FLUENCE

A Siemens and AES Company

16 SEPTEMBER 2021

Integrating energy storage systems into the NEM (ERC0280)

Submission in response to the AEMC's Draft Determination dated 15-Jul-2021

16 September 2021

Attn: Joel Aulbury
Australian Energy Market Commission
GPO Box 2603
Sydney NSW 2001
RE: ERC0280 AEMC – Integrating energy storage systems into the NEM

Dear Joel,

Fluence is a global energy storage technology solutions and services company, and a joint venture of the U.S.-headquartered AES Corporation and Germany-headquartered Siemens AG. Our solutions are built on the foundation of industry-leading technology platforms that are optimised for different application groupings, and Fluence leads the energy storage industry with over 2,900 MW of projects deployed or awarded in 29 countries and territories.

Fluence is an active supplier of Battery Energy Storage Systems (BESS) in the Australian market with our solution installed at the 30MW / 30 MWh Ballarat facility. In addition, Fluence recently acquired AMS – the NEM's leading supplier of algorithmic bidding software for semi-scheduled renewable generators and scheduled BESS, with over 3,000 MW of capacity currently using Fluence's trading platform to facilitate bidding into the NEM.

Fluence supports many recommendations in the AEMC's Draft Determination, in particular the introduction of the Integrated Resource Provider (IRP) registration category and the Integrated Resource Unit (IRU) classification for batteries.

However, there are several concerns relating to TUOS liabilities for Scheduled Loads. Scheduled Loads are inherently different to Customer Loads and should be treated as such. If it is not possible for an exemption to be made, robust negotiating guidelines are crucial to provide investors with more certainty on base assumptions for TUOS under negotiated services.

We expect that the AEMC's draft determination will usefully facilitate investment in 'hybrid' assets and DC-coupled assets, and that these assets will benefit the power system, market participants, and the NEM's emission profile. The AEMC's stated intention to allow participants to manage the dispatch of hybrid assets in the aggregate will be the key enabler of these benefits. However, there is potential for investment to be dampened, and the benefits of this rule change reduced, by the way AEMO chooses to implement aggregated dispatch conformance in its new Power System Operating Procedure (PSOP) and in the NEM Dispatch Engine. The future of hybrid assets will hinge on AEMO's PSOP – in this submission we have highlighted some further actions the AEMC can take to ensure hybrid assets become investable and are able to play a central role in the NEM's transition.

Fluence would like to acknowledge and appreciate all stakeholders including the AEMC and the rule change proponent, AEMO, for envisaging proposed solutions to reduce the barriers for storage to participate in the NEM and for providing Fluence with an opportunity to contribute to the consultation process.

Please direct any enquiries about the enclosed submission to me and my colleague Matt Grover at the contact details below.

Kind regards,

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1. Support for key recommendations

- Fluence supports the new registration category of an Integrated Resource Provider (IRP) and the proposal that existing scheduled batteries would transition to a single classification as an Integrated Resource Unit (IRU) without paying an application fee. However, it is not clear to us what the benefits of transitioning to a single-DUID structure are, and whether the significant costs of transitioning outweigh these benefits.

- The Draft Determination represents a positive tidying up of details relating to the way small and exempt generators will access the NEM's markets, including the FCAS markets. Similarly, a tidying up of details relating to ramp rates, the intervention compensation framework, and recovery of non-energy costs is timely and welcome.

- We commend the AEMC for its efforts to align this rule change with the ESB's Post 2025 NEM design principles.

- Regarding DC coupled systems - we appreciate the AEMC's approach to enhance optionality and provide clarification of connection.

- Regarding hybrid systems - we welcome the lowering of barriers to register and operate hybrid systems. Formally allowing the dispatch compliance of hybrid units to be assessed in the aggregate is a key enabling step to realizing the benefits of this rule change. However, the devil will be in the details, and the Draft Determination proposes that AEMO will be in unilateral control of these details - in the form of a new Power System Operating Procedure (PSOP). The importance of this PSOP – and getting the details right – cannot be overstated.

2. Hybrid asset dispatch conformance

For the IRP rule change to add value and unlock investment, the AEMC's Final Determination (and AEMO's eventual PSOP) should strive to adhere to these two key principles:

Key Principle 1: The IRP framework will only add value if developers & investors can be confident they can develop a 'hybrid' (renewable + storage) asset in a congested or weak part of the network (and effectively store 'clipped' (constrained off) renewable energy in the battery) with certainty that AEMO won't later prevent the asset from doing so by prohibiting it from complying with its dispatch targets in aggregate.

Key Principle 2 : The IRP framework and AEMO's new Power System Operating Procedure (PSOP) should let market participants take responsibility for determining their (aggregate) energy dispatch targets & FCAS enablement quantities (through the bidding process), and also take responsibility for conforming with them (in aggregate). AEMO – through its PSOP or NEMDE - should not attempt to manage this obligation on behalf of a market participant.

The following slides provide a detailed rationale for each of these two key principles.

2. Hybrid asset dispatch conformance

Key Principle 1: AEMO's PSOP is a critically important document

Key Principle 1: *The IRP framework will only add value if developers & investors can be confident they can develop a 'hybrid' (renewable + storage) asset in a congested or weak part of the network, with certainty that AEMO won't later prohibit the asset from complying with dispatch in aggregate, and effectively store its 'clipped' (constrained off) renewable energy in its battery.*

- One of the primary mooted benefits of the IRP rule change is that frequently constrained renewable assets will be able to retrofit storage (becoming a so-called 'hybrid' asset), and capture their 'wasted' (constrained off) energy in a battery, for sale into the market at a later time.
- This is only possible if the hybrid asset is permitted to comply with its dispatch conformance in aggregate. In practice, this would entail a semi-scheduled asset receiving a semi-dispatch-cap flag from AEMO, but instead of curtailing the semi-scheduled generation to respect the cap (as the participant is obliged to do under today's market rules), the participant would instead instruct the battery to charge by a quantity that ensures the aggregate grid-facing generation stays below the cap.
- The AEMC's Draft Determination proposes that AEMO's new Power System Operating Procedure (PSOP) will dictate an asset's ability to conform to its dispatch targets in aggregate, and also the specific circumstances where it will **NOT** be permitted to do so.
- If AEMO is left too much discretion in their PSOP, or the PSOP doesn't clearly set out the situations in which 'aggregate dispatch compliance' is both permitted and prohibited, the PSOP will function as a handbrake on investment decision-making, and the IRP rule change will yield limited market benefits.
- If there is scope to do so, the AEMC's Final Determination should mandate an accelerated deadline for the development & finalisation of AEMO's new PSOP, along with a requirement that AEMO consult with industry on the PSOP.

2. Hybrid asset dispatch conformance

Key Principle 1: The "*certain circumstances*" where aggregate dispatch is not permitted need to be explicitly detailed in AEMO's PSOP

- The section below is excerpted from p78 of the AEMC's Draft Determination (with yellow highlight added by Fluence). We suggest that this is one of THE most critical sections of the Draft Determination, as the section highlights how the eventual form of AEMO's PSOP will determine the usefulness of the IRP framework in facilitating investment in hybrid assets.

> *"the Commission's draft decision is to allow hybrid systems the ability to manage their energy flows (i.e. deviate from unit level dispatch instructions) to comply with dispatch in aggregate. AEMO will however be able to require hybrid facilities to comply with dispatch at the unit level in specified dispatch intervals in* ***certain circumstances****, for example where required for stable power system operation or where the unit is providing ancillary services, in accordance with a power system operating procedure AEMO will develop. To be clear, the default position is for dispatch conformance for hybrid facilities to be set as 'in aggregate', and by exception AEMO can specify in the dispatch instruction that unit level conformance is required, in accordance with the power system operating procedure"* - AEMC Draft Determination, p78

- Investors and developers of hybrid assets will require absolute certainty that they will be able to conform to their dispatch targets in aggregate, prior to committing capital to a project.
- As such, it is imperative that AEMO's PSOP explicitly sets out the "certain circumstances" in which AEMO will and will not prohibit aggregate dispatch compliance, and does not simply afford AEMO the flexibility to apply ad-hoc limits as it sees fit.
- For example, AEMO could determine that any time a semi-scheduled unit is clipped due to a system strength constraint, aggregate dispatch compliance is prohibited, meaning the semi-scheduled asset MUST curtail and waste its generation (can not store clipped energy in its battery). Notwithstanding that such a determination would generally dampen the usefulness of enture IRP rule change – it would chill investment if such a determination was not clearly set out up front, and was instead implemented after an asset had already been committed and built.

2. Hybrid asset dispatch conformance

Key Principle 1: Fundamental changes to NEMDE are likely required, but are not discussed in the Draft Determination

We suggest that implementing the IRP framework will likely require changes to NEMDE that were not discussed in the AEMC's Draft Determination, but which need to be part of the public discussion:

1. **Super Semi Dispatch Cap Flag:** We note that it seems implementing the "certain exceptions" as contemplated in AEMO's PSOP would necessitate the creation of a new "super semi-dispatch-cap" flag (or similar) which would inform a hybrid asset that it must truly respect it's (existing) semi-dispatch-cap flag, and curtail the semi-scheduled component of the hybrid asset. Alternatively, AEMO would require a new semi-dispatch-cap flag that it could apply to the Scheduled IRU component within a hybrid asset, to inform the (battery) that it is prohibited from charging from (otherwise) clipped renewable energy. In any case, it seems impossible for AEMO to implement the PSOP without changes to NEMDE that have not yet been publicly detailed.

2. **Hybrid assets in Constraint Formulas:** in order to invest in hybrid assets, market participants will require clear guidance as to how AEMO plans to integrate hybrid assets (with multiple DUIDS) into constraint formulas. Will both DUIDS be included in the left-hand-side of each constraint formula? Will there need to be a linkage between the two DUIDs within the constraint formula, to explicitly account for the possibility of aggregated dispatch conformance? It will be critical that AEMO's implementation of constraint formulas does not prohibit market participants from self-managing the aggregate dispatch of their multiple DUIDs behind the connection point.

3. **Types of constraints & geographic exclusions:** Will AEMO permit or disallow aggregate dispatch compliance based on the *type* of constraint binding at the time (i.e. system strength constraints vs thermal constraints vs transient stability constraints), or will AEMO determine eligibility based on entire geographic regions (i.e. the "West Murray" issue from 2020)?

Until the industry has clarity on the above topics, it will be difficult for investors to commit capital to hybrid assets, and difficult for hardware & software suppliers to build tools to help market participants operate them efficiently and compliantly.

For these reasons, we suggest the AEMC give AEMO a mandate to develop its PSOP as soon as possible, and in consultation with industry.

2. Hybrid asset dispatch conformance

Key Principle 2: AEMO should let participants choose & deliver on their own dispatch targets, and not dictate them to the participant

Key Principle 2 : *The IRP framework and AEMO's new Power System Operating Procedure (PSOP) should let market participants take responsibility for determining their (aggregate) energy dispatch targets & FCAS enablement quantities (through the bidding process), and take responsibility for conforming with them (in aggregate). AEMO – through its PSOP or NEMDE - should not attempt to manage this obligation on behalf of a market participant.*

- The NER's existing compliance obligations already put a strong onus on market participants to only offer quantities the participant is confident it can physically deliver. These same obligations will continue to be a forceful incentive under the IRP framework, when hybrid asset operators are meeting their dispatch targets in aggregate.
- We confidently suggest that with future 'hybrid' assets, market participants will use software rules to ensure all bids & offers are always compliant, and that the hybrid asset never receives a dispatch target or FCAS enablement quantity it isn't 100% certain it can physically meet in the aggregate.
- We would point to FCAS as one area where the IRP framework has potential to go pear-shaped, and AEMO overreach has potential to dampen investment:
    - Page 78 of the Draft Determination cites an example of a "certain circumstance" where AEMO might step in to prohibit aggregate dispatch conformance: "*where the unit is providing ancillary services*".
    - AEMO will likely be tempted to do exactly that, citing "system security" as justification. AEMO should not be afforded discretion to step in and limit hybrid asset operation in this way – the onus should be left to the market participant to offer & clear FCAS quantities it is confident it can deliver (else face the NER's prescribed consequences for non-compliance)
    - We note that there is already precedent for AEMO expressing a desire to limit FCAS participation from semi-scheduled renewable units, and that AEMO's policies have had a dampening effect on innovation and competition in the FCAS markets. We would point to p29 of AEMO's 2018 report from the Hornsdale II Wind Farm FCAS trial, which details how AEMO has unilaterally chosen to program NEMDE to refuse to enable FCAS from a semi-scheduled unit in any dispatch interval where its INITIALMW > UIGF (i.e. any interval where the renewable resource is forecast to decline over the 5 minutes). This locks renewables out from supplying FCAS a significant portion of the time, and may be one of the reasons few semi-scheduled units have bothered investing in the capability to register to supply FCAS. Indeed, despite the much-celebrated trial in 2018, today the Hornsdale wind farms remain the only semi-scheduled units registered for FCAS.
    - The AEMC needs to ensure the IRP is implemented in a way where AEMO does not unduly make it hard (via its PSOP, or the way it sets NEMDE up) for participants to participate in FCAS using hybrid assets. Instead, AEMO should be comfortable trusting participants to only offer & clear quantities the participant is confident it can deliver. In the example of a declining UIGF, participants are well equipped to manage these risks using sophisticated software tools and plant controllers and participants already have strong incentives to ensure they never under-deliver.

3. TUOS and DUOS liabilities for Scheduled Loads

Scheduled Loads and Customer Loads have very different access privileges. They should be treated differently when applying use of system charges.

- The draft rule clarifies that IRUs should be treated consistently with other load and generation. However, Scheduled Load and Customer Load are not the same thing. Customer Load is afforded unrestricted access to use the network any time it wants (“firm access”), therefore it pays TUOS/DUOS for this privilege. Scheduled Load does not have unrestricted access to use the network any time it wants, as AEMO can constrain the load off (i.e., prohibit it from charging) when the network is congested by Customer Load. On this basis, it is inappropriate to charge TUOS/DUOS to Scheduled Loads.

- TUOS should only apply to loads that increase network expenditure to meet increased load requirements. As a scheduled and bi-directional resource, IRU does not typically charge during peak times, and can be constrained during dispatch. This means that TNSPs are not required to increase the capacity of the shared network to accommodate unrestricted access. TUOS should only apply to customers that drive network expenditure to meet increased load requirements.

- While the rules for TUOS charges are designed to provide flexibility to either accept prescribed transmission services or negotiate transmission services, negotiating charges adds to investor uncertainty and will be burdensome on NSPs who must negotiate with many proponents of IRUs.

Although exempting Scheduled Loads, such as grid-scale storage, is the preferred approach to avoid constraining storage uptake, another approach could be robust negotiating guidelines that provide investors with more certainty on base assumptions for TUOS under negotiated services. Here, base assumptions could commence at zero but would clearly outline specific circumstances that would cause extra costs to arise.

4. Retailer Reliability Obligation

The Retailer Reliability Obligation will capture many large battery storage assets. This could cause perverse outcomes for wholesale markets and system security.

- While the AEMC's Draft Determination suggests that the RRO is unlikely to be a material consideration for battery storage assets, we suggest that many battery storage projects that will be built over the next few years will be large enough to be a liable entity under the RRO, due to round trip efficiency losses. Said otherwise, many batteries are likely to have net load greater than 10 GWh per annum.

- To avoid costs, penalties and non-compliance, the asset could – through its bidding strategy - avoid charging during reliability events. However, completely locking itself out from any charging during such intervals would also require it to cease providing any FCAS services that could result in charging, including Lower FCAS services. The AEMC should consider whether the withholding of FCAS services in order to avoid liabilities under the RRO could result in perverse outcomes for the wholesale markets and for system security.

5. 1 vs 2 DUIDs

The mooted change to a ‘single DUID’ for scheduled IRUs will add costs for market participants (and AEMO) and it is not clear whether the change would solve any problems or bring significant benefits.

- Changing to a single DUID will be a major consideration for AEMO and its dispatch systems - as AEMO would have to overhaul its systems to transition to bi-directional dispatch using one DUID. The costs of this overhaul should be weighed against the benefits on the change.
- Market participants (and in some instances, their IT vendors & solution providers) will also be required to undertake time consuming and costly overhauls of bidding systems that have developed around the status quo arrangements. While the costs of changing legacy systems is not by itself a sound argument against proceeding with the change, the benefits of the change must be considered against the costs – and to us, the benefits have not been clearly articulated in the AEMC’s Draft Determination.
- We suggest that the status quo two DUID arrangement has proven to be manageable for both participants and AEMO, and is thus appropriate for continued use under the IRP framework.
- We suggest that any potential dispatch conflicts arising from the use of two DUIDs can be easily remedied with logic validations in participant bidding systems and/or AEMO dispatch systems – indeed, such instances over the first four years of scheduled battery operations in the NEM (since late 2017) have been rare and immaterial.
- Many submissions to the AEMC’s consultation to date have suggested that it would be easier for market analysts and observers to access battery data in a single DUID datastream, whereas today analysts must access two DUID datastreams, and combine them. We agree that this would be a benefit, but suggest that this benefit is esoteric and pales in comparison to the multi-million-dollar costs to AEMO and market participants of implementing the change.

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The Fluence Australia team were heavily involved in setting up the Philippines team for success, and continue to provide support to the delivery teams.

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