7 May 2021

Mr Ted O'Brien MP
Chair
Standing Committee on the Environment and Energy
House of Representatives
Parliament House
Canberra ACT 2600
Via email: environment.reps@aph.gov.au

Dear Committee,

Inquiry into the need and potential for dispatchable energy generation & storage capability

We welcome the opportunity to provide a submission on the House of Representatives' Standing Committee on the Environment and Energy inquiry into the current circumstances, and the future need and potential for dispatchable energy generation and storage capability in Australia.

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia. We represent and work with over 900 of the leading businesses operating in renewable energy, energy storage and renewable hydrogen. We are committed to accelerating Australia's clean energy transformation.

Up to 19GW of flexible, dispatchable resources needed to firm 50GW of new renewables

The future need for dispatchable energy generation, including storage, has been well documented by the Australian Energy Market Operator ('the Operator') in its 2020 Integrated System Plan (**'the ISP'**). This biennial publication is the product of robust, detailed modelling and analysis by the Operator. It has found that the National Electricity Market (**'the NEM'**) will require 26-50 GW of new variable renewable energy generating capacity between 2020 and 2040 in order to replace the approximately 15 GW (or 63 per cent) of coal-fired generation capacity that will reach the end of its technical life over that timeframe.

The ISP sets out that a further **6-19 GW of new, flexible, dispatchable resources are needed**, including utility-scale pumped hydro, large-scale battery energy storage systems, distributed batteries, virtual power plants and other demand-side participation. It's important to recognise that the ESB have recently noted[1] that the clean energy transition across the NEM jurisdictions is already tracking at the fastest end of AEMO's range of scenarios (the 'step-change scenario') and as such the CEC expects that we will need to be targeting the upper end of this dispatchable resource range to meet the system's needs.

[1] Page 94, ESB Post-2025 Market Design Options, Part A (2021): https://esb-post2025-market-design.aemc.gov.au/32572/1619564199-part-a-p2025-march-paper-esb-final-for-publication-30-april-2021.pdf

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Gas-fired generation may play a 'backstop' role when we achieve high levels of renewables
Over the past year the Australian Government has heavily promoted the role of gas-fired power generation to support the clean energy transition. We note however that the ISP states that *'new flexible gas generators could play a greater role if gas prices remained low at $4 to 6 per GJ over the outlook period.'.* Such prices are unlikely to be a feature of Australia's gas markets in the foreseeable future. The Reserve Bank of Australia forecasts that *'wholesale gas prices in 2021 are estimated to be around $7-8/GJ (ACCC 2020), significantly higher than the $3-5/GJ range observed prior to 2015'*, and that due to the linkage of Australian and international markets in recent years, *'gas prices are likely to remain structurally higher than their pre-2015 levels over coming decades'*[2].

As such, it is unlikely that gas-fired power generation, which is typically used to supply electricity in times of peak demand, will play a major role, or even an expanded role, in providing dispatchable energy within the NEM. Existing gas generation is likely to play a diminishing 'backstop'[3] role in supporting high levels of renewable energy deployment in the later years of the transition for winter periods in which renewable energy resources (supported by pumped hydro and battery storage) are insufficient to meet demand. In its recent report 'Go for net zero', the Grattan Institute notes that not until renewable energy penetration reaches around 90 per cent would gas-powered electricity generation be the most economic option to meet demand in these infrequent winter periods of inadequate dispatchable clean energy supply.

Until this time, geographically diverse energy storage with a range of durations – short, medium and long – will provide more cost-effective solutions for firming wind and solar energy resources.

Short to medium duration storage
The ISP states that initially, relatively shallow 1-2 hour storage is needed to provide firming capacity and intra-day energy shifting. The Clean Energy Council recently published a report outlining that for short to medium duration dispatchable energy, large-scale battery storage outcompetes gas-fired peaking plants on cost, flexibility, services to the network and emissions.

The study – *Battery Storage: The New, Clean Peaker*[4] – compares a new 250 MW gas peaker with a 250 MW grid-scale battery with four hours of storage, both built in NSW, over a 20-year period. It found that the battery provides cost savings of more than 30 per cent on a levelised cost of energy basis, providing energy for $156/MWh compared to $234/MWh for a gas peaker.

In addition to cost, batteries provide a range of added benefits, including a fast response rate to frequency deviations, a wide range of network support services and zero emissions. In comparison, gas projects come with several added risks, including exposure to fluctuating gas prices, planned and unplanned outages and carbon risk premiums.

The market recognises the significant potential of batteries, and there are currently 21 battery projects that are in construction (or due to start construction soon) around Australia[5]. These battery storage projects are valued at $971 million in capital costs, and deliver 1,366 MW of new energy storage capacity with the ability to discharge 2,728 MWh.

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[2] https://www.rba.gov.au/publications/bulletin/2021/mar/understanding-the-east-coast-gas-market.html#fn1
[3] https://grattan.edu.au/report/go-for-net-zero/
[4] https://www.cleanenergycouncil.org.au/resources/resources-hub/battery-storage-the-new-clean-peaker
[5] Clean Energy Council project tracker: https://www.cleanenergycouncil.org.au/resources/project-tracker

Medium-to-long duration storage

As more coal-fired generation retires, medium to long duration storage (4-12 hours) will be required more often. The ISP, supported by CSIRO's annual GenCost analysis[6], finds that pumped hydro energy storage ('pumped hydro') is more competitive in these high-duration applications than battery storage[7] or gas-fired generation, and expects it to play an important role in intra-day and inter-day time shifting of energy supply. Australia's existing hydro power assets are very well placed to play this increasingly important role into the future.

A number of pumped hydro projects are currently in the pipeline, with the 250MW/2,000 MW/h Kidston Pumped Hydro Storage Project recently reaching financial close and commencing construction, the Snowy Hydro 2.0 project under construction, and Tasmania's Battery of the Nation projects (supported by the Marinus Link interconnector) in the planning stages.

The development of long-duration storage assets (such as hydropower) typically has long lead times, and can face challenging commercial hurdles due to significant upfront capital costs and revenue uncertainty. The Australian Government and the Australian Renewable Energy Agency (ARENA) could potentially play an important role in addressing some of these distinct challenges. The CEC would encourage further investigation to understand how the Australian government might best support deep-storage developers and operators to overcome these challenges.

Other medium-term storage technologies are also emerging, such as redox flow batteries which are currently undergoing significant research and development. While smaller than pumped hydro facilities, these flow batteries are beginning to be developed at megawatt scale, targeting between 6-12 hours of flexible discharge, and ideal for daily deep-cycling applications.

A strong transmission network is the necessary backbone for a more flexible, reliable system

A strong transmission network will be critical to facilitating a smooth and efficient clean energy transition, by capitalising on the diversity of resources across the system and enabling resource sharing between regions.

Currently however, the network and protection systems are straining to accommodate the new renewable energy resources that are required to succeed retiring thermal capacity. Planning and investment in the transmission network is slow and complex, and is lagging years behind market need.

The CEC continues to support the effective actioning of the ISP – which prioritises transmission augmentation projects – as a means to address this network capacity issue and the associated connection, congestion and constraint challenges currently being experienced.

Noting that the transition is now moving at or beyond a step-change scenario, the CEC expects that transmission projects identified for medium to long-term time horizons in the most recent ISP may however need to be accelerated for earlier delivery. This will include the strengthening of transmission interconnection between regions such as Marinus Link, Project Energy Connect and the Victoria to New South Wales Interconnector West (VNI West).

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[6] https://publications.csiro.au/publications/publication/PIcsiro:EP208181
[7] Specifically, lithium ion batteries.

The Federal Government should support the proper functioning of our market and the advice of our market bodies, in order to attract the investment in dispatchable resources

In closing, we urge the Committee to draw on the extensive work that has already been undertaken to identify the dispatchable energy generation and storage needs across the NEM, and consider ways that the Commonwealth Government can support the transparent and proper functioning of the market to deliver the outcomes that energy consumers expect.

Hundreds of billions of dollars of private investment[8] is waiting in the wings seeking the right conditions to invest in long-life, clean energy infrastructure assets. To bring that investment forward, investors need clear market signals and a predictable policy environment to enable them to plan projects and commit private funds. Yet, after more than a decade of policy turmoil, industry is still awaiting an integrated federal energy and climate change policy framework.

To fill this void, state governments have displayed leadership and established a range of strong targets and policy mechanisms to support investment confidence. Unfortunately, the Federal Government policy commitments remain generally inconsistent, unpredictable and unco-ordinated, which is making Australia a more complex, higher cost and uncertain investment destination. Government interventions – such as ultimatums to build high-cost, high-emissions, and less flexible gas fired generation – have a chilling effect on investment in clean, dispatchable energy solutions. They are deeply unhelpful to an orderly clean energy transition and they should stop.

Instead, we urge the Government to focus its attention on getting the market signals and settings right to support a clean energy transition, and then allow the market bodies and private market participants to get on with the job.

Yours sincerely,

Anna Freeman
Policy Director, Energy Generation

[8] An Octopus Group survey of global institutional investors published in November 2020 found that global institutional investors planned to invest US$742 billion (AUD$1 trillion) in renewable energy infrastructure over the coming decade. https://octopusgroup.com/newsroom/latest-news/institutional-investors-set-to-double-allocations-to-renewables-in-next-five-years/