23 December 2025

Subject: Wholesale Market Arrangements for battery energy storage systems (BESS). Using BESS in the New Zealand System.

Purpose

This submission is provided by Michael Clark, as Managing Director of Capability Consulting Services (CCS) Limited.

I have worked in and around the energy markets as a lawyer, electricity company legal advisor, regulator, policy and regulatory advisor, asset management reviewer, commercial strategist and negotiator. My expertise has including building the first wholesale electricity market in the Gulf, based in Oman with interconnection with UAE and Saudi Arabia.

I am writing this submission to have those involved in wholesale market policy development to consider most broadly how battery energy storage systems (BESS) can be flexibility employed in the New Zealand energy market. In writing this submission I am drawing on my experience and oversight of the use of battery storage and operations in Victoria and South Australia where battery operations to augment the grid are, due to circumstance, the most advanced in the world.

Why Australia – our near neighbour - is a leader in BESS

Australia's drive to perfect grid-based battery technology was preceded by significant blackouts in South Australia in 2016, when the whole state lost power on 28 September 2016 during a one-in-50-year weather event involving tornadoes , severe thunderstorms, damaging winds, hail and 80,000 lightning strikes. The storm resulted in catastrophic damage to power infrastructure, including the loss of more than 22 transmission towers. As a standard safety response, the South Australian energy system was isolated from the National Electricity Market. Within hours, power was restored to all but 75,000 of the 900,000 homes that lost power. However, the remaining 75,000 took significantly longer to reconnect.

The Australian Energy Market Operator AEMO (2016), has published four reports into the incident which show the event was triggered by the severe weather causing the loss of three major transmission lines (causing six voltage dips over a 2 minute period). AEMO with pressure from Federal and State government were driven to find solutions into what is anticipated to be more regularly occurring extreme weather events. It is anticipated in Australia that without alternative grid security measures, the events of September 2016 could reoccur and could affect more than 1 million connections at a time including key connections to hospitals, and those for vulnerable consumers.

South Australian Advisory Functions – the search for security

Four reviews confirmed the reasons for the blackouts and identified that there was effectively no N-1 ability to maintain the network in such circumstances without significant security intervention. This resulted in State Government legislation require AEMO to advise on grid alternatives aimed at minimising the risk of subsequent blackouts in future years.

The search for security has been exacerbated by the additional problems of fuel and therefore energy price in Australia. New Zealand is not far from precisely what has occurred in this

context in Australia. April to July 2022 was the "perfect storm" for wholesale electricity price instability caused by the fuel embargoes and shortages driven by the Russian Ukraine war, severe storms that forced 85,000 from their homes.[1] The latter caused the closure due to safety and access of key coal mines and gas facilities in Victoria, Queensland and New South Wales, resulting in severe coal and gas shortages, exacerbated by the closure of railroads due to the flooding associated with the storms resulting in the inability to shift fuel to coal fired stations relied on to carry peak load and the inability to carry load by way of gas due to the impacts on east coast gas production.

Renewables were unable to function also and many coal fired plants that may have been able to assist could not function due to the significant earlier closure of the mines employed to service those generation plants.

Manufacturing, hospitality, and retail sectors were hit hardest, with SMEs particularly vulnerable due to their limited financial resilience. Electricity prices surged 141% over the same period of the prior year - forward prices for 2023 delivery in Australia's National Electricity Market surged from ~$48 in 2021 to $156/MWh in 2022 – at one point peaked at $247/MWh!

Multiple horizontal and vertical responses to the crisis

NEM State Governments all reacted by capping prices and significantly beefing up State-backed energy hardship schemes for vulnerable consumers. AEMO was forced to act with haste and focus to promote grid security by ensuring BESS-backed systems attaching directly to wholesale grid and major renewable projects in NEM based States.

Most recently for example, AEMO has completed the System Integrity Protection Scheme (SIPS) procurement process on behalf of the Victorian Government. The successful tenderer is global renewable energy producer, Neoen.

Under the contract, AEMO will reserve 250 megawatts (MW) from Neoen's 300 MW battery to operate in a control scheme to increase the capability of the Victoria to New South Wales Interconnector (VNI) and respond to unexpected network outages in Victoria from November 2021.

AEMO Managing Director and CEO, Audrey Zibelman, said: "AEMO's competitive procurement and evaluation process attracted significant interest and a positive outcome for Victorians.

"Neoen's solution, developed with Tesla and AusNet Services, on a unit cost basis, was a significantly more cost competitive and attractive market response than other major battery developments in Australia," Ms Zibelman said.

In the event of an unexpected network outage between November to March, the battery will automatically discharge energy within seconds, ramping to full output of 250 MW. This will allow AEMO time to safely optimise interconnector flows and dispatch other generation and storage within Victoria to keep the system stable and secure.

[1] The 2022 Energy Crisis: horizontal and vertical impacts of policy interventions in Australia's National Electricity Market (NEM), Simshauser, P. University of Cambridge (UK) Working paper in Economics, CWPE2257; EPRG Working Paper 2216 "*The war in Ukraine and the associated 2022 energy crisis has had far-reaching effects with seaborne prices for coal and gas reaching multiples (5-6x) of their historic averages"* Published: December 2022.

This is part of AEMO's grid security measures referred to as Improving Security Frameworks, which includes the transitional systems initiative. In late 2024, AEMO published a statement of need to procure new types of security services (Type 1) from battery energy storage systems (BESS) to manage minimum system load events in Victoria and South Australia ahead of spring 2025.

AEMO has signed two Transitional Services - Type 1 contracts with BESS owners in Victoria with a charging capacity of 313.75 megawatt hours. Negotiations were undertaken with BESS owners in South Australia; however, no suitable agreements were reached.

"Having BESS contracted importantly reduces the need for market intervention to manage power system security during minimum system load events – providing participants with more certainty on cost recovery – and reduces the need for any last-resort action to reduce or curtail rooftop solar,"[2]

Relevance to New Zealand

It is not a matter of if, but when similar extreme events impact the grid in NZ. Whilst the reliance on fossil fuel systems is different from Australia, similar price spiking impacting wholesale and forward prices occurred in 2024. Those spikes produced similar impacts albeit not as severe as Australia. This could still happen. Extreme weather in NZ is getting more pronounced but has not yet reached the levels of severity witnessed in Australia; it is a matter of time.

BESS should first and foremost be seen as a new and well-developed tool that should be adopted and purchased by Transpower as System Operator earlier rather than later for insertion at key points of the grid. Reliance on energy for economic and social well-being dictates that sensible policy decisions be taken and that these are hastened as part of the solution to energy vulnerability and security of supply risk.

Issues raised in the Electricity Authority paper – Wholesale Market Arrangements for battery energy storage systems

Issue 1: The rules for following dispatch instructions do not recognise that BESSs are highly controllable assets. Addressing this would enable the System Operator (SO) to dispatch BESS in a manner that better supports a stable and resilient power system.

Not only are they controllable and should be available for dispatch by the SO but, as a matter of security of supply should be able to be despatched by the SO, instantaneously by being triggered for automatic discharge of its stored energy within seconds, and should be designed to ramp to full output of 250 MW, just as is already being commissioned in the State of Victoria, Australia.

Issue 2: The rules for BESS submitting bids and offers, and the System Operator's tools for sending dispatch instructions, do not recognise BESS as single entities that can both generate and consume. Addressing this would: • incentivise efficient investment in BESSs

[2] https://www.aemo.com.au/newsroom/news-updates/aemo-progressing-transitional-system-security-services

by reducing barriers to enter the market • ensure secure dispatch to support a resilient system • help support a stable and resilient power system by enabling greater future participation by BESSs in ancillary services.

I agree with this statement 100% and if one investigates the work conducted by AEMO in South Australia, Victoria and most latterly NSW, this is precisely the steps that are being taken to ensure flexibility, focused security of supply on the grid, and efficient and resilient N-1 grid management.

Issue 3: The System Operator's security assessment tools and the rules for BESSs finalising their bids and offers do not recognise that the optimal operation of BESSs is unpredictable as it depends on limited storage and expectations of future prices. Addressing this would help ensure BESSs can operate efficiently without compromising the System Operator's ability to maintain a stable and resilient power system.

I agree with the statements as far as they go and agree that more must be done with the security assessment tools to enable optimisation but I would go further and say that the unpredictability is not simply about economics, it is also about climate dynamics and when and in what circumstances the kind of emergencies and SO responses that may be needed instantaneously to secure and support grid capacity in times of extremes.

Issue 4: The wholesale market financial compensation rules do not recognise that BESS are highly controllable assets. Addressing this would help to promote competition between technologies by ensuring BESS are compensated in similar ways to other generators.

It is fundamental not only for generator compensation but also to attract investment that the wholesale market financial competition rules are overhauled so that they become more technology agnostic and better aligned to modern approaches to grid management.

Conclusions

In Australia, multiple catastrophes coupled with impactful negative economic impacts forced the NEM changes. We have been fortunate in NZ that this has not occurred. This is not about good management. It is simply that Gabrielle style events did not have the same catastrophic effects on generation and the grid as occurred in NSW and South Australia (in particular). The next event could however do exactly that.

AEMO (the Australian SO) recognises that multiple trials are required to prefect grid security, Addressing the issues above is the start, but this must be backed systematically by an entirely updated approach to security of supply. AEMO is now trialling the technologies including by operating them when there are even no operating synchronised generation.[3]

New Zealand must move at pace to improve security of supply in a similar way, or risk not just the kind of wholesale price spikes witnessed in 2024 but also the heightening risk of major outages due to extreme events. There is no shame in plagiarising and learning from our neighbours in a policy setting and implementation space and by drawing on similar expertise

[3] AEMO progressing transitional system security services. 24 October 2025.

that could see NZ advancing its wholesale system security at pace, off the back of the Australian developments.

Trials in Australia are including:

Trial	Objective
Black start capability from inverter-based resources	Exploring whether advanced inverters can provide black start capability, traditionally only delivered by synchronous plant.
Zero synchronous generation	Operating part(s) of the system with no synchronous generation online, relying instead on advanced inverter controls and other assets (e.g. synchronous condensers) to provide reference signals for frequency, and voltage. This would be a world-first demonstration of zero synchronous generation in an islanded system larger than 100 MW.
Grid-forming inverter protection-quality fault current	Demonstrating how grid-forming inverters can contribute fault current to reliably support the operation of essential grid protection systems.
System restart under high distributed PV conditions	Developing automated management capabilities for distributed PV to support system restoration following a blackout.

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