AEMO
530 Collins St
Melbourne VIC 3000

4 December 2018

By email to eges@aemo.com.au

Re: Emerging Generation and Energy Storage Consultation Paper

Dear Taryn,

Tilt Renewables commends AEMO on its detailed work on these important emerging issues, and thanks AEMO for consulting stakeholders at this stage in the process. The issues being consulted on are complex and we consider it of great value to the industry for AEMO to consult widely as it is doing, before proposing rules changes to the AEMC.

Tilt Renewables is the owner of Snowtown, Snowtown North, Snowtown South and Salt Creek wind farms and the recently committed Dundonnell wind farm project, with wind, solar, battery and pumped hydro projects in our development pipeline.

Tilt Renewables has answered a selection of the questions in the stakeholder paper. For the hybrid model, we have provided an alternative suggestion for efficiently managing hybrid sites, as we do not find the hybrid category in the paper captures the full benefit to the market of hybrid sites.

Questions page 20:

Q3 and Q4: Definition of ESS

Tilt Renewables suggests the definition be sufficiently generic to encompass any technology that can take in, store and release electrical energy, including batteries and pumped hydro. We prefer the more generic Alberta Electric System Operator definition: "A facility with technologies capable of storing and releasing electric energy."

Q3: How generic should the definition of ESS be?

Tilt Renewables believes the definition should be generic enough to capture the functionality of a generic electric energy storage system (including battery, pumped hydro, hydrogen).

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Questions page 28:

Q1: Appropriate participation model for ESS

The single dispatch offer for an ESS is of value particularly in allowing the efficient dispatch of FCAS services from full charge to full discharge and gives value in simplifying the offer and dispatch processes and the interpretation of market data.

Tilt Renewables agrees with AEMO that a representative MLF applied across the entire dispatch offer is the most straightforward approach for the participant, who can then calculate the offer prices at the connection point based on the real MLFs (load and generation) and then adjust this for the representative single MLF. It is important in any solution here that the end-points (floor and MPC) can be achieved at the RRN. Further to this, it is Tilt Renewables' view that this is a workaround to the larger issue of the single annual MLF. The change in network losses caused by a 20 MW swing in a generator's output would be like that caused by a swing from +10 MW to -10 MW in a battery's operation, but currently that swing attracts a different MLF along its path. We understand that AEMO is currently reviewing the MLF process.

Q3: Option 1 (single dispatch offer for ESS)

Tilt Renewables agrees in principle with this approach and sees value in the efficient dispatch of FCAS using the full capability of the battery. However, we are concerned with the mechanics of it in two areas:

- As defined in the appendix to the paper, there must be at least one positive (discharge) and negative (charge) volume. The paper does not say whether the negative must all be in lower price bands than the positive. A specific issue is on the ability of the participant to offer all the generation (battery discharge) capacity at the floor price, which would not be possible if the negative volume offer (charge) had to be in band 1. Bidding at the floor is a routine strategy for generators, seen in constraint management (particularly in SA at present), and in managing 5/30 outcomes. It would be a significant limitation on bidding strategy to not allow storage to do this.

- It is not clear from the paper how a battery would offer FCAS from full charge to full discharge. A worked example would clarify this significantly.

Q2: Hybrids

Tilt Renewables agrees with AEMO that hybrid sites are becoming more common and that a consistent approach to these is valuable. However, we do not see that AEMO's proposed hybrid model gives the best use of the intermittent and storage resources.

AEMO's proposed hybrid approaches address technical categorization and registration issues around

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aggregation of bi-directional ESS but does this by requiring the whole site to be run effectively as a Scheduled generator and load. This would require a participant to manage the resources to balance the variability of the intermittent generation using the battery, which would mean battery resources (MW capacity and energy) would be held back from the energy and FCAS markets to balance the local variability of the intermittent generation. Under the Semi-Scheduled category, the market benefit of the near-zero fuel cost intermittent generation is maximized by using the diversity of intermittent generators across the NEM to reduce the short-term variability of the fuel sources. This benefit is lost if hybrid sites are each individually balancing their own output. Also, using the battery for local balancing reduces the financial return on the battery, making proponents less likely to install a battery alongside an existing or new renewable generator, which means the NEM would miss out on the power system benefits including flexible FCAS capability that batteries bring.

One strong benefit of a hybrid site is the ability to store low-cost generation that would otherwise be spilled. At present, hybrid sites can be registered as a single site but with multiple DUIDs, such as a Semi-Scheduled wind farm and a Scheduled generator + load battery. This allows for sharing of connection infrastructure but does not allow for capture of spilled energy that cannot be exported. A current example of such spill is the system strength constraint in SA. Under the current approach using multiple DUIDs, the battery cannot be charged with the additional capacity of the wind farm when this constraint is binding because the wind farm must not exceed its dispatch target with semi-dispatch cap, and the battery must not be off-target. Tilt Renewables proposes an outline of an alternative solution that would allow more efficient use of the renewable energy. We suggest that making best use of the low-cost energy available is in line with the National Electricity Objective.

Tilt Renewables proposal is for the conformance requirements to be adjusted to allow the spilled energy to be fed into the battery, with no change to the dispatch process. Illustrating with an example:

Wind farm: 100 MW, with high wind (capable of full power). Battery: 20 MW charge & discharge. Connected at the same connection point but registered as semi-scheduled wind and scheduled generator & load battery. Wind farm & battery have separate DUIDs and separate SCADA meters. Revenue metering through the connection point.

Example dispatch: Wind farm (with availability 100 MW) dispatched with semi-dispatch cap to 80 MW (for example, under system strength constraint). Battery dispatched to generate 10 MW. The wind farm is spilling 20 MW of wind energy. There is 90 MW going out the connection point. An alternative outcome is for the wind farm to run at 100 MW and the battery to charge at 10 MW (so minus 10 MW generation). The net export at the connection point is still 90 MW but the near-zero fuel cost wind energy is being stored for later export. The wind farm is effectively charging the

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battery at 20 MW.

If this was done currently, the wind farm would be 20 MW above its semi-dispatch level, and the battery 20 MW below. We propose revised conformance requirements:

- On the up-side, the total site cannot be over the sum of the dispatch targets when a semi-dispatch cap is binding (thus ensuring the intent of the semi-dispatch cap is maintained).
    - i.e. in the example above, the dispatched export from the connection point cannot be exceeded, maintaining the integrity of the network constraints.
- On the down-side, the sum of the scheduled components (in this case the battery) must be at least the total of the scheduled dispatch levels less the wind farm feed to the battery (if positive).
    - i.e. in the example above, if the wind is good so 20 MW (100 MW – 80 MW) is charging the battery. The battery output must be at least its dispatch level (10 MW) less the effective feed from the wind farm (20 MW), so at least -10 MW. This maintains the integrity of the battery's dispatch target.
- If the wind goes bad (e.g. to 70 MW), the wind farm will be 10 MW below-target, acceptable as a semi-scheduled generator. There is no effective feed to the battery, so the battery must not generate below its dispatch level of 10 MW.

We acknowledge some complexity remains in managing the FCAS in this situation and suggest a first step be for the participant to optimize offers with enough headroom to capture the potential wind spill.

Exempt networks

Tilt Renewables agrees that it is important for AEMO to clarify the application of a GPS to an exempt network, to allow such networks to be exempted where there are two separate FRMPs connecting at one network connection point. This is particularly relevant in a retro-fit situation where a separate entity may be financially responsible for the new plant, and physically reconfiguring the NSP's network to add additional connection points could be cost prohibitive.

Separation of operational and financial responsibility

Tilt Renewables agrees that this is a valuable area of investigation for AEMO. There are economies of scale to developing, connection and operating a large farm, but the off-take market is seeing smaller players enter, who are not able to off-take a whole farm. For example, Tilt Renewables is soon to

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begin construction on the 336 MW Dundonnell wind farm which has two major off-takers. The significant benefit to an off-taker of having financial responsibility is to gain the positive prudential benefit of the generation. For a generator with a single off-taker, this can be achieved by the off-taker registering as an intermediary, but this is not feasible with more than one off-taker. Prudential benefits may be transferred from the Generator to an off-taker via the reallocations process, but this is operationally difficult given the intermittent output does not match the fixed profiles provided in an ex-ante reallocation. As an alternative, a percentage-of-meter reallocation may achieve a similar prudentials outcome to separate financial responsibility.

Logical metering

Tilt Renewables considers that logical metering offers significant value in retro-fitting of sites, for example when adding a battery system to an existing renewable generator. Physically moving existing metering equipment and switchgear to add in additional meters can add a large cost to a project. A Meter Data Provider (MDP) is best placed to implement the calculations needed. We believe the cost of implementing and maintaining the logical metering would be best borne by the participant through its contracts with its metering co-ordinator and meter data provider, as the participant is then incentivized to efficiently trade off the options and achieve the best outcome.

Thank you again for the opportunity to comment on the stakeholder paper. If you wish to discuss any aspect of our submission, please phone me on 0409 799 095.

Yours sincerely,

Marcelle Gannon
Market Operations Manager
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