Coal is a Health Hazard

Notes for DEA members who are briefing members of Parliament

James Hansen, the respected US climate scientist has said *Coal-fired power stations are death factories. Close them.*
http://solveclimate.com/blog/20091124/why-we-must-phase-out-coal-emissions

The medical profession has not said this and indeed mines cannot be closed suddenly because livelihoods are at stake but they can be replaced with renewable energy industries in a planned manner. Our position is to oppose any new stations and support the orderly development of renewable industries to replace coal.

It is the role of DEA to emphasise that coal is the driver of climate change and therefore the global health impacts and a significant cause of cardio-respiratory diseases.

In Australia the coal industry continues to expand for power generation and export at the behest of state governments. NSW recently abandoned its 2020 greenhouse target because it supported two new coal developments. The federal response to the influence exerted by the coal industry is best summed up in the word abdication.

Australia is the world’s 4th largest producer of hard coal.

The National Greenhouse Gas Inventory, published in May 2009, gives total GHG emissions in 2007 as 547 million tonnes (Mt) of CO2-equivalent emissions. Of this, coal combusted in Australia, provided 200 Mt or 36.6%.

Global figures come from the IPCC (2007) report are less accurate than Australia’s figures but projecting from 2005 data, total global emissions in 2010 are about, 50,000 Mt of CO2-equivalent emissions. Of this, coal provides about 35% that is 17,500 Mt. This represents only 20% of coal production, the rest is exported. Indeed Australia is the world’s biggest exporter of coal -- from which we garner $20 billion each year.

In making coal a priority for our action, we recognize that there is presently a political fatigue with climate change science (unjustifiably) and we are best to focus on defined issues that have explanations and impacts which are more easily understood. Furthermore this issue will be with us for the next decades as a cause of significant illness through local and world pollution. The issue must be addressed urgently if climate change is to be arrested.

Our policy includes education on the health impacts of coal-induced pollution and its major role in climate change. We detail our opposition to any expansion of the coal industry and our support its gradual replacement by job-creating industries in renewable energy that will establish a new economic frontier for Australia. DEA Energy Policy: http://dea.org.au/about/file/policy_docs

**Why is coal a health hazard?**

In making our representations, we must recognise the health impacts of coal:

- Air is polluted from combustion, mining and transportation.
• Greenhouse gases are emitted from combustion and mining.
• Water is diverted from drinking, agricultural and ecological uses. This has become detrimental in areas which are mixed mining and agricultural. For example, in the Latrobe Basin over 50% of total surface water is extracted annually by brown coal electricity generators.
• Water is polluted from mining, coal washing and combustion.
• Land is degraded from mining, pollution from combustion and the disposal of solid wastes.
• Coal mining is still one of the most dangerous occupations, even in industrialized countries.
• Coal mining and coal-fired electricity foster centralized energy production and use, thus supporting a system that is vulnerable to disruption from natural causes, electrical instabilities and sabotage.
• The industry is losing jobs rapidly and, in particular, local jobs in regional centres and rural areas.

All these costs are passed on to the community as externalities, i.e. they are not included in the market price of coal. Much of this cost is in human morbidity and mortality.

We intend to educate within our area of medical expertise on the first two of these impacts.

**Cardio-respiratory impacts**

The medical consequences of the use of coal have been assessed in the USA by Physicians for Social Responsibility (PSR). [http://www.psr.org/resources/coals-assault-on-human-health.html](http://www.psr.org/resources/coals-assault-on-human-health.html)

In summary pollution from coal affects all major body organ systems and contributes to the leading causes of morbidity and mortality in the U.S. heart disease, cancer, stroke, and chronic lower respiratory tract disease and asthma. It interferes with lung development, and increases the risk of heart attacks.

Each step of the coal lifecycle—mining, transportation, washing, combustion, and disposing of post-combustion wastes—has additional impacts on human health.

**Particles, what do we need to know as doctors?**

Lidia Morawska of QUT has worked on particles for nearly two decades and has been active in addressing community groups in coal communities. It is recommended that you read her review Airborne particles and health. This is in press so it is attached. Also consult the US Environmental Protection Authority [http://www.epa.gov/ttn/oarpg/t1/fact_sheets/pmfact.pdf](http://www.epa.gov/ttn/oarpg/t1/fact_sheets/pmfact.pdf)

The composition of airborne particles is multi-factorial with many physical, chemical and microbiological characteristics. Larger particles (Often termed ‘coarse’, 10 - 2.5um) are generally primary because they are produced as dust by mechanical processes and are less harmful than fine particles (defined as less than 2.5 um and ultrafine range < 0.1mu) which are called secondary because they are produced in the air for example by combustion and by exhaust fumes.

The most significant health end points due to the inhalation of particulate matter include: decreased lung function, increased respiratory symptoms, increased chronic obstructive pulmonary disease, increased cardiovascular and cardiopulmonary disease, and increased mortality. These are related to the concentration of particles and to their size, harm being inversely related to size of particle, with no safe level. Thus for PM 10 concentration, the response is linear there is no threshold and is the same in all geographical settings discussed.

The recognition of the relationship between size and potency has lead to the adoption of the standard of measurement as 2.5um (referred to as PM 2.5 (PM (particulate matter)
Particulate Matter Air Pollution and Cardiovascular Disease
An Update to the Scientific Statement from the American Heart Association
http://circ.ahajournals.org/cgi/reprint/CIR.0b013e3181dbece1%20

Summary
In a statement on air pollution, published in Circulation: Journal of the American Heart Association an expert panel indicates that the evidence is strongest for fine particulate matter (PM2.5) having a causal relationship to cardiovascular disease.

The major source of PM 2.5 is fossil fuel combustion from industry, traffic, and power generation. Biomass burning, heating, cooking, indoor activities and forest fires may also be relevant sources, particularly in certain regions.

“Particulate matter appears to directly increase risk by triggering events in susceptible individuals within hours to days of an increased level of exposure, even among those who otherwise may have been healthy for years,” said Robert D. Brook, M.D., lead author of the statement, which was based on a review of epidemiological, molecular and toxicological studies published during the past six years.

“Growing evidence also shows that longer-term PM 2.5 exposures, such as over a few years, can lead to an even larger increase in these health risks. In this context, the American Heart Association said that PM2.5 should be recognized as a ‘modifiable factor’ that contributes to cardiovascular morbidity and mortality.”

In the statement, the panel also concluded that there is a:
• “small yet consistent” association between short-term exposure to air pollution and pre-mature death;
• strong level of evidence supporting a relationship between air pollution and ischemic heart disease;
• “moderate, yet growing link” between air pollution and heart failure and ischemic stroke;
• “modest” level of evidence supporting an association between air pollution and peripheral vascular diseases, irregular heartbeats and cardiac arrest.
• The elderly and those with existing heart diseases, such as heart failure or coronary artery disease, and perhaps those with diabetes appear to be at higher risk from short-term PM2.5 exposure.

There are several ways by which PM 2.5 could affect the cardiovascular system; however, one leading explanation suggests that several components of PM 2.5, once inhaled, can cause inflammation and irritate nerves in the lungs. These responses can start a cascade of changes that adversely affect the rest of the body, Brook said.

“It’s possible that certain very small particles, or chemicals that travel with them, may reach the circulation and cause direct harm. The lung nerve-fibre irritation can also disrupt the balance of the nervous system throughout the body. These responses can increase blood clotting and thrombosis, impair vascular function and blood flow, elevate blood pressure, and disrupt proper cardiac electrical activity which may ultimately provoke heart attacks, strokes, or even death.

“These studies also indicate that there is no ‘safe’ level of PM2.5 exposure,” he said.
Further reading on particles and health

Cardiovascular Risks from Fine Particulate Air Pollution
http://content.nejm.org/cgi/content/full/356/5/511

Report funded by the Pew Center
Dirty Air, Dirty Power
FW: Mortality and health damage due to pollution from power plants

Particles and health in Australia
The measurement of PM 2.5 in the US and Europe has lead to firm conclusions of harm to health in these populations and there are enforceable standards for PM 2.5. In Australia only limited measurements of PM 2.5 are made and there is no enforceable PM2.5 standard only an advisory one. This standard is set at a national level but monitoring and reporting occurs at the state level. There are no comprehensive studies of health and morbidity in the coal regions of Australia yet reports from local practitioners suggest morbidity for example due to asthma is considerable

However, in Australia we do know from data from the National Pollutants Inventory that there is considerable local pollution. Pollution in NSW is reported in the press article

For these reasons we ask the Federal Government:
- To review the National Environmental Protection Measures (NEPM) for Air Quality to ensure they are sufficient to protect public health based on the best available evidence. For example why is there only an advisory standard for fine particle pollution (PM2.5) in Australia, not an enforceable standard as in the USA? Why is there so little monitoring by state authorities near major mining and industrial sites?
- To develop health assessment and care for regional communities at present disregarded or denied by some state governments.

You should be aware of the likely responses to this request:

(1) Some limited studies have been done at the behest of the coal industry and these show little environmental impact. e.g. Malfroy, H, Cope, ME, Nelson, PF (2005) An Assessment of the Contribution of Coal-Fired Power Station Emissions to Atmospheric Particle Concentrations in NSW; available at http://www.gse.mq.edu.au/Research/staff/FIPARTS_MAIN.pdf CSIRO Atmospheric Research, Macquarie University and Malfroy Environmental Strategies.

In this study, state-of-the-art air quality assessment and modelling techniques were used to gain an understanding of the significance of emissions from coal-fired power stations located in New South Wales, Australia, to the occurrence of atmospheric particles (PM10 and PM2.5) in the near-field of the power stations and regionally, including the Sydney urban area. Using a conservative first-order reaction methodology combined with a comprehensive chemical transformation methodology the project has demonstrated that the contribution of NSW coal-fired power station emissions to urban fine particle concentrations is likely to be small and infrequent.
The study was funded by the state-owned electricity generating organisations, Delta Electricity, Eraring Energy and Macquarie Generation.

(2) Assertions are made that it is difficult to separate the impact of coal pollution from the general urban pollution. However, the answer is that this has been possible in the US studies referred to above and in any event there is a lack of morbidity and mortality studies in coal communities compared to communities which suffer only urban pollution.

Greenhouse gases are emitted from combustion and mining. They cause climate change and threaten the foundations of good health.

According to the World Health Organization, climate change is one of the greatest threats to public health and it will affect, in profoundly adverse ways, some of the most fundamental pre-requisites for good health: clean air and water, sufficient food, adequate shelter and freedom from disease.

The elderly, the very young, the poor and the chronically ill are the most vulnerable to the impacts of climate change. Recent events such as the unprecedented heatwave and bushfires in Victoria suggest health impacts are beginning to be seen in Australia. Farming communities, particularly in the Murray Darling Basin, are suffering from stress, social disruption and depression. In the future if no action is taken, we can expect more extreme weather events, threats to food and water security, sea level rises, changes in vector-borne, food and water borne disease, exacerbation of air pollution, increases in aeroallergens, mental health and refugee health impacts.

Coal is an expensive fuel taking into account all the impact listed above. The cost of greenhouse emissions is already massive. If we focus only on local health impacts the cost in Australia is estimated to be to be $2.6 billion per annum in a report by the Australian Academy of Technological Sciences and Engineering (ATSE) 2009.

*The Hidden Costs of Electricity: Externalities of Power Generation in Australia*: A Report by the Australian Academy of Technological Sciences and Engineering (ATSE) 2009. We need to make the point that coal is the most expensive fuel if one includes the cost of externalities, for example the costs from ill health. This study estimates the health burden of coal in Australia to be $2.6 billion per annum.

An initiative to replace coal with renewable energy: The coal industry always makes the point that jobs will be lost if mines are closed. We have to counter this with evidence that there should be a planned transfer of jobs to emerging renewable industries and that there is now considerable evidence that more jobs will be created than lost.

The following papers are selected to address these points.

Report from the ACF and ACTU, 2010
Creating jobs -Cutting pollution
The roadmap for a cleaner, stronger economy

Why Clean Energy Public Investment Makes Economic Sense - The Evidence Base

The Energy (R) Evolution

Green Power Goal To Add More Jobs, Study Suggests.
Based on the above studies, we put the following requests to our elected representatives

- With a projected world crisis in food production, the continued approval of open cast mining of productive agricultural land is madness. In the long term national interest we ask that the Federal Government adopt mechanisms to prevent the use of productive agricultural land for open cast mining.

- We request an immediate levy on carbon without any concession to the coal industry. Such considerations rendered the CPRS ineffective according to a report from the Grattan Institute. 
  It is our view that the government must harden its resolve on this issue.

- We oppose the development of any new coal mines on health grounds.

- We support planned redeployment of jobs from coal mining areas to renewable energy industries, thereby reducing the impacts of mine closure and health hazards of unemployment.

- We request the government to greatly increase development of renewable energy by fiscal means. There is now an extensive literature demonstrating that these industries support more jobs than coal mining. For example in Australia wind power employs two to three times the number of job years per kw hour of power produced by coal mining and generation. These jobs are sustainable, healthy and clean and offer a technological future for Australia which we are failing to grasp (in contrast to our competitors). The gain in jobs has been substantiated in the ACF- ACTU report “Creating jobs- Cutting pollution”.

- Climate change is the great moral challenge of our generation, that it is an economic challenge, a social challenge and actually represents a deep challenge on the overall question of national security, and that to delay any longer would be reckless and irresponsible for our economy and for our environment. (Prime Minister Rudd) Therefore as a wealthy advanced nation we should offer leadership in our greenhouse emission curtailment and recognise that we must do this as a step in the attainment of future international agreements.

David Shearman, 2012