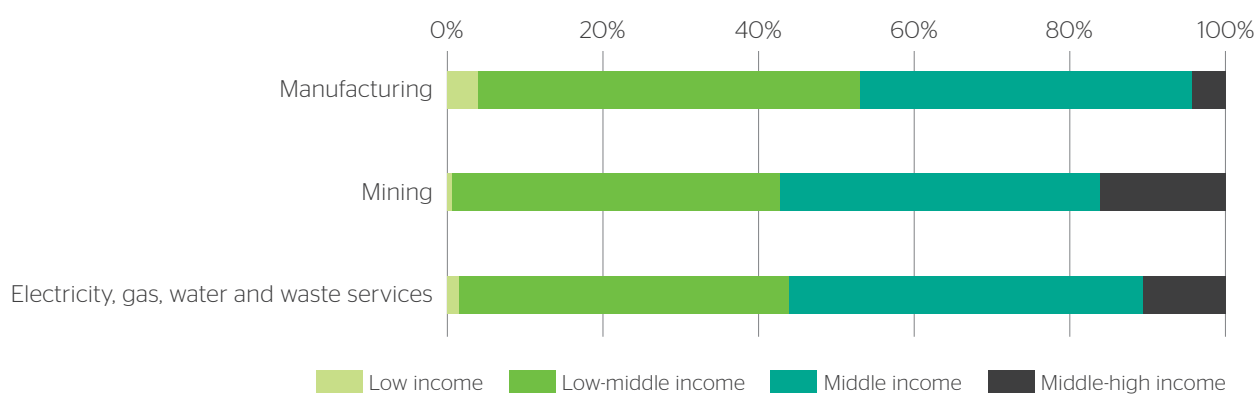
There are 526 facilities in the NPI classified as electricity, gas, water and waste services. This includes facilities generating electricity from fossil fuels such as coal-fired power stations. These facilities are predominantly located in low-middle and middle-income areas. Approximately 42% are in low-middle income areas and 45% are located in middle-income areas.

Electricity, gas, water and waste services include facilities engaged in fossil fuel energy production such as coal-fired power stations, and as a result they are highly polluting – three of the top five most polluting NPI facilities are coal-fired power stations.

Manufacturing facilities operate in regions with higher population densities – **exposing more Australians to their pollution**

Figure 6

Distribution of income groups across industry classifications



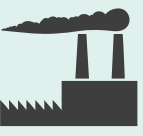

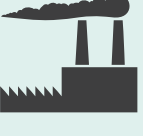



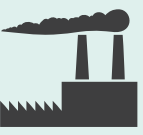



The number of facilities in high income areas were less than 1% of the distribution in each industry classification. As a result, the data was not visible in Figure 6.



Figure 7

Profile of top five most polluting facilities

Facility	Owner	Type	Location	Emissions (kg)	
1 Mount Isa Mines	Glencore	Copper, lead, zinc and silver mining 	Mt Isa, QLD 	Mercury NO _x PM _{2.5} PM ₁₀ SO ₂ Total	209 3,794,242 66,115 1,297,678 189,990,964 195,149,208
2 Bayswater Power Station	AGL	Coal-fired power station 	Hunter Valley, NSW 	Mercury NO _x PM _{2.5} PM ₁₀ SO ₂ Total	73 32,214,852 293,713 892,658 50,270,895 83,672,192
3 AGL Loy Yang	AGL	Coal-fired power station 	Latrobe Valley, VIC 	Mercury NO _x PM _{2.5} PM ₁₀ SO ₂ Total	408 21,347,118 511,511 4,097,618 51,741,379 77,698,034
4 Nyrstar Port Pirie	Nyrstar	Metal smelting and refining 	Port Pirie, SA 	Mercury NO _x PM _{2.5} PM ₁₀ SO ₂ Total	638 1,471,174 31,402 199,867 58,225,538 59,928,619
5 Stanwell Power Station	Stanwell Energy	Coal-fired power station 	Rockhampton, QLD 	Mercury NO _x PM _{2.5} PM ₁₀ SO ₂ Total	101 18,206,790 287,504 870,600 35,500,005 54,865,000

Where does Australia's air pollution occur?

The location of facilities recorded in the National Pollution Inventory (NPI) broadly map to the general population distribution of Australia. Like the majority of Australians, most of our polluting facilities are dispersed along the east coast of Australia, centred around major urban centres and regional hubs.

People living in Australia's largest cities are generally exposed to higher concentrations of air pollution. This is due to the geographical disbursement of polluting facilities around major urban hubs and the prevalence of other sources of air pollution not considered in this report, such as vehicle emissions. The most polluted urban areas are often located on the fringes of major population centres. Postcodes including the Port of Brisbane, Altona in Melbourne, Botany Bay in Sydney and Port Adelaide are all located within the outer urban suburbs of their respective cities. These postcodes are home to facilities engaged in highly polluting heavy industries such as smelting and refining, chemical manufacturing and fossil fuel electricity generation. It is also important to note that in several cases, the most polluted postcodes within Australian capital cities also contain that city's major airport. This is the case in Canberra, Darwin, Botany Bay in Sydney, and the Port of Brisbane.

However, certain rural communities in Australia also suffer disproportionately high impacts of toxic pollution due to their historical proximity to industries with large numbers of highly polluting facilities. This is particularly the case in regions home to coal-fired power generation and mining such as the Hunter Valley in NSW, Mt Isa in the Queensland Gulf Country, the Latrobe Valley in Victoria, Port Pirie on South Australia's Spencer Gulf and the Pilbara in Western Australia.

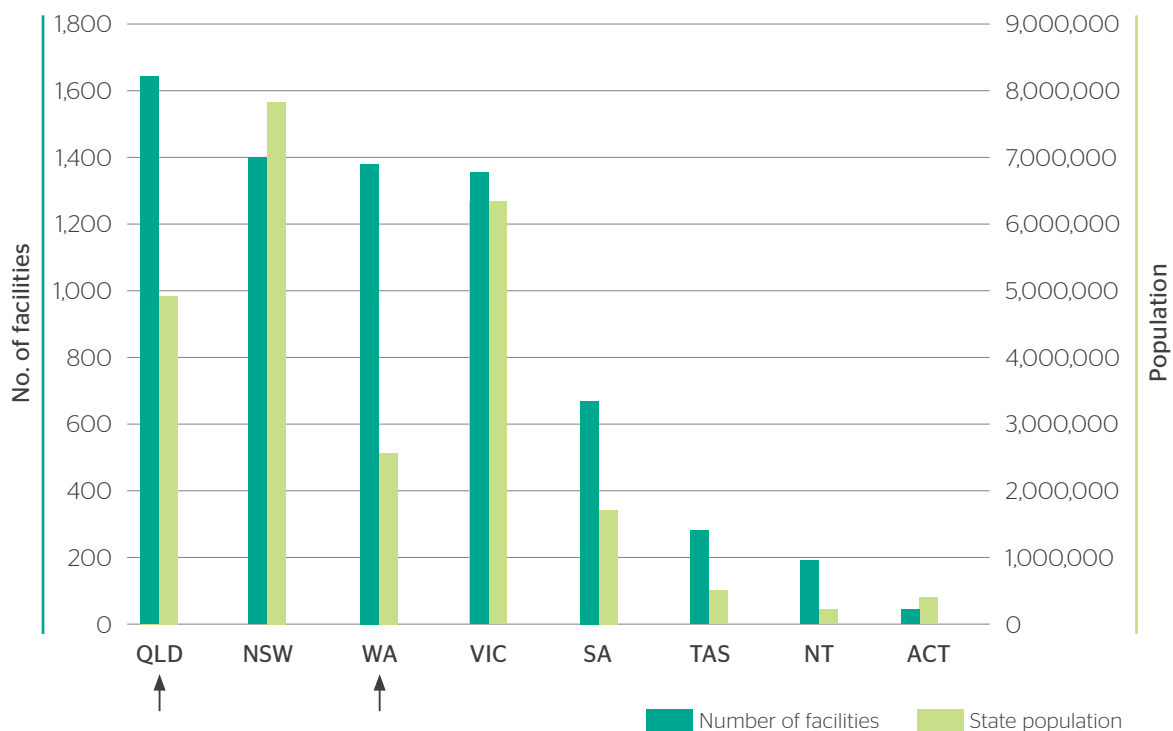
Not only are these areas home to a disproportionate number of facilities relative to their population, but the facilities themselves emit some of the highest volumes of toxic pollutants of any facility captured by the NPI. This is reflected in Figure 1, which shows the five Australian postal areas that contain the most air pollutants as measured by the NPI. All five postal areas are rural, and most of the air pollution within these areas is either generated by coal-fired power stations or mining projects.

In general, facilities are distributed across the states in line with population, although there are some notable exceptions. Queensland and Western Australia have a disproportionate number of polluting facilities relative to their share of the Australian population. Driven by the same industrial trends, Western Australia and Queensland both have large, mature fossil fuel extraction and power generation industries. This has driven up the total number of NPI facilities and increased the total volume of toxic pollutants emitted in each state.

Queensland and Western Australia have a disproportionate number of polluting facilities relative to their **share of the Australian population**

Figure 8

Number of NPI facilities compared to total population across Australian states and territories



‘There was absolutely no communication about air pollution’

Graeme Wilson lives at Delburn, about 15km south of the recently closed Hazelwood coal-fired power station in the Latrobe Valley. He has seen an improvement in his family’s health since Hazelwood closed in April 2017.

‘Up until then, myself, my wife and the kids, before they left home, used to get respiratory problems and runny noses on a regular basis. Occasionally when there was a north wind, you’d wake up with a sore throat.

‘I have personally noticed an improvement in my health since the closure of Hazelwood. My sinuses have improved, I have had no respiratory problems or runny noses at all this season. I have felt much healthier.

‘We are located on the first ridge that surrounds the valley. Most of the time we enjoy clean air, with winds usually blowing from the south-east, or north-west.

‘On occasions when there is a north wind, it is usually hot, the power stations are at full power and we often used to get soot fallout, smoke haze from the valley. This was evidenced by the buildup of black, sooty muck in our roof gutters. This seems to have all but disappeared since Hazelwood closed down.’

The fall-out reached extreme levels when the Hazelwood mine caught fire and burned for 45 days straight in 2014.

‘On the days when the wind was blowing from the north, the smoke and ash was blown towards our area. It did not really dissipate and disappear as the EPA would like people to believe. Our house and cars were covered in ash and a fine brown sulfur dust.

‘The brown dust was clearly in the air inside our house and we had no option but to breathe it. Every horizontal surface in the house was covered in dust.



‘I reported this to the authorities who had set up the Government Health Services in Morwell, but there was never any follow up. I tried reporting it to the EPA. They also did no follow up.

‘There was absolutely no communication about air pollution. The EPA didn’t monitor out our way. They wanted to pretend it was just around Morwell.


‘We’re on tank water. Our roof was covered in ash. The surface of the water was covered in an oily film. Whether it’s toxic or not, I don’t know. We did manage to get the Health Officer from the Baw Baw Shire to test our water but she only tested two samples taken from kitchen taps. This water is pumped from the bottom of the tank. What was on the surface?

‘I often wonder what chemicals were deposited on surrounding potato crops and whether the ash contained carcinogens from the mine fire that may have entered the food chain. I have been told anecdotally that local soils are more alkaline than they were before the mine fire.’

Case study courtesy Environmental Justice Australia:

www.envirojustice.org.au/powerstations

Interview date 2017

‘On occasions when there is a north wind, it is usually hot, the power stations are at full power **and we often used to get soot fallout, smoke haze from the valley’** 

Recommendations

The evidence shows our current laws are failing and the process for developing new national reporting standards is moving too slowly. Australia needs a new generation of national environment laws and institutions to address national problems like air pollution.

Air pollution causes thousands of deaths and severe health problems every year. It is affecting communities across Australia, disproportionately harming poorer, more vulnerable Australians. It demands a national solution that is driven by a coordinated response by the Commonwealth government.

Air pollution is a by-product of an economic system that is failing our planet and people. The raw economic gains generated by highly polluting facilities cannot be separated from the serious environmental and social harms that are created as a result. Our governments must do better to promote a healthier economy that values the health of people and the planet. With 3,000 people in Australia dying each year from air pollution-related illness, governments cannot afford to wait any longer to take decisive action.¹⁶

1. Establish new laws and a National Sustainability Commission to set national air pollution standards

Australia has no binding national air pollution standards. Instead we have non-binding reporting standards that are negotiated between state, territory and federal governments. To ensure a consistent national approach that applies to every community across Australia, we need to set national standards as part of a new National Environment Act to drive down pollution – binding national ambient air standards and national stack emissions standards for highly polluting industries, such as coal-fired power stations. Standards should be set by an independent commission at levels that benefit all Australians.

The purpose of national standards should be to achieve continuous improvement in air quality across the country. Maximum permitted concentrations and stack emissions of each major pollutant must meet global best practice and World Health Organization guidelines.

They must apply to all Australians, wherever they live. The current practice of exempting smaller communities and those that happen to be close to point sources must be discontinued.

2. Establish a national Environment Protection Authority (EPA) to enforce the law

A national Environment Protection Authority (EPA) should be established as a Commonwealth government agency with responsibility for implementing, monitoring and enforcing national standards. The EPA would make sure states and territories comply with the standards and investigate community complaints of breaches.

3. State and territory action

The State and Territory level is the most appropriate level for on-ground implementation of air pollution laws. Governments at state and territory level have experience in pollution control and have specific responsibility for the majority of regulatory approvals that affect air pollution. Although the Commonwealth has power to directly regulate companies, it would be preferable for the Commonwealth to be responsible for national level standards, which the states and territories would then implement. The states and territories would need to develop implementation plans and develop criteria for the regulation of polluting activities to ensure the standards are met.

4. Develop an environmental justice framework for pollution impacts

In conjunction with state and territory governments, Australia needs to **develop an environmental justice framework** so disadvantaged communities do not continue to bear a higher burden of pollution than other Australians. This should include requirements on decision-makers to consider environmental justice implications of their decisions, take actions to reduce pollution in disadvantaged areas, and not approve any new polluting facilities in low-socioeconomic areas that will add to the toxic burden those communities face.



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- ¹³ Doctors for the Environment Australia, Submission no 4 to Senate Community Affairs References Committee, Parliament of Australia, Impacts on Health of Air Quality in Australia, 2013, pp8,11
- ¹⁴ <https://www.theguardian.com/australia-news/2018/feb/01/coal-lobby-ads-biggest-third-party-political-expenditure-in-australia>
- ¹⁵ https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?view=map&year_high_desc=true
- ¹⁶ https://www.envirojustice.org.au/sites/default/files/files/Submissions%20and%20reports/Envirojustice_air_pollution_report_final.pdf
- ¹⁷ <http://www.who.int/news-room/fact-sheets/detail/mercury-and-health>

Appendix 1: Which pollutant is which and how they harm our health

Air pollution occurs whenever a harmful or excessive quantity of a substance such as a gas, particulate or biological molecule is introduced into the earth's atmosphere. Natural processes such as bushfires, volcanoes and dust can generate air pollution, though human activities are increasingly responsible for the release of many dangerous toxic substances.

The NPI contains emissions information on 93 individual toxic substances emitted by polluting facilities in Australia. This report is focused on five of the most pervasive air pollutants in Australia, primarily produced by anthropogenic (human-made) sources.

Sulfur dioxide

- Sulfur dioxide is a major air pollutant and has significant impacts on human health.
- The concentration of sulfur dioxide in the atmosphere can influence the health of broader ecosystems by impacting the habitat suitability for plant and animal life.
- Inhaling sulfur dioxide is associated with increased respiratory symptoms and disease, difficulty in breathing, and premature death.
- The highest concentrations of sulfur dioxide in the air are found around petrol refineries, chemical manufacturing industries, mineral ore processing plants and power stations.

Oxides of nitrogen

- Oxides of nitrogen are a mixture of gases that are composed of nitrogen and oxygen. Two of the most toxicologically significant compounds are nitric oxide (NO) and nitrogen dioxide (NO₂).
- Other gases belonging to this group are nitrogen monoxide (or nitrous oxide, N₂O), and nitrogen pentoxide (NO₅).

- Oxides of nitrogen mainly impacts on respiratory conditions causing inflammation of the airways at high levels. Long-term exposure can decrease lung function, increase the risk of respiratory conditions and increase the response to allergens.
- High levels of oxides of nitrogen can damage vegetation, including leaf damage and reduced growth. It can make vegetation more susceptible to disease and frost damage.

Mercury and compounds

- Elemental and methylmercury are toxic to the central and peripheral nervous systems.
- The inhalation of mercury vapour can produce harmful effects on the nervous, digestive and immune systems, lungs and kidneys, and may be fatal.
- Mild, subclinical signs of central nervous system toxicity can be seen in workers exposed to an elemental mercury level in the air of 20 µg/m³ or more for several years.¹⁷
- Burning coal for power and heat is a major source of mercury. Coal contains mercury and other hazardous air pollutants that are emitted when the coal is burned in coal-fired power plants, industrial boilers and household stoves.

PM_{2.5}

- Particle pollution is a mixture of solid particles and liquid droplets. PM_{2.5} particles are smaller than 2.5 micrometres (0.0025 mm) in diameter. Commonly described as 'fine particles', they are up to 30 times smaller than the width of a human hair.
- PM_{2.5} particles are small enough to be breathed deep into the lungs. This can cause serious health problems. Common symptoms are wheezing, chest tightness and difficulty breathing.

- Studies have found a close link between exposure to fine particles and premature death from heart and lung disease. Fine particles are also known to trigger or worsen chronic disease such as asthma, heart attack, bronchitis and other respiratory problems.
- PM_{2.5} particles result from the burning of fossil fuels, organic matter, and most other materials, such as rubber and plastic. Motor vehicles and power plant emissions are also major sources of fine particles.
- Fine particles can be carried over long distances by wind and then settle on ground or water. Depending on their chemical composition, the effects of this settling may include making lakes and streams acidic, changing the nutrient balance in coastal waters and large river basins, and depleting the nutrients in soil.

PM₁₀

- PM₁₀ particles are smaller than 10 micrometres (0.01 mm) in diameter. PM₁₀ particles are commonly described as ‘coarse particles’.
- PM₁₀ particles commonly occur from combustion activities such as motor vehicles and industrial processes. Dust from unsealed roads is another major source of PM₁₀ particles.
- Exposure to high concentrations of PM₁₀ can result in a number of health impacts ranging from coughing and wheezing to asthma attacks and bronchitis to high blood pressure, heart attack, strokes and premature death.

Table 1
Total annual emissions of five air pollutants

Type of emission	Total (kg)	(%)
Mercury and compounds	7,710.13	0.0003%
Oxides of nitrogen	725,104,292.6	28.31%
Particulate Matter ≤10.0 µm (PM ₁₀)	918,348,007.5	35.85%
Particulate Matter ≤2.5 µm (PM _{2.5})	30,326,666.92	1.18%
Sulfur dioxide	887,781,254.5	34.66%
Total	2,561,567,932	100%

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