

10 November 2016

To The Environment and Communications References Committee,

RE: Inquiry into the retirement of coal-fired power stations

Introduction

Thank you for the opportunity to write this submission into the retirement of coal –fired power stations. I have a Bachelor of Environmental Science and Management from the University of Newcastle, with my Major as Social Systems. I have lived in the City of Lake Macquarie for over 40 years.

I am involved in Lake Macquarie City Council’s Sustainable Neighbourhood Group Program, firstly as a committee member on the Lake Macquarie Sustainable Neighbourhood Alliance and as the Chair of LT Creek Sustainable Neighbourhood Group.

As of 2011 I became a Community Representative on the Centennial Newstan Community Consultative Committee and as of 2016, I attend Origin Energy – Eraring Community Forums. I consider myself as Community and Environmental Advocate, appreciating both sides of the argument while working for a better future for the community and the environment.

While Australia has been riding on the coal industry’s back, economically, coal is a finite resource and the coal-fired power stations are coming to the end of their lifespan. The ‘Paris Agreement’ should be embraced as an opportunity to move forward and lead globally in renewable energies and transitioning away from coal.

Brief History

Concerns about the effects of anthropocentric activities on the environment have been well articulated, officially since 1972 with Stockholm Conference, 1987 with the Brundtland Report (Our Common Future) and in the 1990’s with the Rio Earth Summit and the implementation of Agenda 21.¹

Last year the world witnessed the drawing up of the ‘Paris Agreement’ which Australia signed, committing to the reduction of global emissions and to keep global warming below 1.5 – 2 degrees Celsius.

¹ <https://sustainabledevelopment.un.org/resourcelibrary>

Global Context

Scientists and academics worldwide have been studying the transitioning of fossil fuel base load power stations to alternate renewable base load power stations. One of the options is solar- aided coal fired power stations (SACFPSs).

It is acknowledged that coal-fired power stations produce over 67% of China's power² and that coal is the major polluting fuel³, which contributes to climate change and global warming.⁴ Chinese modelling indicates that SACFPS reduces emissions and coal consumption, and also improve the efficiency of thermal power units.⁵ Several solar collection units have been investigated for viability in SACFPSs. They include parabolic trough system, parabolic dish system, solar power tower and Fresnel reflectors.⁶

Integrated Solar Combined Cycle Systems (ISCCs) have been trialled, developed and put into commission in Italy⁷, Algeria^{8 9}, Iran^{10 11} and Morocco.^{12 13} Algeria, Morocco¹⁴ and Italy¹⁵ use the parabolic trough technology.

In in their review of ISCCs, Behar et al (2014) found:

- “ the higher the solar field performance the higher the operating temperature and thus high the efficiency;
- The smaller the solar field the higher the exergy efficiency;
- The larger the power plant the lower the produced electricity cost;

² Rongrong Zhai et al 2016 Page 375 www.elsevier.com/locate/energy Energy 102 (2016) 375 -387

³ Rongrong Zhai, et al 2016 Page 453 www.elsevier.com/locate/emconman Energy Conversion and Management 111 (2016) 453-465

⁴ Junjie Wu et al 2016 Page 319 www.elsevier.com/locate/apthermeng Applied Thermal Engineering 104 (2016) 319- 332

⁵ Rongrong Zhai, et al 2016 Page 453 www.elsevier.com/locate/emconman Energy Conversion and Management 111 (2016) 453-465

⁶ Rongrong Zhai et al 2016 Page 375 www.elsevier.com/locate/energy Energy 102 (2016) 375 -387

⁷ Cau G et al 2012 Page 2975 www.elsevier.com/locate/solener Solar Energy 86 (2012) 2975-2985

⁸ Cau G et al 2012 Page 2975 www.elsevier.com/locate/solener Solar Energy 86 (2012) 2975-2985

⁹ Behar O. et al 2014 Page 224 www.elsevier.com/locate/rser Renewable and Sustainable Energy Reviews (2014) 223-250

¹⁰ Cau G et al 2012 Page 2975 www.elsevier.com/locate/solener Solar Energy 86 (2012) 2975-2985

¹¹ Behar O. et al 2014 Page 225 www.elsevier.com/locate/rser Renewable and Sustainable Energy Reviews (2014) 223-250

¹² Cau G et al 2012 Page 2975 www.elsevier.com/locate/solener Solar Energy 86 (2012) 2975-2985

¹³ Behar O. et al 2014 Page 225 www.elsevier.com/locate/rser Renewable and Sustainable Energy Reviews (2014) 223-250.

¹⁴ Behar O. et al 2014 Page 224- 225 www.elsevier.com/locate/rser Renewable and Sustainable Energy Reviews (2014) 223-250

¹⁵ NREL (National Renewable Energy Laboratory) US . Cited 6 Nov. 16
http://www.nrel.gov/csp/solarpaces/project_detail.cfm/projectID=19

- The higher the fossil fuel prices the more the competitiveness of the ISCCS.”¹⁶

The United States of America have been world leaders in the commissioning and operation of concentrated solar power (CSP) stations,¹⁷ having over 20 CSP units. Fourteen are in California. Other States include Arizona, Colorado, Florida, Hawaii, Nevada and Utah, with the parabolic trough as the main technology.¹⁸

National Context

There are over 460 power stations nationally, with the Northern Territory and Tasmania having no coal-fired power stations. There are approximately 34 Coal- fired power stations with at least four of those power stations non-operational.¹⁹ South Australia has closed its two coal fired power stations.²⁰ The transition to renewable energies is happening. Nationally there are approximately 30 small-scale Photovoltaic power stations.²¹ Research and development (R&D) activities into baseload solar energy is happening. Examples of solar R&D activities include the Mildura Solar Power Station Project,²² The CSIRO Energy Centre at Mayfield and²³ Beyond Zero Emissions, a not-for-profit NGO.

State and Regional Context

The NSW Governments, “Hunter Regional Plan” acknowledges the need for diversification and transition in the energy and mining sectors.²⁴ The Plan acknowledges that Liddell and Bayswater power stations will close in the next 20 years. There is an accelerated need to transition and transform the energy sector. Action 12.3 of the Plan, states “Promote new opportunities arising from the closure of coal-fired power stations that enable long term sustainable economic and employment growth in the region.”²⁵

The Hunter Regional Plan forecasts an increase in tourism, agriculture, viticulture, and the domestic service industries. It plans to promote innovative small businesses.

¹⁶ Behar O. et al 2014 Page 248 www.elsevier.com/locate/rser Renewable and Sustainable Energy Reviews (2014) 223-250

¹⁷ Herrera, L J & Klinge T. 2015. Renewable Energy Focus (2015) 171-173

¹⁸ NREL (National Renewable Energy Laboratory) US .
[http://www.nrel.gov/csp/solarpaces/by_country_detail.cfm/country=US%20\(%22_self%22\)](http://www.nrel.gov/csp/solarpaces/by_country_detail.cfm/country=US%20(%22_self%22))

¹⁹ Aus Gov. <https://data.gov.au/dataset/national-power-stations-database> Cited 7 Nov 2016 CSV Spread sheet.

²⁰ Alinta Energy <https://alintaenergy.com.au/about-us/news> Cited 7 Nov 2016

²¹ Aus Gov. <https://data.gov.au/dataset/national-power-stations-database> Cited 7 Nov 2016 CSV Spread sheet

²² Power- Technology.com <http://www.power-technology.com/projects/mildura-solar-power-station> cited 7 Nov 2016

²³ CSIRO Energy Centre <http://www.csiro.au/en/Research/EF> is researching solar and integrated energy systems. Cited 7 Nov. 16

²⁴ NSW Govt. Hunter Regional Plan Page 24

²⁵ Ibid. Pages 34-35

Concentrated solar thermal technology using Lineal Reflectors is integrated into the Liddell coal-fired power station, producing 9.3MW of power.

Avar Solar, the solar construction company, for Liddell states that CSP stations “can replace the extraction steam used for feedwater heating with solar steam. ... The steam that is not extract can continue expanding through the steam turbine and produce more electricity with increasing plant emissions.”²⁶

Local Context

The local context in this case is Lake Macquarie. There are two operational coal- fired power stations – Eraring and Vales Point. This section will concentrate on Eraring. Eraring (Origin) produces 2800MW of power and is the largest power station nationally.²⁷ Coal is mainly sourced from Centennial Coal’s Mandalong and Myuna Collieries with coal transported by dedicated over land conveyor belt or by trucks using a purposed built haul road.

It is thought that Eraring will close somewhere between 2030- 2032. Myuna Colliery lease is due to end in 2032.

With the foreseeable closure of Eraring in the next 15 years transitioning baseload power into a cleaner and renewable source is paramount. It is also important that employment levels be maintained as high as possible.

Investing in technologies such as ICCS, CSP, and SACFPS as well as large scaled photovoltaic to complement existing coal-fired power stations should be seriously considered. This could include utilising disused colliery pit tops such as Awaba Colliery to have areas of solar farms. This is happening in Britain. ²⁸ Existing buildings and infrastructure could be used to hold photovoltaic units to aid in base load power generation.

Louie and Pearce discuss the retraining investment of transitioning coal to solar photovoltaic employment. “The results show that a relatively minor investment in retraining would allow the vast majority of coal workers to switch to PV- related positions.”²⁹

In Lake Macquarie, there is potential to have increase employment growth in eco-tourism, tourism, education and research and thus assist in the transition process. This is demonstrated, for example in the conceptual plan for the “Scribbly Gum Centre”. A 7ha parcel of land, near Eraring Power Station, the “Scribbly Gum Centre” would host a tourist information centre on the west side of Lake Macquarie, an environmental education room, host eco-tourist activities and a wildlife research and release area facility. It is only minutes away from the Myuna Bay Sport and Rec Facility. Approximately 10 minutes from Morisset

²⁶ Areva Solar <http://www.areva.com/EN/operations-3642/areva-solar-projects.html?xtmc=Liddell&xtcr=1> cited 7 Nov 2016

²⁷ Aus Gov. <https://data.gov.au/dataset/national-power-stations-database> Cited 7 Nov 2016 CSV Spread sheet

²⁸ ANESCO <http://anesco.co.uk/transforming-former-collieries> cited 9 Nov 2016

²⁹ Louie EP & Pearce JM., 2016 Pages 295 Energy Economics

and Toronto. The Scribbly Gum Centre would be accessible from the M1 via either the Morisset interchange or the Awaba interchange.

Conclusion

Retiring and phasing out coal-fired power stations is a necessity. In saying this it is important that the transition to a smarter and cleaner energy alternative is done thoughtfully. By focussing on solar energy and other renewables to complement the transition and on alternate employment industries, the transition can be accomplished without too much upheaval to the community. All levels of government must work together with the private sector and the community to make this happen.

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