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To the Select Committee on the Port Augusta Power Stations,

Beyond Zero Emissions applauds the South Australia Parliament for investigating a solar thermal industry in Port Augusta by establishing the Select Committee on the Port Augusta Power Stations. Please find below the Beyond Zero Emissions' submission to this process, and attached supporting material including our *Repowering Port Augusta* report, a report on the Port Augusta Community Vote, modelling on the effect of renewable energy bringing down the wholesale price of electricity, and documentation on policy options for the South Australian Parliament.

Replacing the coal fired power stations Playford B and Northern with solar thermal power is a once in a generation opportunity for the people of Port Augusta, the Upper Spencer Gulf region, and South Australia. By taking advantage of this opportunity, Port Augusta would not only retain its important role in power generation for South Australia, but would become a hub for solar power generation and innovation of global significance.

With this comes a large employment opportunity, not just to guarantee current operational power sector jobs in Port Augusta for a generation, but to create a large pulse of construction jobs over the best part of a decade, as well as manufacturing jobs and professional services throughout the region and the state.

Port Augusta would go from being one of the last remnants of dirty brown coal combustion, to a centre of excellence in solar innovation, an industry undergoing an exponential global boom which is as certain to continue as the demise of brown coal fired power generation. The project will create enormous business opportunities for the state and the downstream jobs that these create.

However the most important reasons for solar thermal power plants to replace the coal power plants are to protect the health of the people of Port Augusta, and to reduce greenhouse gas emissions.

The international peer reviewed literature on the impact of coal combustion on health is clear that coal combustion seriously impacts the health of local communities. This includes;

- Increased risk of death from lung and other cancers,
- Increased risk of heart attack,
- Increased asthma rates and respiratory symptoms,
- Higher rates of preterm birth, low birth weight, miscarriages and stillbirths.[1]

[1] Coliguiri "Health and Social Harms of Mining in Local Communities;

Burning coal is the single largest cause of global warming, described by the world's leading medical journal, The Lancet, as "the biggest health threat of the 21st century".[2] Brown coal is the most greenhouse gas intensive way of burning coal.

Continuing to operate the coal plants until "the coal supply from the Leigh Creek mine is no longer viable" will impose an unacceptable cost on the future health of the people of Port Augusta. If, as this implies, the remaining coal will be burned before the power plants are replaced, the same amount of particulate pollution will be pumped into the air over Port Augusta, and the community will continue to suffer from the devastating health impacts.

It is also unnecessary. Building the solar thermal power plants will create more than enough jobs to replace existing power plant jobs, as well as many additional jobs. Many of the existing electricity generation jobs will directly transferable to the new power stations which are largely identical to coal power stations as they are both thermal power generation plants.

Certainly, the life of coal mine of Leigh Creek will be shortened, but the demise of these jobs is inevitable due to a lack of coal, and it is far better to proactively deal with situation facing Leigh Creek than to extend it's operation for as long as possible at the cost of the health of the Port Augusta community. Alternative economic development options for the town should also be considered, including large scale renewable power generation.

The global solar context; and industry experiencing exponential growth

There are two key solar technologies, solar photovoltaic and solar thermal power. Both are experiencing exponential growth. Solar photovoltaic is the more advanced, having been deployed at a staggering rate over the past decade, and doubling in capacity in the last two years. In the process it has achieved massive cost reductions, and is around one tenth of its cost a decade ago. Last year alone the cost of solar photovoltaic reduced by 30% alone.

Germany, the economic powerhouse of Europe, with a fraction of the solar resource that South Australia is blessed with, has increased its solar output by 50% this year alone to 25 GW. China has a 2015 solar target of 21 GW[3] and is considering almost doubling this to a staggering 40GW, and even Saudi Arabia recently announced plans for 18GW[4],[5] of solar development.

Solar thermal is starting from a lower base than solar photovoltaic, but as can be seen in figure 2 it is undergoing rapid deployment. A detailed breakdown of existing deployment can be seen in Appendix 1. South Australia has a huge opportunity to become a world leader in the expanding global solar thermal industry.

Spotlight on the Hunter Region" University of Sydney

[2] http://www.thelancet.com/climate-change

[3] http://cleantechnica.com/2012/07/02/china-quadruples-2015-solar-power-target/

[4] http://www.bloomberg.com/news/2011-03-31/saudi-arabia-to-target-solar-power-in-100-billion-energy-plan.html

[5] http://www.eco-business.com/news/china-may-raise-solar-power-capacity/

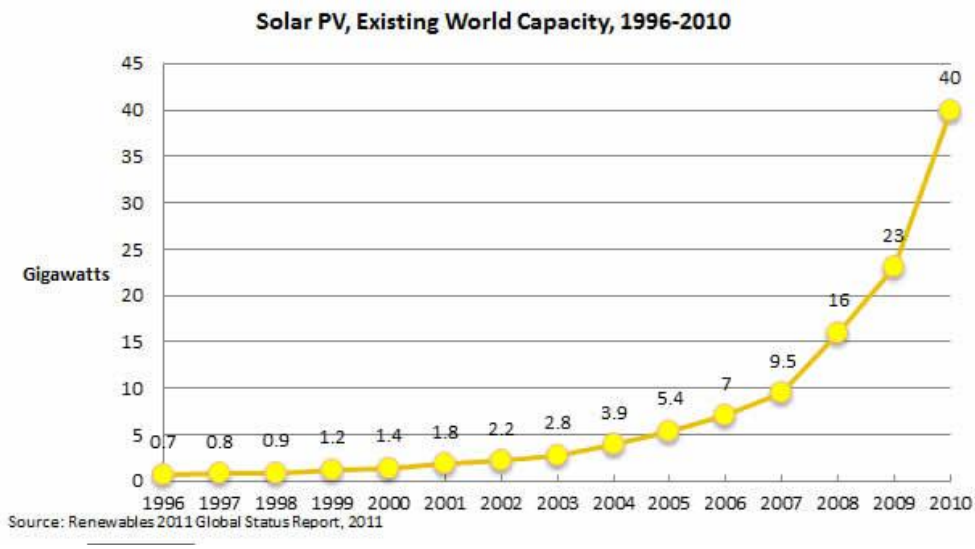

Figure 1: Solar PV, Existing world capacity

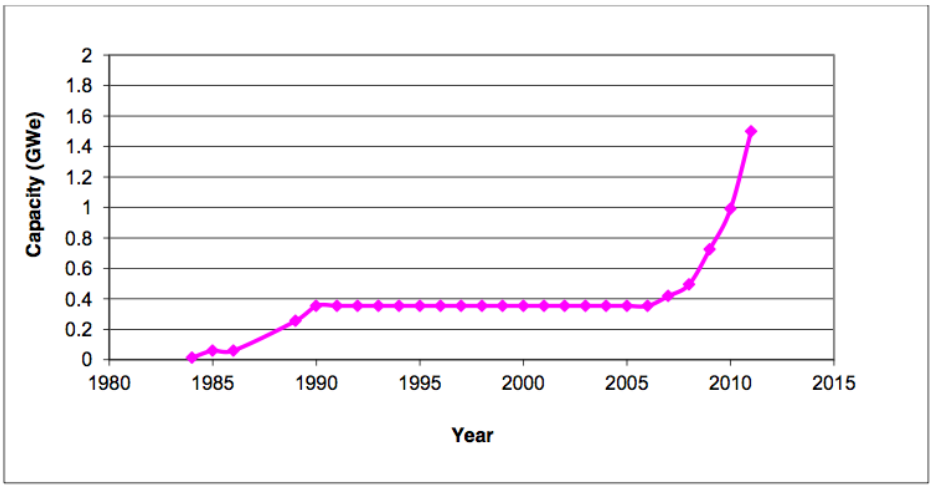

Figure 3-1: Global installed capacity of CSP plants to end of 2011.

Figure 2: Solar thermal, growth in world capacity

Below is a summary of our points, each related to the specific Select Committee term of reference.

The Investment required to repower Port Augusta, and the impact on household and business electricity prices

Solar thermal with storage is an affordable and reliable power source. Although solar thermal has a higher capital cost than gas or coal, once the plants are built there are no ongoing fuel costs. The capital cost of solar thermal with storage can be met using a variety of policy mechanisms, as outlined by the attached document *Concentrating Solar Thermal: Support options for South Australia*.

The impact of solar thermal on electricity on electricity prices will depend on the rate and timing of the deployment, the policies used to implement the proposal, and whether those policies are implemented by the state or federal governments.

The full Repowering Port Augusta proposal could be implemented with an incremental contract for difference across the South Australian electricity market. A 0.7 c per kilowatt hour price rise would allow two solar thermal plants with storage to be built to replace the generation capacity of Playford B, with no impact on the state budget. This contract for difference would be offset by the merit order effect of the additional 220 megawatts of solar thermal in the electricity market, causing the wholesale price of electricity to fall by 0.55 c per kilowatt hour. This system could be implemented through a reverse auction with a contract for difference, as demonstrated by the ACT Government this year, or through a feed in tariff. Further information on policy options for the South Australian Government to support solar thermal in Port Augusta is attached.

Renewable energy also reduces the wholesale price of electricity, and as a result lowers household and business electricity prices over time. It does this by providing extra supply at peak periods of demand which lowers the wholesale price of electricity. This is called the Merit Order Effect. Further modeling on the merit order effect of solar thermal in Port Augusta is attached to this submission. Solar thermal with storage is the only technology that can provide ongoing stable electricity prices for South Australia.

The real threat to household and business electricity prices is South Australia's reliance on gas for electricity generation. Current gas prices in Australia are a relatively inexpensive $3-4 per gigajoule (GJ), but are likely to increase significantly over the next few years. When Australia begins exporting large quantities of Liquefied Natural Gas from the east coast (estimated to start around 2015), suppliers will be selling to Asian consumers at prices far higher than currently offered in Australia. Domestic gas prices will become linked to the international oil price and the high Asian market prices that Australian gas will be predominantly sold into (currently around $17 GJ). Wholesale natural gas prices are projected to more than double over the next few years.[6] These price increases will flow onto electricity prices and increase electricity prices for households and businesses.

Santos has acknowledged that the entry of shale gas into the South Australian market alone will double the wholesale gas price and increase household energy bills by $163 per year[7]. This would also increase household electricity bills by and additional $100 per year.

[6] AEMO 2012d. *2012 National Transmission Network Development Plan*. Melbourne: Australian Energy Market Operator. http://aemo.com.au/Electricity/Planning/National-Transmission-Network-Development-Plan/~/media/Files/Other/ntndp/2012NTNDP.ashx.

[7] http://www.adelaidenow.com.au/news/south-australia/secure-gas-will-come-at-a-higher-price-to-customers/story-e6frea83-1226452928723

The impact on employment in the region;

Solar thermal power has a similar level of employment to coal fired electricity, and provides many times the amount of permanent ongoing operations and management jobs as gas per unit of energy produced. It also provides substantial construction and manufacturing jobs.

The Repower Port Augusta proposal for 6 solar thermal power towers would provide around 1300 construction jobs, 225 manufacturing jobs and a further 360 ongoing, permanent jobs providing a significant boost to the Spencer Gulf region and to the South Australian economy. The manufacturing and construction jobs would exist for at least 6 years, while the entire solar thermal project is completed.

Solar thermal power is largely identical to coal fired power generation in terms of the turbine, generator and other thermal infrastructure. For this reason, many of the current coal power station jobs are directly transferable.

If a gas power plant were built instead, it would result in around 76 permanent jobs, 360 construction jobs (over two years) and 10-50 upstream gas field jobs. This would cause significant job losses for the Port Augusta region, where currently 400 people are employed on a permanent basis at Playford B and Northern.

Solar thermal power; reliable commercially available technology

Providing real energy security for South Australia

Solar thermal power has been operating continuously and reliably in the US since the 1980s. There are currently around 40 large scale solar thermal power plants operating around the world, with around half that again under construction and many more planned.

This infrastructure requires many billions of dollars, and it is not possible to finance infrastructure on this level unless proper due diligence is conducted and it is shown to be completely reliable. None of these plants have experienced any significant problems in operation, or even delays in construction or cost blowouts.

Solar thermal power also has energy storage capability, meaning that it can be dispatched at any time of the day and night without sun. Although the storage can be up to 17 hours, in the context of the SA grid, a 50% capacity factor, or around 8 hours storage is sufficient.

There are at least 10 plants with significant molten salt energy storage in operation and many more being built. This technology was originally designed by the US DoE, Boeing, Bechtel and Rocketdyne.

The experience of gas fired power is very different. In 2008 the Varanus Island gas processing plant exploded, knocking out 30% of WA's gas supply for several months and causing billions of dollars of damage to the State's economy. Victoria experienced a similar catastrophe at Longford in 1998 which cost the lives of two workers, and in 2004 the processing plant at Moomba also exploded threatening SA's electricity supplies.

Solar thermal power will increase South Australia's energy security.

Greenhouse gas emissions

Last month the **World Bank** warned that the world is on track for a disastrous 4 degrees warming, and that is was it is essential to avoid warming of more than 2 degrees "*A 4°C warmer world can, and must be, avoided – we need to hold warming below 2°C"* [8]

Around the same time global accounting firm PriceWaterhouseCoopers has confirmed that the world is on track for 6 degrees warming by the end of the century if current emissions trends continue. [9]

The implications of kind of warming will include rapid sea level rise, food crisis, a large increase in dangerous wether events including superstorms, bushfires, flood and drought. These will lead to regional instability and conflict and an increase in the movement of displaced people.

These impacts will be felt keenly by South Australia which is highly vulnerable to fire, drought and impacts on agriculture.

It also means that support for fossil fuel electricity generation will rapidly erode, jurisdictions saddled with fossil fuel infrastructure will face increasing pressure and direct financial penalties. Brown coal is the most carbon intensive form of electricity generation, and unconventional gas is increasing understood to have far higher leakage rates, and hence lifecycle emissions that previously thought.[10]

It is increasingly accepted by experts and governments around the world that if we are to avoid the scenarios described by the World Bank and others that we will be required to remain within our carbon budget of 1000 Gt of CO2 by reducing greenhouse gas emissions as quickly as possible. As at 2012, we have already emitted around 450 Gt CO2 – almost half of the 2 degree carbon budget within only 12 years[11] – leaving only 550 Gt for the remainder of the period to 2050[12]. The small size of our remaining carbon budget sits in contrast to the immensity of the world's remaining fossil fuel reserves. Current reserves are equivalent to 3,500 Gt of CO2. Given that some of the global carbon budget will be consumed from non-energy source of emissions, at most only 1/8 (equivalent to around 450 Gt CO2) of our remaining fossil fuel reserves can be burned up to 2050.[13]

Playford B and Northern power stations emit around 5 million tonnes of greenhouse gas emissions each year. Given the need to reduce our emissions as quickly as possible, and the emissions intensity of burning fossil fuels, replacing these coal plants with solar thermal with storage is a forward thinking and responsible leadership opportunity for South Australia.

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[8] http://climatechange.worldbank.org/content/climate-change-report-warns-dramatically-warmer-world-century

[9] http://press.pwc.com/GLOBAL/News-releases/current-rates-of-decarbonisation-pointing-to-6oc-of-warming/s/47302a6d-efb5-478f-b0e4-19d8801da855

[10] http://thinkprogress.org/climate/2012/02/08/421588/high-methane-emissions-measured-over-gas-field-offset-climate-benefits-of-natural-gasquot/?mobile=nc

[11] Malte Meinshausen et al, "Greenhouse-gas emissions targets for limiting global warming to 2 degrees" (2009) *Nature*, Vol 458, p 1158-1162

[12] Ibid.

[13] Green & Finighan, *Laggard to Leader* (2012), Beyond Zero Emissions, p 8-9

Community Support

Since the publication of the Repowering Port Augusta report a series of additional steps have been taken to build support for a solar thermal solution. The Repower Port Augusta Alliance, which was created in April 2012 has united a range of sectors and organisations that support replacing both Playford B and Northern with solar thermal and wind power.

The Alliance includes local community and business groups as well as the Conversation Council of SA, CLEAN SA, Public Health Association of Australia, National Union of Workers, Australian Education Union, the Australian Youth Climate Coalition and others.

A broad and committed consensus has been established within the Port Augustan community that renewable energy, and specifically concentrated solar thermal, is the future industry for the city. As such, both the Port Augustan City Council and Business Port Augusta are strong supporters of the transition from coal to renewable energy and are integral members of the Repower Port Augusta Alliance. In July this year a vote by the Port Augustan community clearly demonstrated broad community commitment. In a two option preferred vote where either a gas powered plant or solar thermal plants were constructed, 4053 (98.9%) community members voted in favour of solar and only 43 (1.1%) voted for gas. The Port Augusta community will not accept anything less than the full closure of the coal-fired power stations and their replacement with concentrated solar thermal.

A full report on the Port Augusta community vote can be found here http://minus.com/mEC70SG4m

Health Impacts

A recent report by researchers at the University of Sydney entitled '*Health and Social Harms of Coal Mining in Local Communities*' was published in October 2012. The report summarised the peer reviewed literature on the health impacts of coal from around the world. It found clear evidence that proximity to coal mines or coal fired power plants is associated with serious health effects, which include higher rates of; lung cancer, cardiopulmonary disease, chronic obstructive pulmonary disease (COPD) and other lung diseases, hypertension, kidney disease, heart attack, stroke and asthma. Higher rates of preterm birth, low birth weight, miscarriages and stillbirths have also been associated with proximity to coal industries.

As such Port Augusta has been called SA's 'cancer hotspot' and is reported to have double the rate of lung cancer than the rest of the state. Slightly higher rates of smoking have been dismissed by health experts as an explanation. This disease burden could be significantly reduced with an investment in renewable technology.

Conclusion

We are encouraged by the establishment of Committee to investigate the feasibility of the concentrated solar thermal and wind power plants at Port Augusta.

Replacing the coal power plants in Port Augusta with solar thermal power and wind will make Port Augusta a globally significant centre for innovation in an industry that is experiencing exponential growth that is certain to continue.

Port Augusta has a number of advantages that make it an ideal location to be Australia's first baseload solar hub, including excellent sun, transmission lines in place, a fully trained workforce and the necessity of replacing the current coal power stations.

The proposal represents enormous benefits to the people Port Augusta, the Upper Spencer Gulf region, and South Australia in terms of regional and economic developments, employment and health.

What is needed is decisive action and not prevarication. Waiting until the coal runs out is a recipe for South Australia and the region to miss out and fall behind, with dire consequences for employment, economic development of the region and the health of the local community.

This is a once in generation opportunity and we urge the committee to recommend=d decisive action to secure the economic future of people of Port Augusta and the region.

Sincerely,

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