

# Retirement of coal fired power stations

Submission by Mr Laurence Capill

I am a professional geologist and forester, with qualifications, experience and interest in many aspects of natural resources management and the environment.

In this submission, I wish to draw your attention to the situation in the southwest of Western Australia, where a number of [power stations](#) burn sub-bituminous coal sourced from the Collie Basin. The Basin contains estimated 760 million tonnes of coal.

A major portion of anthropogenic carbon emissions to the atmosphere is the result of the mining of coal and burning it for electricity generation (see this [analysis of Queensland coal projects](#)).

The increasing level of carbon dioxide in the atmosphere and in earth's oceans is driving undoubtedly catastrophic changes in climate and other earth processes, with flow-on impacts to ecosystems across the earth. These changes will certainly severely impact human society.

The scientific consensus is that we can minimise the magnitude of these changes and impacts by:

- Reducing emissions of carbon dioxide, methane and other greenhouse gases
- Ceasing to mine and burn fossil fuels, instead leaving these carbon reserves stored in the earth
- Maintaining existing biological pools of carbon
- Actively removing carbon from the atmospheric and oceans

[Early action](#) towards these goals will be proportionately more effective than delayed action, given the inertia of natural systems and the reinforcing nature of many of the forecast changes.

It is logical, therefore, to close all existing coal-fired power stations as soon as possible. In this context, 'as soon as possible' should mean as soon as the energy needs of society can be supplied by alternative, less carbon-intensive sources (including energy efficiency gains).

This submission specifically addresses the following Terms of Reference:

*(a) the experience of closures of electricity generators and other large industrial assets on workers and communities, both in Australia and overseas;*

*(b) the role that alternative mechanisms can play in alleviating and minimising the economic, social and community costs of large electricity generation and other industrial asset closures, drawing on experiences in Australia and overseas;*

*(c) policy mechanisms to encourage the retirement of coal-fired power stations from the National Electricity Market, having regard to:*

*(i) the 'Paris Agreement' to keep global warming below 2 degrees celsius, and ideally below 1.5 degrees celsius,*

Burning of fossil fuels, especially coal, is one of the major sources of anthropogenic carbon emissions across the earth. [Coal-fired power stations burn large quantities of coal](#) to generate electrical energy for industry and society.

Given the urgent imperative of the climate crisis, the burning of fossil fuels, and coal in particular, needs to cease as soon as possible. Existing coal reserves which cannot not be burned if the world is to keep global atmospheric warming within the agreed 2C limit are referred to as '[unburnable carbon](#)'.

Nicholas Stern, of the London School of Economics and president of the British Academy science group, has [commented](#) on the need to consider the broader economic costs of burning coal:

*The use of coal is simply bad economics, unless one refuses to count as a cost the damages and deaths now and in the future from air pollution and climate change.*

The quantity of carbon dioxide (and other pollutants) emitted from power stations depends on:

- The quality of the coal, with lower grade brown and sub-bituminous coals having lower energy-to-carbon ratios than higher coal grades;
- The size of the power station;
- The design and operating efficiency of the power station, with newer power stations tending to be less polluting due to deployment of superior technologies;
- The age of the power station, with older stations tending to be more polluting because they often pre-date state-of-the-art technologies, and they lose efficiency due to wear-and-tear over time.

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*(ii) the state and expected life span of Australia's coal-fired power plants,*

*(iii) the increasing amount of electricity generated by renewable energy and likely future electricity demand,*

The southwest of Western Australia is well-endowed with renewable energy resources, including:

- **Solar** (suitable for roof-top photovoltaics and concentrating thermal technologies). Domestic roof-top photovoltaics and solar thermal hot water systems are [very popular in this region](#), reflecting their competitive economic performance. Also, many people like the sense of being more independent or autonomous with regards to their energy supply. Inland and northern parts of Western Australia have some of the [best incident solar radiation](#) on the planet, which would enhance the efficiency

of solar power installations in these localities.

- **Wind.** Many parts of Western Australia, including the southwest, have [reliable wind patterns](#) that are already powering a limited number of wind turbine farms.
- **Oceanic.** Wave power, in particular, has great potential, given the exposure of the southwest coast to the long-wavelength swells of the Southern Ocean
- **Bioenergy** – with large areas of land either forested or capable of afforestation, and large areas of agricultural land potentially suitable for growing a range of bioenergy crops. The existing forestry industry generates large volumes of forest and mill residues which could be used to generate bioenergy. Expansion of the plantation estate could provide
- **Geothermal.** There have already been trials exploring the potential for tapping geothermal heat resources in the deep sediments of the Perth Basin.

Given the limited (and declining) rainfall received in southwest Western Australia, together with a relatively subdued topography, the scope for **hydroelectric power** is limited, but not insignificant. A number of existing dams and water reservoirs could conceivably contribute to energy storage, if coupled with high-level reservoirs via pumps and turbine generators.

*(iv) maintenance of electricity supply, affordability and security,*

Traditional electricity-generating stations typically are based on one or several large, often coal-fired powerstations often located adjacent to the supplying coal mine, and linked to transmission and distribution grid infrastructure. This is the case at Collie/Muja and in many other parts of Australia.

Energy supply systems based on renewable energy resources are typically characterised by comprising a large number and type of relatively small power stations that are geographically dispersed. This reflects the dispersed nature of renewable energy resources. The associated grid infrastructure needs to be less centralised and 'smart', that is, able to automatically respond to fluctuating supplies and demands.

Transitioning from primarily coal-fired power to alternative energy sources therefore requires fundamental reorganisation of the grid infrastructure.

- Planning and design of the grid needs to consider potential energy sources, locations and supply characteristics, as well as the profile of the market.
- A well-designed 'smart' grid is a public infrastructure that has the potential to mediate energy transactions between hosts of suppliers and consumers, and as such, might be considered as analogous to the road network which mediates transit by hosts of independent users. This infrastructure underpins and facilitates regional economic activity.
- Good design, resourcing, implementation and management should be given to ensure restructured 'smart' energy grids are efficient and effective.
- The WA Government has recently [announced](#) its consideration to sell Western Power, the entity that owns the WA electricity grid infrastructure. Given the need to radically restructure the grid, privatisation would seem to lock in the existing grid structure, making it unnecessarily difficult to undertake the restructuring. This WA

Government initiative should be discouraged at this stage.

At present the electricity supply capacity in WA significantly exceeds the demand, meaning that the mean cost of power must include the invested cost of this excess capacity which is often idle. The [WA government has indicated](#) that this situation is unacceptable, and foreshadows the closure of some plants. Closing the coal-fired power stations such as Collie and Muja would make the most difference for global warming.

*(v) any other relevant matters;*

*(d) policy mechanisms to give effect to a just transition for affected workers and communities likely impacted by generator closures, as agreed in the 'Paris Agreement', including:*

*(i) mechanisms to ensure minimal community and individual impact from closures*

The impact of ceasing mining of Collie coal and ceasing the burning of coal for power generation on the local Collie community and the wider Western Australian community could be minimised by the adoption of a number of partially inter-related strategies:

#### **Generate bioenergy from forest and timber industry residues.**

- The economics of the forestry and timber processing sectors would be enhanced if there were better markets for wood residues. In some cases there are presently no markets for the large volumes of wood residues; in other cases a market for biomass products would create a more competitive market environment.
- Some existing power stations have existing capability substitute biomass for coal (eg [South 32's Worsley power station](#)).
- It is possible to retrofit this capability in (some) conventional coal-fired power stations, and this option should be investigated.
- Consideration could be given to establishing a wood pellet facility in the vicinity of biomass resources and power stations. Wood pellets have a controlled moisture content, making them a preferred fuel for bioenergy plants.
- Co-location of pyrolysis plants with bioenergy plants can enhance the quality of the fuel for the power stations, and also support a range of biochemical production facilities
- A pilot plant designed to produce electricity and a range of products from oil mallees (40,000ha of existing resource in the WA wheatbelt) was established at Narrogin. Consideration should be given to further developing and deploying this technology in other parts of regional Australia.

#### **Expand the scale of the forestry plantation sector.**

- Expanding the plantation forest estate within an economic radius of power stations can not only provide a larger biomass resource, but can rehabilitate water catchments such as the [Collie River catchment](#) which presently suffers serious salinity problems.
- Forestry and timber processing also support relatively large workforces.
- The recent recommendations from the Forest Industries Advisory Council for

*Transforming Australia's Forest Products Industry* include expanding forestry production around strategic regional hubs. Collie is a good candidate for such development

- There is substantial scope for utilising and expanding the established oil mallee resource on farmlands throughout the WA Wheatbelt.
- Increased areas of forestland within WA river catchments can make significant improvements to water quality and biodiversity outcomes.

Locate **new renewable energy plants** in proximity to existing power stations, so that the existing electricity distribution infrastructure can be utilised.

- At Collie, it would be possible to co-locate solar power stations, wind farms and wood-sourced bioenergy plants, so as to feed into the existing Collie/Muja grid.
- Towns such as Collie, which have a history of coal mining and energy production, can continue to be associated with new energy systems. There may be considerable alternative employment opportunities for mine and power station workers in the alternative energy sector, if developed on a sufficient scale.
- The WA Greens, as part of their [Energy 2029 plan](#), have produced a [strategy](#) for transitioning Collie to become a regional hub for renewable energy. I commend this strategy for closer consideration by the Committee.

### **Consider options for energy storage facilities:**

- In southwest WA, options for storing energy in order to address the problem of fluctuating supplies from wind and solar include:
  - mass storage of wood pellets,
  - pumped hydroelectric facilities utilising the 300m elevation difference between the Swan Coastal Plain and the Darling Plateau,
  - construction of pressurised water storage systems.

### **Minesite rehabilitation**

- Decommissioning the coal-fired power stations at Collie/Muja will likely mean the end of the associated coal mining operations.
- At Collie, as for many other places in Australia, the outstanding minesite rehabilitation obligations are large, with the Government/taxpayer highly exposed in the case of default by the mining companies. It is, therefore, in the public interest to find ways to achieve the necessary rehabilitation at minimal cost to Government.
- Minesite rehabilitation can provide useful bridging employment for local mining workforces for several years.
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*(ii) mechanisms to attract new investment and jobs in affected regions and communities;*

*(e) the appropriate role for the Federal Government in respect of the above; and*

*(f) any other relevant matters.*

