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21.04.2021

Committee Secretariat

Standing Committee on Environment and Energy

PO Box 6021

Parliament House

Canberra ACT 2600

By Email: Environment.Reps@aph.gov.au

Re: Inquiry into the current circumstances, and the future need and potential for dispatchable energy generation and storage capability in Australia

Dear Committee Secretariat,

Thank you for the opportunity to submit to the Standing Committee on Environment and Energy in relation to the inquiry into the current circumstances, and the future need and potential for dispatchable energy generation and storage capability in Australia.

I have been a member of the global renewable energy industry since 2008, and have held different senior roles within different global multinational organisations. I was involved in origination, development, investment and building of over 2 GW Solar and Wind projects in Europe, Middle East, Africa and Asia. Since 2019, I have been leading a team which is developing GW scale solar and storage projects across Australia. As a senior level renewable energy professional, I have several different positions in various Australian and overseas entities focused on the renewable energy investment and development platforms. I have a Master of Science degree on Renewable Energy Technologies and Management, and with this submission, I will be addressing following terms of references: a. current and future needs; b. issues related to system integration, connection, and grid transmission requirements; c. existing, new and emerging technologies; d. comparative efficiency, cost, timeliness of development and delivery, and other features of various technologies; g. opportunities for Australia to grow and export dispatchable zero-emission power; and h. other relevant matters, including reference to international examples, by sharing my views on:

a. Shifting to Renewable Energy is Inevitable
b. Why we should be thinking of dispatchable energy in a new concept.
c. How storage will play a key role in meeting Australian`s energy targets and transition.
d. Challenges around storage investments and solution suggestions.

**Shift to Renewable Energy is Inevitable:**

The global trends in relation to renewables are very positive. The shift from fossil fuel generation towards renewable energy generation in the electricity sector has effectively become unstoppable. Globally, more renewable energy capacity has been installed every year than new fossil fuel and nuclear capacity combined. In most countries including Australia, producing electricity from wind and solar PV is now more cost effective than generating it from new coal-fired power plants. Progress is slow in the two larger sectors; heating/cooling and transport. However, new trends show

us that this picture will change dramatically in the very near future when we see more electric cars on the roads and other cost-effective solutions around heating/cooling. On top of it, global emission targets and global carbon price will add an unbeatable advantage over the renewables in the very near future. This global trend is unavoidable, and Australia should carefully read the global trends to take advantage of the change.

We see similar trends in Australia in the last few years. Following the recent unprecedented renewable energy boom, we are witnessing how renewables are transforming Australia's energy generation mix. This is not being driven by ideology, but simply by economics.

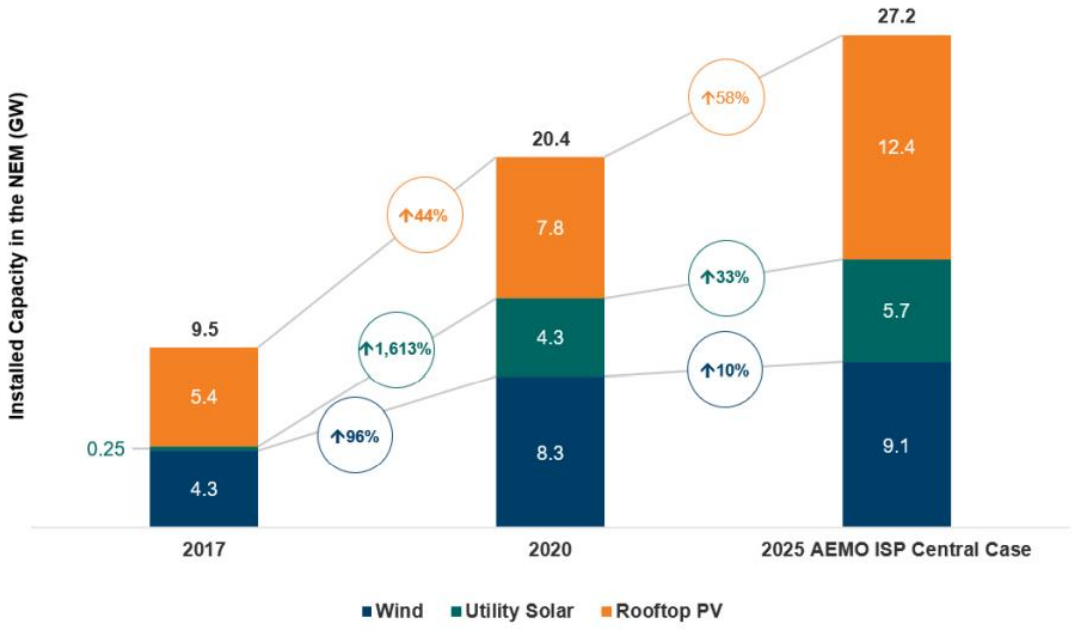


*Figure 1 AEMO ISP Central Case*

The Australian electricity system was founded on centralised, carbon-intensive coal-fired generation which is not in line with today's modern and smart grid. The average lifetime of a coal powered plant is 29 years although its design life is 40 to 50 years. About three-quarters of Australia's coal-fired power stations are operating beyond their original design life and some have had extensive refits.[1] Australia's ageing fleet of coal and gas-fired power plants are becoming increasingly unreliable and inefficient, suffering breakdowns at least twice a week on average[2]. Over the next 15 years, the Australian Energy Market Operator (AEMO) projects most of Australia's 20-odd coal plants will also be closed[3]. There is no prospect for new coal fired power plants as estimates of the levelized cost of electricity (LCOE) of any hypothetical newly built coal fired power stations are significantly higher than the LCOE of wind and solar PV power in Australia now, with that difference expected to widen over time (AEMO 2018, BNEF 2018). The difference in future LCOE is likely to exceed the costs of firming up intermittent renewables with energy storage even in a system with high renewables

[1] https://www.energynetworks.com.au/news/energy-insider/the-demise-of-coal/
[2] https://reneweconomy.com.au/australias-coal-and-gas-plants-are-breaking-down-every-three-days-34744/
[3] https://theconversation.com/the-death-of-coal-fired-power-is-inevitable-yet-the-government-still-has-no-plan-to-help-its-workforce-156863

penetration[4]. As a result, it appears that there is no prospect for new coal fired power stations being built in Australia on a commercial basis. Considering the fact that most of the coal powered plants are already in loss[5] , will be closed earlier than scheduled and be replaced, most likely, by a grid-scale battery[6], Australia urgently needs investment and policy solutions to manage this inevitable transition.

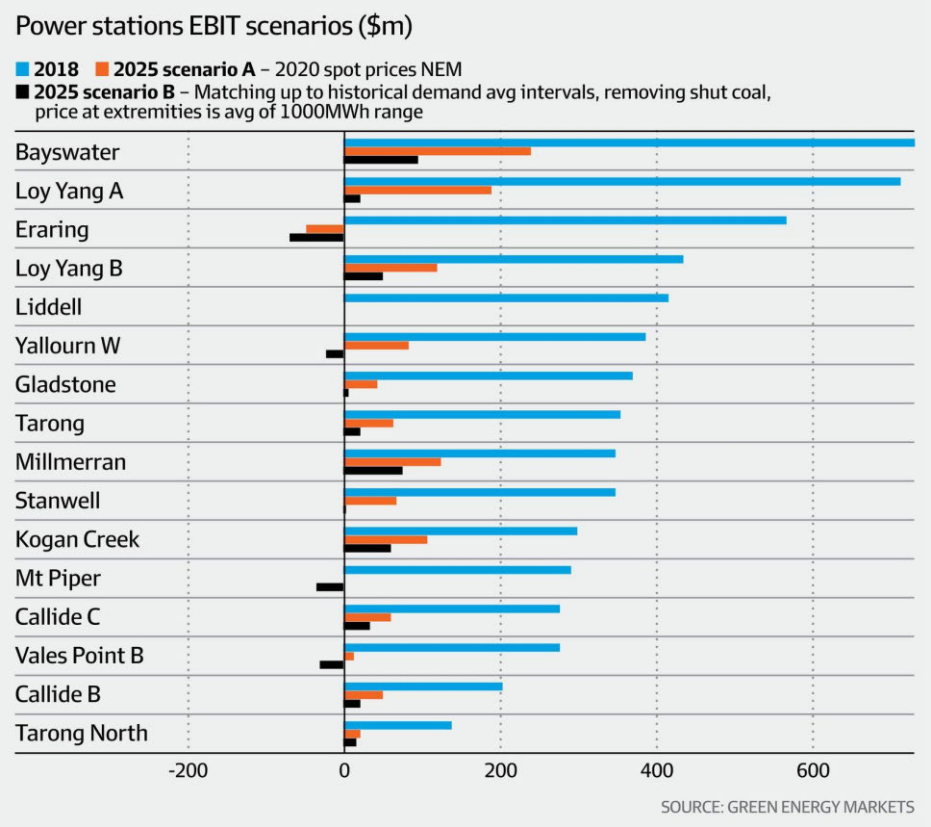


*Figure 2 Unprofitable Coal Plants*

**The Importance of Utility Scale Storage:**

Energy storage will play an important role in this transformation together with renewable energy, particularly with Solar PV. This concept is the new dispatchable energy or in other words "dispatchable renewables" concept, which is replacing the old, fossil fuel based dispatchable energy.

Large scale batteries can store low-cost electricity, such as renewable energy, when there is an oversupply or during periods of low demand so that it is available when demand is higher or supply decreases. They also stabilise the grid during frequency disruptions. Large-scale batteries can also immediately dispatch stored electricity when there is a temporary loss of supply (either unexpected or regulated) and is a cheaper interim electricity source than emergency gas-fired and diesel

[4] https://ccep.crawford.anu.edu.au/sites/default/files/publication/ccep_crawford_anu_edu_au/2019-06/1811_0.pdf
[5] https://www.afr.com/companies/energy/up-to-five-coal-plants-unprofitable-by-2025-20210222-p574uz
[6] https://www.theguardian.com/australia-news/2021/mar/10/yallourn-close-early-victoria-australia-brown-coal-power-stations-giant-battery

generators. Storage can reduce the frequency of blackouts and need for load shedding when there is a supply imbalance.

Large-scale batteries improve grid reliability and lower prices in three main ways:

1. First, they can help lower prices by storing low-cost power for use during times when generation costs are higher.
2. Second, large-scale batteries make stored electricity available for immediate dispatch when energy demands exceed generation. They are comparable to other peaking generation mechanisms (such as gas peaking plants) and can be deployed quickly, allowing for more efficient use of the network. This will help keep downward pressure on power bills and reduce network costs.
3. Third, High-renewables markets without energy storage could see very low demands and extreme negative pricing for very long periods of time which will hurt the renewable energy investments and overall market mechanism. Storage helps renewable energy plants to be protected in negative price events and maintain a sustainable revenue.

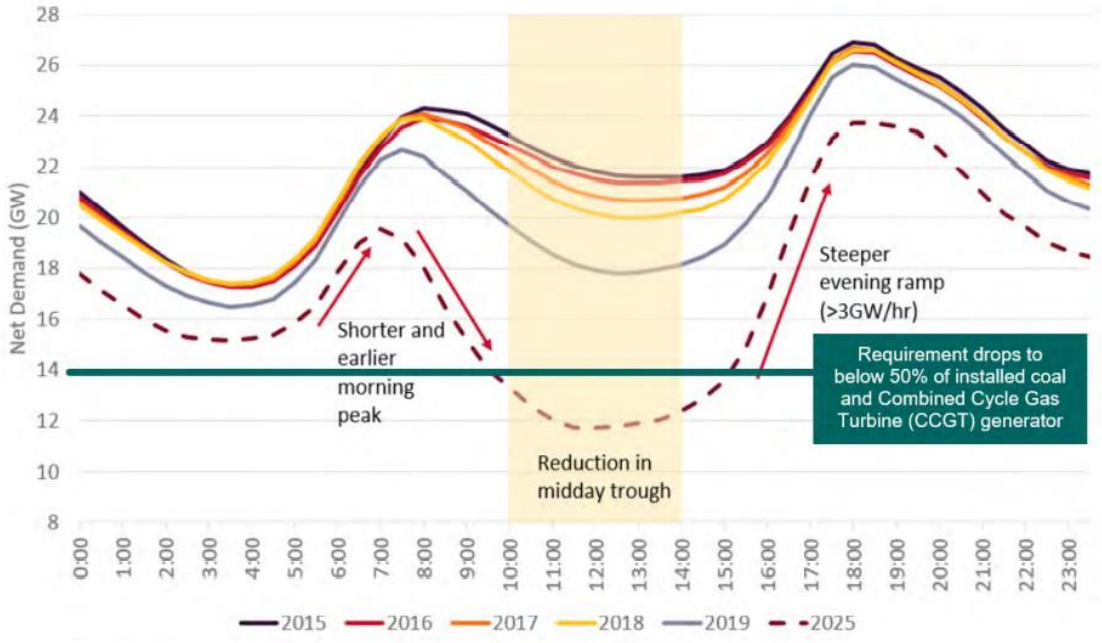


*Figure 3 NEM average winter net demand curves (actual 2015 – 19 and projected in 2025 under AEMO's Central)*

Storage basically helps to shift the generation into times when it's more useful. It can be batteries, but potentially longer term it could be (green) hydrogen as well.

The economics of owning batteries also looks to be improving. Five-minute settlement, which AEMO plans to introduce later this year is partially designed to increase the profitability of fast-starting batteries. At the same time, battery module prices are also falling steeply as order sizes increase and

manufacturing improves. Prices will fall further to reach $100/kWh in 2023. By 2030, they will touch $61/kWh.[7]

Renewable Energy Projects which were non-economic because of curtailment, MLF, grid capacity, or market price risk could have favourable business models when the dispatch periods are more controllable with the help of storage. Another significant advantage is that off takers are looking for firmed green power where dispatchable renewables could fill in this gap in the market.

**Challenges Ahead:**

Having had a hands-on experience in the Australian marketplace in the past two years, and in light of my global experience and knowledge, I see two main challenges in the market in relation to the storage investments:

1. Uncertainty in forecasting revenues which is blocking the project finance and investment case. More reliable revenue streams are needed, particularly as Frequency Control Ancillary Services ("FCAS") revenues are speculative. Many valuable services that batteries can provide aren't yet adequately compensated or have regulatory barriers, such as Fast Frequency Response, synthetic inertia and other network services.

2. The uncompensated benefits of improved loss factors and reduced congestion to surrounding projects. The two key financial and technical benefits are the potential:
    a. Improvements in loss factors (marginal loss factors ("MLF") and distribution loss factors ("DLF"))
    b. Reduction in congestion, allowing projects to increase their export availability into the grid. However, there is currently no ability for one project to 'charge' another project for the benefits provided to them.

**Solutions:**

In my opinion, some simple solutions to overcome these challenges would be:

1. Supporting storage developers and investors by introducing a ***capacity payment type of support,*** which will unblock project finance and accelerate the deployment of storage capacity relatively quickly.

2. As more batteries are built, arbitrage opportunities and FCAS revenues should decrease which will make these investments unprofitable in a few years' time. Therefore, the required ***storage capacities*** should be regulated and ***limited under a licensing mechanism***. The renewable energy operators should have an allocated storage capacity in proportion to the renewable energy plant capacity.

3. ***The ownership model of energy storage by Network Service Providers*** ("NSPs") and leasing back the storage asset competitively to the renewable energy generator in the same

[7] https://www.downtoearth.org.in/news/energy/battery-prices-falling-sharply-says-report-68274#:~:text=Battery%20prices%20are%20falling%20sharply,published%20on%20December%203%2C%202019.&text=According%20to%20the%20report%2C%20prices,they%20will%20touch%20%2461%2FkWh.

distribution region should be encouraged and incentivised. This model could bring a solution to the project finance challenge as the NSPs could finance the storage assets based on the balance sheets and could have a reasonable and steady annuity-based returns while the renewable energy asset owners could use this instrument to enrich the revenue streams without any upfront capital and get all the benefits of the dispatchable energy generation.

4. The Social Licensing aspect of the renewable energy transition should not be underestimated. The government should encourage ***fossil fuel energy generators to involve more actively in*** development, investment and operation of ***renewable energy and storage assets*** together with renewable energy players in the market. This could be a win-win scenario for both parties as the development and investment capital will start flowing towards renewables and development, investment and operational know-how of renewables will be shared with potential new players in the market.

Reading the global and local trends carefully and designing Australian grid and electricity market mechanism with a long-term vision is very important. This long-term vision should be based on minimum 101% renewables with storage including green hydrogen.

I trust that this information is of benefit.

Yours sincerely,

Muren Guler, MSc.

Partner, Venn Energy
Banksia Solar Project Pty Ltd

[redacted]

PS: I am willing to appear at any public inquiry to answer the respected committee members' questions in more detail at my personal professional capacity.