John Kim

Australian Energy Market Commission

Submitted via AEMC Webportal

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Dear John

ERC0339: Efficient Procurement of Inertia – Directions Paper

Akaysha Energy (Akaysha) appreciates the opportunity to provide the Australian Energy Market Commission (AEMC) with a response to the Directions Paper on "Efficient Procurement of Inertia" (the Directions Paper)

Akaysha is one of the largest BESS build, own, operator in Australia. Established in 2021 as an Australian-owned and operated Independent Power Producer (IPP) Akaysha has now grown to more than 140 people – with offices in Melbourne, Sydney, Brisbane, Singapore, Tokyo, Portland and Houston. We have a 4GWh portfolio of 4 battery energy storage systems (BESS) projects in construction, and another 13GWh in the development pipeline in the National Electricity Market (NEM).

Akaysha is supportive of continued consideration being given to the best ways to incentivise system security services that have historically been provided as an operational byproduct of an aging coal generator fleet. As Australian coal generators retire, it will be critical to have a long-term, sustainable approach in place to procuring system security services – including inertia, system strength, and other emerging services currently contracted under the network support and control ancillary services (NSCAS) and transitional services contracts through AEMO. As a company focused on developing and operating a significant amount of BESS capacity in the NEM, we have a particular interest in the role that grid-forming (GFM) inverters, particularly GFM BESS, can play in replacing this retiring coal capacity.

Akaysha appreciates the work done by the AEMC on the Improving Security Frameworks (IFC) Rule Change. Updating the definition of inertia in the National Electricity Rules (NER) removes regulatory barriers for inverter-based resources and "synthetic" inertia to be procured by Transmission Network Service Providers (TNSPs) for bilateral inertia contracts under the inertia procurement arrangements in the NEM. This is a positive step in recognising the range of services that can be provided by BESS assets in the NEM.

While this Directions Paper is also a positive step forward, from Akaysha's perspective, there is still more work to be done on creating a technical roadmap that provides clear and consistent technical

guidance for inverter based resources and ensures BESS assets are recognised for their role in system strength and inertia services.

From a first principles perspective procurement of system security services, including inertia – through both bilateral procurement methods and through real-time markets – should be based on the following:

- Procurement of services should be technology agnostic to the extent that prescribed technical parameters are complied with.
- Clear guidance on specifications for services needs to be provided to enable this technology agnosticism.
- Consideration needs to be given as to whether there needs to be specific requirements for different technology types – such as GFM inverters to achieve the same grid outcomes. This should include any technology specific nuances that need to be considered for different technology types.

In our response below, we highlight some of the current concerns with the existing procurement approach and potential pathways for addressing these issues to create a true level-playing field for BESS assets.

For more information on this submission please contact Emma Fagan at [redacted]

Kind regards

Emma Fagan

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Akaysha Energy

Procurement of minimum operational inertia

Akaysha understands the rationale of the AEMC in continuing with the existing Transmission Network Service Provider (TNSP) led bilateral procurement model for minimum inertia requirements. We agree with the AEMC that this is a fundamental system need, and the risks of under-procurement of inertia are significant from a system security perspective.

As noted above, the IFC Final Determination removes the regulatory barriers for the procurement of "synthetic" inertia from GFM BESS assets by updating the definition of inertia in the NER. This, however, does not necessarily translate to a clear pathway for procurement of BESS assets when compared against alternative synchronous options like synchronous condensers. Within almost all the TNSP led RIT-T work on System Strength, and procurement of inertia, there seems to be a common theme that more work needs to be done on understanding the technical capabilities of GFM BESS in providing these services. The Directions Paper recognises the clear benefits of GFM BESS in providing these services but also notes that "the role of grid-forming inverters in maintaining system security is limited and still evolving".

As a recent example, the Transgrid "Flagship Report – Large-scale battery storage as an inertia substitute" [1] report for ARENA on the Wallgrove Grid Battery provides some insights into TNSP concerns on "synthetic inertia". In that report, Transgrid noted that the Wallgrove grid battery does provide an inertial response, but Transgrid's view is that this is not like-for-like inertia from synchronous generation. The Flagship Report also noted "Both Transgrid and Tesla believe with further tuning of the inverter controllers, the active power inertial response can be as fast as a typical synchronous generator, but these tunings will lead to some undesired or non-compliant performance."

The procurement of inertia services to address inertia shortfalls[2] all occurred prior to the IFC Rule Change being finalised, so provide a less informative summary, however a similar trend regarding TNSPs taking a conservative approach regarding GFM BESS assets is emerging in the current RIT-T processes for system strength:

- The Powerlink System Strength Project Assessment Draft Report (PADR)[3] released in November 2024, noted an assessment of >80 non-network solutions and ultimately determined the preferred portfolio solution for meeting the minimum system strength fault level requirements in Queensland included eight new synchronous condensers in central Qld, one synchronous condenser in Southern Qld, non-network contracts with synchronous generation assets (gas and hydro). While it does allow for the use of GFM BESS for efficient stable voltage waveform services, it concluded that GFM BESS are "relatively novel" and that "comprehensive power system and protection studies need to be undertaken to confirm their effectiveness to provide system strength support".

[1] TransGrid-Wallgrove-Battery-Flagship-Report.pdf

[2] AEMO directions to TNSPs for procurement of services to address jurisdictional inertia shortfalls include a 2018 direction to ElectraNet in South Australia, which was managed via the procurement of synchronous condensers. A separate direction by AEMO was made for South Australia in 2020 which specified that the shortfall needed to be managed via the procurement of "Fast-frequency response (FFR) services", which necessarily resulted in ElectraNet contracting with a number of battery energy storage systems (BESS) assets to provide these services. This shortfall was expanded by AEMO in 2021 with a continuation of FFR contracts. In Tasmania AEMO declared an inertia shortfall in 2019, which resulted in TasNetworks contracting inertia services with HydroTasmania.

[3] Project Assessment Draft Report Summary - Addressing System Strength Requirements in Queensland from December 2025

- The Transgrid System Strength PADR[4] resulted in a similar outcome, recommending fourteen new synchronous condensers be built and owned by Transgrid, as well as non-network contracts with synchronous hydro and redispatching existing hydro generators. As with Powerlink, Transgrid also values the role of GFM BESS specifically in providing stable voltage waveform services – suggesting a need for 4.8GW of GFM BESS for this purpose.
- TasNetworks[5] System Strength PADR also concluded that contracting with existing synchronous condensers is a preferred method from a technological and commercial perspective when compared against a hybrid solution that would also include contracts with BESS assets.

To address these ongoing concerns, industry would benefit from a forward technical work program that focuses on resolving any technological uncertainties and creates a common understanding, and framework of expectations, for the role of GFM BESS in the NEM. This should focus on:

- The expected response of GFM BESS and inverters to create positive results for the NEM. Does the response of GFM inverter-based resources need to provide a "like-for-like" response to traditional synchronous generators? Or is there a more nuanced approach needed for managing inertia (both minimum and additional) needs in a NEM environment with far higher rates of variable renewable energy (VRE) and inverter-based resources.
- What does the optimal "tuning" of systems need to look like. How geographically limited is this going to be, and what will the negotiation process with TNSPs and AEMO to align on these inputs need to look like.
- How is guidance going to be published for industry – does the role of TNSPs in establishing jurisdictional inertia and system strength technical requirements need to sit within the NER, or should broad guidance be published by each TNSP with subsequent project by project negotiation.
    - We note that AEMO has released a voluntary specification on GFM inverters, but it is not yet clear how this is going to be used. Akaysha would support this document being used as a clear basis for OEMs and TNSPs on the expectations of GFM inverters in providing specific services.

Without a clear forward work program, GFM BESS assets risk being locked out long-term in providing these services. The residual uncertainties are resulting in the playing field not being level in respect of the current procurement approach. There is also a not insignificant risk of overspending on system security services if we fail to create an aligned technical pathway forward for GFM inverters. As presented by HoustonKemp in their cost assessment of technology types in Table 6.1 – the fixed costs for new-build synchronous condensers are significantly higher on a $/MWs/ year basis, than even the highest projected equivalent costs from privately owned GFM BESS. The focus on using new-build synchronous condensers, rather than a portfolio approach to providing system security services, will create security risks in the event of any synchronous condenser supply chain constraints.

Akaysha would ask that the upcoming Draft Determination consider what a long-term strategic plan might look like to improve the current bilateral procurement process. This work may include use of the AEMO NMAS transitional arrangements (in partnership with developers, OEMs and the TNSPs).

[4] Meeting system strength requirements in NSW

[5] Meeting the System Strength Standard in Tasmania from December 2025 onward.

Alternatively, this work program might fit more naturally into the Independent Panel review of the NEM wholesale market settings review[6]. The risk of these technical barriers not being addressed is that it will bleed into the design specifications and criteria for the marked procurement approach for additional inertia as well.

Options proposed for operational procurement of additional inertia

In principle Akaysha is supportive of exploring procurement approaches for additional inertia through real time markets, and in the approach suggested by the AEMC:

- Establishing a new ancillary services market to procure inertia; or
- Amending the design of the existing 1-second FCAS market.

Amending the existing 1-second FCAS market would appear to be the most efficient approach for valuing inertia. The AEMC Directions Paper notes that many GFM inverters are already registered in the 1-second FCAS market, and by the time that this Rule Change is finalised and recommendations implemented it is likely that there will be GW of additional BESS capacity available. Noting that the AEMC also presents some uncertainty in the level of additional inertia that will be needed, there may not be a depth of market to justify two new FCAS markets from being established.

Akaysha does have questions as to how this would operate in effect. It would be helpful for the AEMC and AEMO to provide a more detailed exploration of what an amendment to the 1-second FCAS markets would look like and how inertia will be valued within the existing market. Specifically, we would like to explore:

- Whether the intention of including inertia (through a RoCoF) valuation would be to increase the MW capacity that a generator or bidirectional unit (BDU) can register for the existing 1-second FCAS markets, and so inertia would be valued by increased bidding capacity?
- Alternatively, would RoCoF be valued separately – either resulting in a separate form of real time market payment (some type of add-on). If it is valued separately would this not effectively resemble a new market?
- Similarly, would there be an intention that AEMO manages two registrations for 1-second FCAS, with the market ancillary services specification (MASS) differentiating how generators or BDUs register as being inertia enabled, or not.

There will also be a lot of work to be done in aligning the technical performance requirements of inertia enabled assets within the MASS. This work should tie into the broader technical work program noted above.

Depending on how the design of the real-time procurement of additional inertia, we are also supportive of the AEMCs suggestion that there may be a future role for additional inertia replacing some of the capacity used for meeting minimum inertia requirements where it is cheaper. This does, however, highlight the current flaws in the bilateral procurement process.

[6] National Electricity Market wholesale market settings review - DCCEEW

As shown in HoustonKemp's numbers inertia from GFM BESS is expected to be significantly cheaper than inertia from new synchronous condensers. However, by the time we get to market bid periods this is a sunk cost, with very low incremental operational costs as noted by HoustonKemp. To properly ensure the lowest cost approach to providing inertia we need a portfolio approach of solutions, which will also require addressing the residual issues with the bilateral procurement of services – highlighted above.

Akaysha is very happy to continue to support the AEMC on the design of what a potential market for additional inertia would look like – including the technical characteristics of the design of an update to a 1-second market.