Doctors for the Environment Australia
www.dea.org.au

Submission to the Senate Committee on The impacts on health of air quality in Australia

March 2013

Submission from
Doctors for the Environment Australia Inc.
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Doctors for the Environment Australia welcomes the opportunity to comment on the impacts on health of air quality in Australia, as this is an important public health issue to which inadequate attention has been paid to date.

Who is DEA?

Doctors for the Environment Australia (DEA) is an independent, self-funded, non-government organisation of medical doctors in all Australian States and Territories. Our members work across all specialties in community, hospital and private practices. We work to prevent and address the diseases – local, national and global – caused by damage to our natural environment. We are a public health voice in the sphere of environmental health with a primary focus on climate change and the health harms from pollution.

Terms of reference

We would like to comment in relation to all four parts of the TOR:

(a) particulate matter, its sources and effects;

(b) those populations most at risk and the causes that put those populations at risk;

(c) the standards, monitoring and regulation of air quality at all levels of government; and

(d) any other related matters.

We would like to point out at that particulate matter, whilst a very important component of air pollution causing harm to human health, is only one group of pollutants amongst a number which are important. Therefore whilst we will be addressing issues related primarily to particulate matter (particulates), we will also be mentioning other pollutants.

We refer the Committee to DEA's policy on ambient air pollution, from which we take much of our material.
http://dea.org.au/images/general/DEA_Air_Pollution_Policy_03-12.pdf.

We note that the literature on the health impacts of air pollution is vast and therefore we need to refer the Committee to summaries of that literature where possible and to narrow our focus to issues hitherto poorly addressed.

Summary

- Ambient air pollution is an important public health problem globally, nationally and locally, contributing significantly to illness and premature death.
- There is an extensive international body of literature on the health impacts of air pollution, reporting a wide range of adverse health outcomes including: worsening of asthma and chronic lung disease, increasing risks of heart attack, stroke and lung cancer, and affecting lung development. This translates to increases in emergency department presentations and hospital admissions, as well as deaths.
- Health effects occur even at exposure levels below current air quality guidelines, and for many pollutants, it is unclear whether a safe threshold exists.
- Children, the elderly and those with chronic health conditions are especially vulnerable.
- There are significant health costs associated with the effects of air pollution.
- Coal-fired power stations and other fossil fuel developments, as well as motor vehicles, are a major source of air pollution.
- The current national ambient air quality standards have been reviewed but are yet to be changed to reflect current scientific evidence of health impacts. In particular, there is a lack of a compliance standard for fine particulate matter despite overwhelming evidence of its importance as a health issue. The review process is too slow.
- Current monitoring and reporting practices for air quality by the states are generally inadequate to fully protect public health and inform communities of their exposures.
- Climate change is expected to cause further declines in air quality.
- A reduction in fossil fuel combustion can improve human health directly, by reducing chronic disease risks from air pollutants, and indirectly from mitigation of climate change, which is hazardous to health.

Air pollution background

According to the OECD, air pollution is set to become the world's top environmental cause of premature mortality http://www.oecd.org/env/indicators-modelling-outlooks/49846090.pdf . "By 2050, the number of premature deaths from exposure to particulate matter is projected to more than double to reach 3.6 million a year globally, with most deaths occurring in China and India. Because of their ageing and urbanised populations, OECD countries are likely to have one of the highest premature death rates from ground-level ozone, second only to India."

European studies have estimated that outdoor air pollution contributes to approximately 6% of total mortality and thousands of cases of illness due to respiratory and cardiac diseases.
http://www.ncbi.nlm.nih.gov/pubmed/11022926?dopt=Abstract

While less research has occurred on health impacts of air pollution in Australia, nationally it contributes significantly to morbidity and mortality.
https://www.mja.com.au/journal/2002/177/11/air-pollution-and-its-health-impacts-changing-panorama

Deaths due to urban air pollution in 2003 were estimated to be 2.3% of all deaths and nearly twice the national road toll.
http://www.environment.gov.au/soe/2011/report/atmosphere/3-1-current-state-atmosphere.html#ss3-1-2

Ambient air pollution in Australia derives primarily from motor vehicle emissions, electricity generation from fossil fuels, heavy industry, and home heating using wood and coal. It is a complex chemical mixture comprising a number of different key pollutants which have a complex relationship with each other, and with the climate. Climate change is expected to cause a decline in air quality. Common ambient air pollutants include particulate matter of varying size (PM), ground-level ozone, oxides of nitrogen (NO_x), carbon monoxide (CO), and sulphur dioxide (SO_2) and air toxics such as volatile organic compounds.

There is a vast international body of literature on the health impacts of air pollution, which is beyond the scope of this submission to detail. It reports a wide range of adverse health outcomes, including exacerbation of chronic respiratory and cardiovascular disease, and premature mortality. Air pollution worsens asthma and chronic obstructive pulmonary disease and can increase the risk of cardiac arrhythmia, heart attack, stroke and lung cancer, and hinders lung development. This translates to increases in emergency department presentations and hospital admissions, as well as deaths. There are also impacts on the health of unborn and young children.

Health effects occur even at exposure levels below current air quality guidelines, and for many pollutants, it is unclear whether a safe threshold exists. Those most susceptible are generally the very young, the elderly and those with pre-existing health conditions.

There are significant health costs associated with the effects of air pollution. A NSW government report estimated that across the Sydney GMR from 2000 to 2002, the total health costs of annual emissions of common ambient air pollutants from all sources were between $1 billion and $8.4 billion per annum.
http://www.environment.nsw.gov.au/resources/air/airpollution05623.pdf

Particulate matter

Particulate matter (PM) is generated from coal-fired power stations, mining, wood or vegetation combustion, industry and motor vehicles. The size and composition of particles can influence health impacts. Particulate matter may be coarse, fine or ultrafine (PM_{10}, $PM_{2.5}$, $PM_{0.1}$). Coarse particles are smaller than 10 micrometres and fine particles have diameters 2.5 micrometres and smaller (for comparison, an average human hair is about 70 micrometres in diameter- see diagram below). PM can aggravate chronic respiratory and cardiac disease, damage the lungs and increase the risk of premature death.

Fine particles are able to penetrate further into the lungs and also to enter the bloodstream via the lungs. In recent years, a large body of new scientific evidence has emerged that has strengthened the link between ambient PM exposure and health effects, particularly in relation to $PM_{2.5}$ particles, which are strongly associated with mortality and other endpoints such as hospitalisation for cardio-pulmonary disease. Numerous scientific studies have linked particle pollution exposure to a variety of health problems, including increased respiratory symptoms, decreased lung function; worsening of asthma, irregular heartbeat and premature death in people with heart or lung disease (US EPA).
http://www.epa.gov/pm/health.html

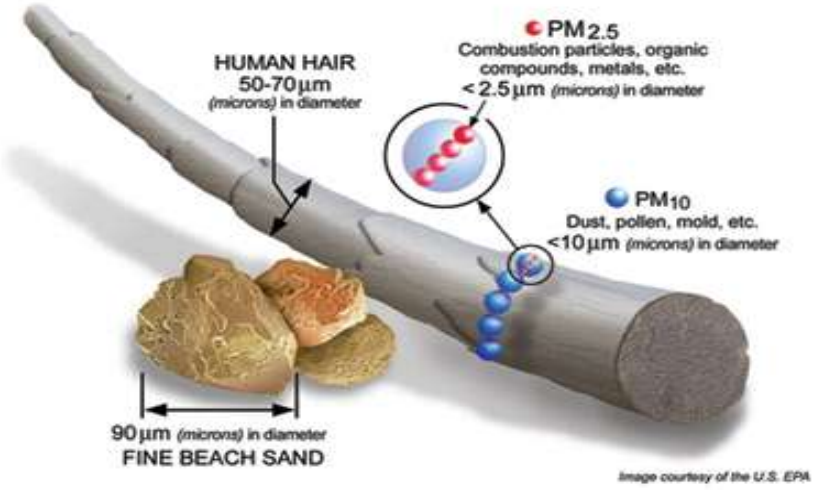


Image : US EPA http://www.epa.gov/pm/basic.html

In children particulate air pollution has been associated with increased chronic cough, and bronchitis. Pope et al. in the USA found that each 10µg/m3 elevation in fine particulate air pollution was associated with approximately a 4%, 6% and 8% increased risk of all-cause, cardiopulmonary and lung cancer mortality, respectively.
http://jama.jamanetwork.com/article.aspx?articleid=194704

A review by Chen and Goldberg found a 6% increase in mortality for each increase of 10µg/m3 in ambient fine particles.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2687917/

A discussion paper prepared for the National Environment Protection Council reviewed the recent health evidence for exposure to a range of air pollutants, including particulate matter (NEPC 2010)
http://www.scew.gov.au/archive/air/pubs/aaq-nepm/aaq_discppr_review_of_the_aaq_nepm_discussion_paper_aq_standards_final_201007.pdf.

A review report by the same body in 2011
http://www.ephc.gov.au/sites/default/files/AAQ%20NEPM%20review%20report_0.pdf
concluded: "PM_{10} and $PM_{2.5}$ are associated with increases in mortality and morbidity, with much stronger evidence now for cardiovascular outcomes…. There is evidence for links with both cardiovascular and respiratory effects, particularly respiratory disease, asthma and COPD, while there are strong associations with ischemic heart disease and congestive heart failure…. Associations have also been found between particles and increases in respiratory symptoms and medication use in children with asthma. These are linked to reduction in lung function and increased lung inflammation."

A World Health Organisation report (WHO 2003) http://www.euro.who.int/__data/assets/pdf_file/0005/112199/E79097.pdf notes that:

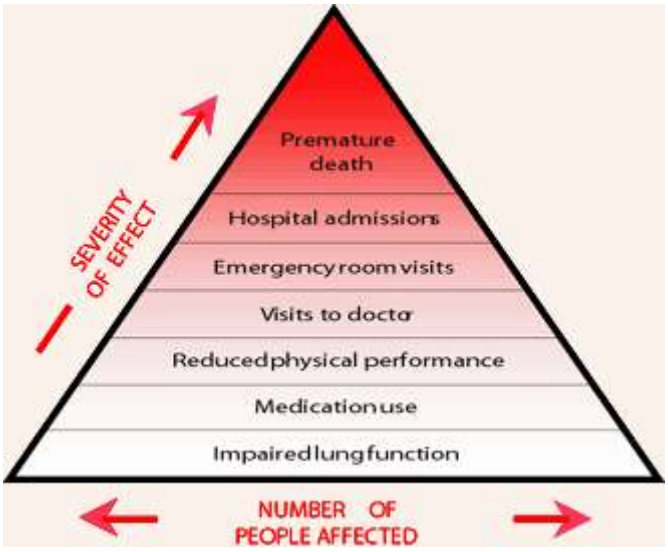
- Fine particles are strongly associated with mortality and other endpoints such as hospitalization for cardiac and pulmonary disease.

- Epidemiological studies on large populations have been unable to identify a threshold concentration below which ambient PM has no effect on health.

- Studies suggest that a number of source types are associated with health effects, especially motor vehicle emissions and also coal combustion.

WHO Air quality guidelines Global Update 2005 http://www.euro.who.int/__data/assets/pdf_file/0005/78638/E90038.pdf states "There is robust scientific evidence indicating that exposure to air pollutants can affect human health in a variety of ways, ranging from subtle biochemical and physiological changes to severe illness and death".

This is illustrated by the diagram below.



Public health impacts of air pollution:
Image courtesy Gov of Canada http://www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/poster/375

It notes also "$PM_{2.5}$ is an important indicator of risk to health from particulate pollution, and might also be a better indicator than PM_{10} for anthropogenic suspended particles in many areas."

The American Heart Association has gone on record to say evidence is consistent with a causal relationship between $PM_{2.5}$ exposure and cardiovascular morbidity and mortality.
http://circ.ahajournals.org/content/121/21/2331.abstract

"Exposure to PM <2.5 μm in diameter ($PM_{2.5}$) over a few hours to weeks can trigger cardiovascular disease–related mortality and nonfatal events; longer-term exposure (eg, a few years) increases the risk for cardiovascular mortality to an even greater extent than exposures over a few days and reduces life expectancy within more highly exposed segments of the population by several months to a few years; reductions in PM levels are associated with decreases in cardiovascular mortality within a time frame as short as a few years".

Other ambient air pollutants

Ground-level ozone (O_3) is a secondary pollutant which is formed by a combination of oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicles and industry are the main sources of these pollutants. Ozone affects even healthy lungs, causing inflammation, reduced lung function and increased respiratory symptoms. Exposure to ozone is linked to increases in mortality, hospital admissions and emergency department attendances mainly for respiratory causes. There is no evidence of a safe threshold for ozone exposure.

Coal-fired power stations are a major source of sulphur dioxide. Exposure to sulphur dioxide creates an acute irritant respiratory response with cough and wheeze, especially in asthmatics. Short-term SO_2 exposure is associated with increases in mortality and respiratory and cardiovascular morbidity. There is no threshold for health effects.

Short-term increases in nitrogen dioxide concentrations have been associated with increases in asthma, hospital admissions and emergency department presentations for respiratory symptoms and increased cardiovascular and respiratory mortality. Long-term exposures to NO_2 are linked to changes in lung growth in children and respiratory symptoms in asthmatic children.

Standards, Monitoring and Regulation

The Australian Ambient Air Quality National Environment Protection Measure (AAQ NEPM) sets national benchmarks for air quality monitoring and action by the states. The AAQ NEPM in 1998, set standards for six criteria air pollutants: PM_{10}, ozone, CO, NO_2, SO_2, and lead. The NEPM

was varied in 2003 to include advisory reporting standards for $PM_{2.5}$. A review of the NEPM commenced in 2005.

The standards apply to regional air quality of populations of a sufficient size and not to individual sources or pollution hot-spots. The NEPM monitoring protocol does not apply to monitoring or controlling peak concentrations from major roads or major industrial sources. However, recent recommendations from the review have suggested monitoring on potential population risk rather than on population size and the introduction of compliance standards for $PM_{2.5}$.

Current monitoring and reporting practices for air quality are inadequate to fully protect public health. Outside of large cities and major regional centres there is often great difficulty obtaining independent air quality assessment. In spite of proximity to polluting industry, coal fired power stations, coal and other mines, or heavily trafficked roads; there are many parts of Australia where citizens do not have access to air quality data for their environment.

A change of the advisory reporting standard for $PM_{2.5}$ to a compliance standard is strongly supported by DEA. A compliance standard for $PM_{2.5}$ in the AAQ NEPM is needed to increase monitoring activity and drive air quality management action in the jurisdictions. See DEA submission http://dea.org.au/images/uploads/submissions/Submission_AAQ__DEA.pdf

Recommendations were made in 2011 which have yet to come into force. The National Plan for Clean Air has also not yet eventuated. The AAQ NEPM review process has been unacceptably long and has not produced timely outcomes. Action seems at least another 2 years away http://www.scew.gov.au/publications/pubs/air/national-plan-for-clean-air-public-statement.pdf. The regulatory process is lagging way behind the growth in scientific knowledge on this issue.

The United States has just tightened its annual primary National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$. The US EPA estimates that the updated standards will lead to annual benefits of $4–9.1 billion in avoided health problems and premature deaths.
http://ehp.niehs.nih.gov/2013/03/121-a74/

Sources of air pollution

Motor vehicles

Motor vehicles are a significant source of urban air pollution, emitting large quantities of carbon dioxide, carbon monoxide, hydrocarbons, nitrogen oxides, particulate matter and air toxics, and this source has been the most extensively studied. There are a number of reviews available in relation to this, eg http://pubs.healtheffects.org/getfile.php?u=552.

Coal mining, transport and combustion

Image courtesy Glenn Albrecht

Multiple air pollutants arise from coal mining and power generation which are injurious to humans, including sulphur dioxide, oxides of nitrogen, PM_{10} and $PM_{2.5}$ particles. Coal combustion also releases toxic trace elements, including mercury. Once released mercury deposits in soil and waterways and accumulates up the food chain, particularly in fish. Mercury is known to affect the human nervous system and exposure during pregnancy is concerning because it may harm the development of the unborn child's brain. This is one reason why pregnant women receive advice to restrict their intake of certain fish. Over a third of all mercury emissions attributable to human activity come from coal-fired power stations.

In addition, Australia's coal contributes to climate change and its global health impacts. This in turn threatens the health of all Australians. According to the WHO, climate change is one of the greatest threats to public health. It will affect some of the most fundamental pre-requisites for good health: clean air and water, sufficient food, adequate shelter and freedom from disease. Changes to our weather patterns will subject Australians to more severe heat waves, droughts, fires, floods and storms, which we are already becoming familiar with. Such events further strain our health and health services. The health and climate costs of coal are unseen, and when costs to health systems are included, coal is an expensive fuel.

See :
http://dea.org.au/images/general/Coal_Policy_Document.pdf

http://dea.org.au/images/general/Briefing_paper_on_coal_2011.pdf

https://www.mja.com.au/journal/2011/195/6/mining-and-burning-coal-effects-health-and-environment

http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2010.05890.x/abstract;jsessionid=661228ED444FCC36513965676DD54044.d04t04?deniedAccessCustomisedMessage=&userIsAuthenticated=false

http://www.psr.org/assets/pdfs/psr-coal-fullreport.pdf

A recent report http://media.beyondzeroemissions.org/coal_health_Report_FINAL.pdf has found that there are few Australian studies that directly examine the health effects of coal mining or coal burning power stations on the health of local communities. However it concluded that the international health research literature indicated that there are serious health and social harms associated with coal mining and coal-fired power stations for people living in surrounding communities.

Unconventional gas exploration and mining

Air pollution from coal seam gas and shale gas exploration and mining is a major concern for the health of nearby residents. Air pollution can occur locally around CSG wells transferring volatile chemical pollutants into the atmosphere. These can contribute to ground level ozone, a respiratory irritant that can inflame lungs and reduce lung function.

While research is currently limited, a number of scientific papers suggest that cancer and non-cancer health risks of residents living close to unconventional gas wells may be increased.
http://www.ncbi.nlm.nih.gov/pubmed/22444058

In fact the US EPA has recently announced new regulations to control air pollution from oil and gas sites.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3404676/.

Recent independent research in Australia has found methane leaking from gas fields in much higher concentrations than expected, and this indicated that other gases may also be leaking into the atmosphere.
http://www.scu.edu.au/news/media.php?item_id=6041&action=show_item

There is no effective systematic regulation to control air pollution from unconventional gas operations in Australia, and monitoring of emissions is minimal. This makes it particularly difficult to assess a situation, such as in the Tara gas fields in Queensland where residents developed health symptoms after the introduction of mining.

The American Public Health Association has produced a policy statement in relation to hydraulic fracturing of unconventional gas reserves in the US http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1439; which notes

"significant potential to impact local and regional air quality".

"Levels of ozone, PM_{10}, and $PM_{2.5}$ have been found to be elevated near gas activity…. Hydrocarbon emissions from gas drilling activity have also

been shown to be high in Colorado, where researchers found that twice as much methane was being leaked into the atmosphere from oil and gas activity than was originally estimated."

"Individual drilling operations may not create air emissions that trigger regulation under existing environmental laws. However, the cumulative impacts of emissions may create significant public health threats for local communities or regions."

The association recommends that:

"Development should proceed at a scale and pace that allow for effective monitoring, surveillance, and adaptation of regulation to anticipate/prevent negative health effects. Should negative health/environmental effects be observed, development/extraction should cease until further evidence indicates that operations can resume safely. Health impact assessments should be conducted at a local and regional scale prior to expansion of new approaches to natural gas development".

Air pollution and climate change

The sources of air pollution - motor vehicles, power generation, industry, etc - are among the main sources of greenhouse gas emissions which lead to climate change. Hotter temperatures resulting from climate change can worsen air quality by increasing particle pollution and ground level ozone.

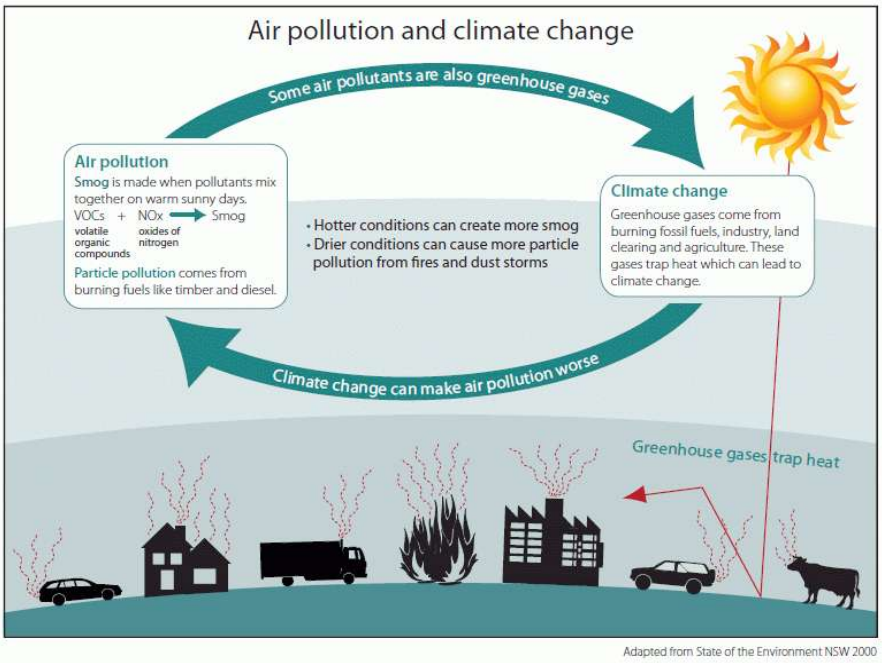


Image courtesy NSW Gov
http://www.cleartheair.nsw.gov.au/science_and_research/science/climate_change_and_air_quality.aspx

Bernard et al have researched air pollution and climate change interactions in relation to health in the US:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240667/

"Climate change may affect exposures to air pollutants by affecting weather, anthropogenic emissions, and biogenic emissions and by changing the distribution and types of airborne allergens…. If the climate becomes warmer and more variable, air quality is likely to be affected. There is already extensive evidence on the health effects of air pollution. Ground-level ozone can exacerbate chronic respiratory diseases and cause short-term reductions in lung function. Exposure to particulate matter can aggravate chronic respiratory and cardiovascular diseases, alter host defences, damage lung tissue, lead to premature death, and possibly contribute to cancer. Health effects of exposures to carbon monoxide, sulfur dioxide, and nitrogen dioxide can include reduced work capacity, aggravation of existing cardiovascular diseases, effects on pulmonary function, respiratory illnesses, lung irritation, and alterations in the lung's defence systems. Adaptations to climate change should include ensuring responsiveness of air quality protection programs to changing pollution levels."

Health and climate mitigation co-benefits of acting to reduce air pollution

Action on climate change has the potential to reduce levels of ambient air pollutants, resulting in significant public health gains in a relatively short period of time. There are a number of "natural intervention" events which demonstrate health gains that can occur when fossil fuel combustion is reduced.

See:
http://www.publish.csiro.au/?act=view_file&file_id=NB10026.pdf

http://caha.org.au/wp-content/uploads/2010/11/OurUncashedDividend_CAHAandTCI_August20121.pdf

Children and air pollution

Children are particularly vulnerable to air pollution for a range of reasons. Children's lungs continue to develop after birth, including formation of around 80% of the alveoli (air sacs). Children have immature host defences (protective systems) including metabolic and immune systems. They experience high rates of respiratory infections, which appear to have a synergistic effect with air pollution at causing lung damage. They also have activity patterns that increase their exposure to air pollutants. Children are exposed to higher relative doses of pollutants that are, or

have been, airborne due to their higher consumption of air, food and water for their size. In addition, rates of chronic lung disease are high in children. These include asthma, prematurity related lung disease and rarer hereditary conditions such as cystic fibrosis with which children now can survive into adulthood.

The detrimental impacts of air pollution on children's health are well established. The 2005 WHO report "*Effects of Air Pollution on Children's Health and Development*" www.euro.who.int/document/e86575.pdf, summarized the evidence available at that point. It referred to approximately 600 publications to draw the following conclusions.

Air pollution and children's lung function:-

- The developing foetal lung and the infant lung are more susceptible to air pollutants at lower doses, and even below the no-effect level, for adults.
- Living in areas with high levels of air pollution is associated with reduced lung function.
- Chronically elevated air pollution levels are associated with lower rates of lung function development.
- Lower air pollution levels result in improved lung function and/or growth rates.
- Lung function attained during childhood determines the level of lung function going into adulthood. A small decrease in average lung function may yield a large increase in the proportion of children with "abnormally" low lung function.
- Decrements in lung function are also particularly significant for children with already compromised lung function.

Infant Mortality:-

- Air pollution causes increased rates of infant mortality, particularly respiratory deaths in the post-neonatal period. Particulates are most strongly implicated but nitrogen dioxide, sulphur dioxide and ozone also appear to contribute.
- Evidence suggests a causal link between air pollution and lower birth weight, a higher incidence of preterm births and intrauterine growth retardation.

Respiratory Symptoms:-

Air pollution causes an increased prevalence of:

- cough and bronchitis

- hospital admissions and emergency department visits for asthma
- increased medication use among children with asthma

It is also associated with exacerbation of wheezing and coughing during extended periods of air pollution.

Respiratory Infections:-

Most data suggest a significantly increased risk of respiratory infections following long-term exposure to air pollutants.

Community concerns about air pollution

DEA receives a large number of complaints about air pollution from communities in all mainland states in relation to resource projects and power stations. When possible we investigate these, using public health expertise within our membership and make representations to state governments. We also become aware of potential harm to the public's health through review of environmental impact statements for proposed projects.

In general terms we can say that exposure of the public to air pollution is a significant problem because of inadequate federal standards and inadequacies in state processes in assessments, monitoring and implementation of remediable actions. For new projects health impact assessment is dealt with inadequately or not at all within the EIS process. These inadequacies in public health management are facilitated by inadequate guidelines and lack of enforcement legislation, in effect a license to pollute. We will summarize regulatory problems in the states and then we have selected an example from each state.

It is appropriate to first discuss the EIS process because this displays the spectrum of state involvement in projects which may result in air pollution. We have encountered the following situations which lead to inadequate assessment:

- lack of resources for state environmental protection agencies (EPA) which have a variable degree of independence
- absorption of environmental protection into other often less independent departments
- boundaries placed on the selection of the terms of reference for EIA, weakening the process
- removing decisions from the aegis of the EPA
- preparation of EIAs by 'independent' companies which favour the

proponent

- health advice which is not publicly available for scrutiny and the use of 'gagging orders' for interaction with outside experts
- moving the goal posts for decision making
- creating legislation to ensure unwanted outcomes are reversed for example recent changes to favour development in Queensland and in New South Wales with the involvement of the Planning Assessment Commission
- once decisions are made to proceed with development there are many failures of monitoring and to divulge results

Existing developments display even more deficiencies in regulation. Problems arising from an existing industry are often considered on an ad hoc basis by state governments, which generally do nothing because of the legal and economic considerations and also the cost of inquiry falls upon them. When an Environmental Protection Authority is involved it is constrained not only by agreements, for example to allow pollution, but by a requirement to balance economic viability against public interest outcomes such as public health. So health considerations are clouded by legal argument and the possibility that company towns might close. A prime example is Port Pirie in South Australia which has been subjected to decades of lead air pollution. In effect damage to children's health due to raised blood levels of lead is balanced with needed employment.

We cannot detail all the problems that we have encountered which demonstrate failure of regulation for in volume this would need a separate report from a senate Committee. We will select our findings for one air pollution issue in each mainland state.

South Australia – Pollution from Port Augusta power stations

The Port Augusta coal-fired power stations are among the most polluting in Australia and the smoke stack for the southern station is 3km from the edge of the town of 15,000 inhabitants.

Under agreements the operators were responsible for air monitoring in the town and the results were passed to the EPA for analysis. It was reported to government that the results over several years had not shown any exceedance of recommended air quality standards.

Our investigations at Port Augusta illustrate the following:

- The operators were granted licences to pollute.
- Licences can remain in operation for many years and so ignore the march of medical science with advice for stricter standards.

- Pollution data were not readily available on any government web site and indeed were not available to outside medical experts wishing to review it.

The licence agreement for Playford stated in 2009 gives the following conditions:

"1. Ensure that a continuous ambient sulphur dioxide monitoring station, agreed to in writing by the Authority, is installed and maintained at a location within the Port Augusta township boundary;

2. Ensure that ambient particulate concentrations (Total Suspended Particulates and PM_{10}) are monitored one day in six, within the Port Augusta Township, at five locations as approved in writing by the Authority."

In 2011-12, air quality data were not made available by the EPA despite correspondence over some months and it was indicated that we should approach Alinta for data. After a long negotiation we were informed: "We are in the process of getting all the necessary confidentiality and legal approvals to seek to provide you with the information". We declined on the basis that such information should be available to all. Eventually the data were provided by the EPA.

The data from the EPA were reanalysed. In the opinion of DEA, Port Augusta has been subject to air pollution from the power stations for years and this is likely to be a contributing factor responsible for the increased incidence of childhood asthma and adult cancer of the lung in the town. Our findings are detailed here: http://dea.org.au/news/article/illness_and_pollution_at_port_augusta_dea_speaks_at_the_parliament_of_south.

In our opinion Port Augusta has been polluted because of a combination of the following factors; licence agreements, reliance on operator monitoring without adequate supervision, mistaken analysis of data, lack of transparency and failure to make data available in a form which can be analysed by independent experts.

Conflict of interest may also have played a part. Port Augusta became the source of power vital to the state with few other forms of employment in the town.

Queensland – Acland coal mine

The Acland open cast coal mine; stages 1 and 2 are in operation. Since stage 2 became operative in 2006, local inhabitants have complained of severe dust pollution and have suffered a range of health problems.
Living in the dusty shadow of coal mining, The Australian
http://www.theaustralian.com.au/news/features/living-in-the-dusty-shadow-of-coal-mining/story-e6frg6z6-1226255705308

An EIS for stage 3 was completed in 2009. Analysis of this data prepared for stage 3 is inadequate and incomplete, but what available data there is shows air pollution above accepted standards. Despite this, mine expansion proposals continue. The experience of DEA is detailed here, http://dea.org.au/news/article/dea_acland_correspondence and a submission on the draft terms of reference for stage 3 at http://dea.org.au/images/uploads/submissions/New_Acland_Stage_3_Submission_02-13.pdf.

Doctors for the Environment Australia contends that there is a failure of government and proponent to address community health concerns, failure of consultation with the community, inadequate monitoring of air quality and inadequate economic assessment of the overall value of the mine. All these deficiencies of public process have resulted in persistent air pollution from the mine.

Western Australia – Esperance lead pollution for wagons in transit

It took birds falling from the sky with lead poisoning to signal to government its spectacular failure of responsibility to the Esperance Community and to bring action. In concluding the Parliamentary Inquiry, the Education and Health Committee said,

> *"The Committee has identified major failings in DEC's (Department of Environment and Conservation) industry regulation function and shortcomings in other regulatory agencies… The Committee believes that these regulatory failures, combined with the irresponsible and possibly unlawful conduct of the Esperance Port Authority, Magellan Metals Pty Ltd, and BIS Industrial Logistics, exposed workers and the community to unacceptable and avoidable health and environmental risks." (WA report on lead pollution)*

Eighty-one of the approximately 600 children tested had blood lead levels equal to or above five micrograms per decilitre. These events were even more remarkable because the pollution from dust from lead carbonate transportation was foreseen.

"The Committee is convinced that the events that unfolded were foreseeable and in fact were foreseen. What remains less clear, and is the subject of much detailed examination in this Report, is how, despite being foreseen, the events leading to this inquiry happened anyway.

One of the recommendations of the inquiry was an increased emphasis on Health Impact Assessment and the provision of funding to employ more staff. This increased funding was short-lived.

New South Wales – T4 Environmental Impact statement

The T4 project has the potential to increase pollution in Newcastle because of coal loading at a new terminal and in the Hunter region by facilitating the expansion of coal mining and also by the transit of coal wagons through Newcastle.

Analysis by DEA shows that the Environmental Impact Assessment has bias in favour of development in selection of referencing and inappropriate use of data. DEA's view has been supported in general by health concerns from within NSW Health (submission by Hunter New England Local Health District https://majorprojects.affinitylive.com/public/0f0afe81bc7476016c93022beafa5686/NSW%20Health%20(Hunter-New%20England%20Local%20Health%20Service).pdf) indicating that their opinion had not been appropriately sought.

In practice the NSW government has now restricted further public consideration of the responses by placing the decision in the hands of one arbiter within the Planning Commission to ensure approval.

The aims of government in delivering this project have resulted in inadequate health impact assessment with the potential result that communities in Newcastle will suffer increased air pollution.

Victoria – Coal at Anglesea

Image: A new primary school at Anglesea has been built close to a coal fired power station and open cut coal mine.

At Anglesea in Victoria, residents are facing the expansion of the open cut coal mine and ongoing pollution from an old coal-fired power plant on the outskirts of their town. The power station is only approximately a kilometre from the primary school which was completed in 2011, and children are one of the groups most susceptible to the effects of air pollution. The open cut coal mine is approximately 0.5km from residents' homes.

The annual air emissions from the power station alone (based on NPI data 2009-2010) are: sulphur dioxide 40,000,000 kg, nitrogen oxides 3,700,000 kg, carbon monoxide 71,000 kg, PM_{10} particulates 290,000 kg and $PM_{2.5}$ particulates 72,000 kg.

Data released by the company Alcoa shows Anglesea residents are exposed to levels of SO_2 which could produce health impacts. No information is available on other pollutants and the EPA does not operate any independent air quality monitoring there.

It is ironic that Victoria has legislation to prevent wind power development – which does not cause any air pollution - within 2km of people's homes, but the same does not apply to highly polluting fossil fuel sources. The Anglesea community are asking that Alcoa invest in currently available technology to clean up their current operation and transition toward clean energy. They are also seeking a government funded independent study into air quality to establish levels of pollutants in Anglesea.

Failures of health assessment

DEA from its own experience believes that the failures of health assessment are profound. There are two recent significant failures in the health assessment of unconventional gas projects that illustrate this assertion. While they do not necessarily relate only to air pollution they illustrate that failure is common.

In Queensland a FOI investigation in February 2012 indicated that assessments of gas projects with investments of billions of dollars had been truncated on government demand. One public servant said he was given three days to draft hundreds of conditions. Public servants had not been given information on the location of gas wells. Such information is important for assessments of risks to human health.
http://www.couriermail.com.au/news/public-servants-tasked-with-approving-to-massive-csg-projects-were-blindsided-by-demands-to-approve-two-in-two-weeks/story-e6freon6-1226574952587

http://www.couriermail.com.au/news/queensland/coal-seam-gas-company-threatened-to-walk-away-from-16-billion-project-if-approval-not-granted-quickly/story-e6freoof-1226576528166

In 2013 in a courageous statement NSW Health publicly called for health assessment of drilling that it had not been asked to consider "A comprehensive assessment would be required to establish the full range of potential health risks, which may include risks associated with air pollution, ground and surface water contamination and noise. The information available does not allow a comprehensive assessment of

potential risks to human health.'' http://www.smh.com.au/environment/full-csg-health-check-essential-20130117-2cwav.html

Failure to adequately protect population health from the impacts of air pollution at federal and state level: an example of the Latrobe Valley, Victoria.

The Latrobe valley is home to five brown coal fired power stations and many coal mines. Almost half of all the SO_2 emitted in Victoria is emitted in the Latrobe Valley: 140 million kg per year of SO_2 is emitted in Victoria by energy generators and 100 million kg of this is emitted in the Latrobe Valley.

Despite this, there is only one independent EPA air quality monitoring station in the area and it is not located to pick up the impact of industry or power generation. (This monitoring station does not monitor for $PM_{2.5}$, in spite of this pollutant being considered to be a high risk pollutant for health impacts). Monitoring by electricity generators is required by the EPA and shows there are exceedances of the current SO_2 standard, but this monitoring is not publicly transparent as is the direct EPA monitoring.

Evidence given by Dr Lynette Dennison, Principal Scientist, Air Quality EPA Victoria in October 2011 during a VCAT hearing discusses the issue of SO_2 arising from coal combustion there. She notes that studies on the health effects of SO_2 in Australia mirror results of international studies and that these effects are well documented to affect mortality, respiratory conditions and child health and that there is no safe level of exposure, particularly for sensitive groups. The state standards for SO_2 (AAQ SEPP) relate to the national air quality standards (AAQ NEPM) which were set 14 years ago. In recent years there have been extensive reviews of the health impacts of SO_2 which has led to the WHO and the US EPA significantly tightening their standards, so they are now much more stringent than Australian state and federal standards.

To our knowledge, despite the significant exposures to air pollution, there has been no recent federal or state commissioned research on the impacts on the health of the population there.

So it could reasonably be argued that this area has significant exposure to air pollutants at levels known to affect health, with inadequate state standards and monitoring related to outdated federal standards and little research on the health impacts.

Recommendations

- Timely updating and strengthening of national air quality standards in keeping with current scientific and medical evidence.
- Transparent national reporting of air quality levels and control actions.
- Change the advisory reporting standard for $PM_{2.5}$ to a compliance standard in the AAQ NEPM.
- Monitoring in relation to potential population risk rather than just population size.
- Guidelines for protection of communities and sensitive groups eg children in new developments, such as positioning schools away from coal mines , coal seam gas wells, power stations and major roads.
- Urgent action away from fossil-fuel intensive energy generation and motor vehicle dependence to renewable non-polluting energy technologies.
- Increased funding for research regarding the health effects of air pollutants from fossil fuel mining and combustion. A National Council for Coal and Health to oversee independent research into the health impacts of coal mining and combustion. Research into the co-benefits to human health that effective action on climate change can deliver.
- Removal of subsidy for coal mines and coal exports.
- New fossil fuel developments should be subject to independent health impact assessment.
- Improved monitoring and public reporting of air pollution, not only in our cities but also in communities affected by polluting industries such as coal-fired power plants and coal mining.
- Improved intersectoral approaches between health, environmental and planning departments; to address air quality issues. Intersectoral policies should aim to reduce motor vehicle use and increase the use of public transport and active transport.
- Strategic planning to minimise the projected increases in particulate matter and ozone due to climate change.

Key References referred to in text and URLs:

AHA Scientific Statement. Particulate matter and cardiovascular disease. An update to the scientific statement from the American Heart Association. Circulation. 2010; 121**:** 2331-2378

Australian Government. State of the Environment Report 2011.

Bernard SM, Samet JM, Grambsch A, Ebi KL, Romieu I. The potential impacts of climate variability and change on air pollution-related health effects in the United States. Environ Health Perspect 2001; 109 (suppl 2): 199-209.

Climate and Health Alliance. Our Uncashed dividend. The health benefits of climate action. Aug 2012.

Castleden WM, Shearman D, Crisp G, Finch P. The mining and burning of coal: effects on health and the environment. Med J Aust 2011; 195 (6): 333-335

Chen H, Goldberg MS. The effects of outdoor air pollution on chronic illness. McGill J Med 2009; 12; 58-64

Colagiuri R, Cochrane J, Girgis S. Health and Social Harms of Coal Mining in

Local Communities: Spotlight on the Hunter Region. Beyond Zero Emissions, Melbourne, October 2012.

Dennekamp M, Carey M. Air quality and chronic disease: why action on climate change is also good for health. NSW Public Health Bulletin 2010; 21(6):115-121.

Epstein PR et al. 2011.Full cost accounting for the life cycle of coal in "Ecological Economics Reviews." Robert Costanza, Karin Limburg & Ida Kubiszewski, Eds. *Ann. N.Y. Acad. Sci*. 1219: 73–98.

HEI Panel on the Health Effects of Traffic-Related Air Pollution. 2010. Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. HEI Special Report 17. Health Effects Institute, Boston, MA.

Kjellstrom T, Neller A, Simpson R. Air pollution and its health impacts: the changing panorama. Med J Aust 2002: 177; 604-608.

Künzli N, Kaiser R, Medina S, et al. Public-health impact of outdoor and traffic-related air pollution: a European assessment. Lancet 2000; 356: 795-801

McKenzie LM et al. Human health risk assessment of air emissions from development of unconventional natural gas resources Sci Total Environ 2012; 424: 79-87.

National Environment Protection Council Service Corporation.

Review of the National Environment Protection (Ambient Air Quality) Measure Discussion Paper Air Quality Standards. Prepared for the National Environment Protection Council July 2010

National Environment Protection Council Service Corporation. 2006. National Environmental Protection (Ambient Air Quality) Measure Review Report. Prepared for the National Environment Protection Council May 2011.

NSW Government. Department of Environment and Conservation. Air Pollution Economics. Health Costs of Air Pollution in the Greater Sydney Metropolitan Region. November 2005.

OECD. Health and Environment Chapter of the OECD Environmental Outlook to 2050: The Consequences of Inaction. 2012

Pope CA, Burnett RT, Thun MJ, et al. Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. J Am Med Assoc 2002; 287: 1132-1141.

Weinhold B. The Future of Fracking: New Rules Target Air Emissions for Cleaner Natural Gas Production Environmental Health Perspectives 2012;120(7):A272-A279

Weinhold B. New primary standard set for fine particulate matter. Environ Health Perspect. March 1, 2013

World Health Organization. Health aspects of air pollution with particulate matter, ozone and nitrogen dioxide. Report on WHO working group Jan 2003.

World Health Organization. WHO Air Quality Guidelines Global Update 2005 Report On A Working Group Meeting, Bonn, Germany, 18-20 October 2005. Copenhagen, WHO Regional Office For Europe.

World Health Organisation. Effects of air pollution on children's health and development, World Health Organization Special Programme on Health and Environment, European Centre for Environment and Health, Bonn, 2005.