Ben Hiron

Australian Energy Market Commission (AEMC)

Submitted via AEMC online portal

31 August 2023

Dear Ben

ERC0364: Clarifying mandatory PFR obligations for bidirectional plant

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the Australian Energy Market Commission (AEMC) with a response to the Consultation Paper on the Australian Energy Market Operator (AEMO) led rule change clarifying primary frequency response (PFR) obligations for bidirectional plant.

The AEMC has drawn out two key issues in the Consultation Paper.

- Issue 1: clarification regarding the non-inclusion of scheduled bidirectional units providing PFR when discharging.
- Issue 2: adding additional requirements for scheduled bidirectional units to provide PFR when operating with a zero-dispatch target for energy (i.e. when charging or enabled for frequency control ancillary services (FCAS)).

In respect of Issue 1, we agree with the AEMC in that this appears to be a genuine drafting error. We are supportive of this correction to the NER being made.

In respect of Issue 2, our feedback below considers the expected impact on revenue streams regarding this change, as well as some general policy design principles. From Tesla's perspective, we do not believe that this change will act as a disincentive to the uptake of utility scale storage, however, we have also included some alternative options that should provide AEMO with the same level of confidence in system security.

Impact on revenue

Tesla's assessment of the proposed impact of Issue 2, is that it will require a utility scale battery-energy storage system (BESS) to provide PFR when dispatched in Energy or FCAS markets. This is not considered material if dispatched in Energy or FCAS Regulation markets as this is purely an approximately normal distribution of the variance of the AGC signal and the subsequent active power setpoint, it therefore does not impact the energy discharged/charged into the market nor an increase in cycling of the system.

Of contention, is if the BESS is only dispatched in FCAS Contingency and not in Energy or FCAS Regulation, and therefore does not receive an AGC target and is at a zero-target power state. In this scenario, the BESS is not under AGC dispatch, however is dispatched under FCAS Contingency and must respond to a frequency deviation in accordance with the FCAS Contingency obligation under the MASS, which is typically 150mHz for proportional

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frequency response providers. The area of contention is therefore only when the system is not dispatched under AGC and narrowed down to response within the 15mHz to 150mHz Primary Frequency Response zone prior to the Normal Operating Frequency Band (NOFB) being exceeded when FCAS Contingency obligations take over, and the quantum of which this results in increased throughput to the battery.

Tesla do not believe this is a material issue as experience in the Australian market suggests that the optimised bidding strategy typically results in the battery being dispatched under AGC the clear majority of the time. An example of a random day with AGC dispatch for a typical 2h utility-scale battery in Australia is shown below and shows that the battery is dispatched under AGC >90% of the time – which would result in increased energy throughput of <1% based on Tesla internal analysis. It is however recognised that shorter duration batteries will have a higher proportion of time not under AGC dispatch. Additionally, Tesla expect the duration of future battery projects in the NEM to increase, as energy markets deepen, which will further increase the percentage of time under AGC dispatch.

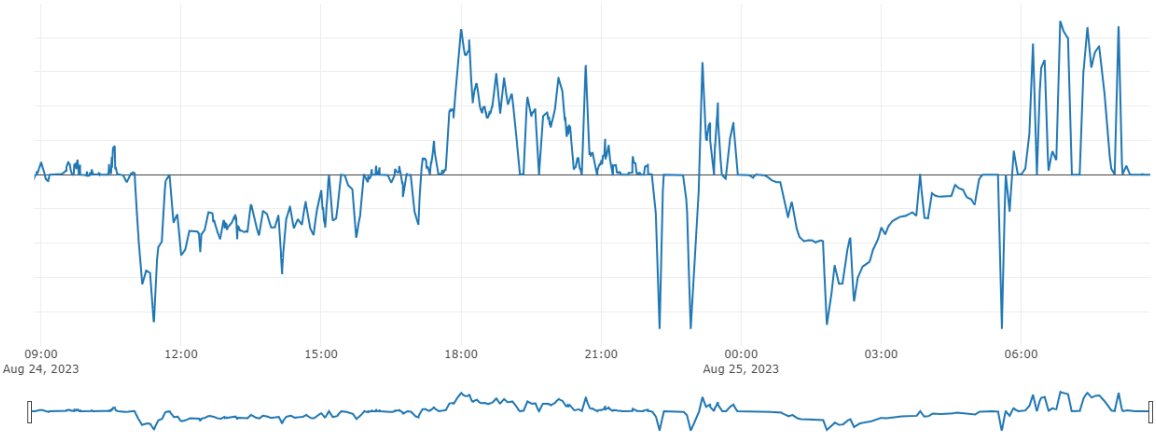

Figure 1: Example AGC dispatch over a 24 hour period

Although this is not considered a material impact on the financial performance, an increase in throughput of <1% does increase the Short Run Marginal Cost of providing FCAS Contingency when not dispatched under AGC, which would be expected to be captured by the Participant through the bidding price of the FCAS Contingency services, which is a change in the bidding behavior which often assumes zero marginal cost for provision of the service. Tesla also notes that it would be very difficult to meet FFR requirements without the initial response starting outside the 15mHz PFR dead band, and expect most proponents to have frequency control enabled to meet the MASS requirements.

Based on the relatively small amount of time that PFR is provided by batteries when not dispatched under AGC (estimated at <10%) relative to all Generators in the NEM, this is also not expected to have a material impact on the power system whether mandated or not.

Tesla also notes that the intent of PFR for generation in the NEM is that the more generators that provide PFR, the tighter the frequency and the lesser the impact on individual generators when providing PFR, which is experience well

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documented upon implementation of PFR originally in late 2020 (ref: https://aemo.com.au/-/media/files/initiatives/primary-frequency-response/2023/pfr-implementation-report-8-may-23.pdf?la=en)

Figure 2 – AEMO PFR Excursions

Our response above, is also predicated on the current AEMO position of not require any reservation of capacity or energy for PFR. Our reading of the proposed NER changes is that this position would not change, however it would be helpful for the AEMC to confirm this as any requirements to reserve headroom for PFR would have further economic impacts. Additional points that may impact on the revenue streams of a utility scale BESS:

In summary, we do not see a significant revenue impact for BESS assets that are already actively providing FCAS or system strength, but this position changes if AEMO is intending to mandate head/foot room reservation under these changing provisions.

Policy design principles

Notwithstanding the above, we do have concerns with what has been proposed by AEMO from a policy design principles perspective. Tesla's starting position from a policy design perspective is to:

- Support market-based solutions that drive the most effective performance outcomes
- Use mandatory performance requirements only where markets are ineffective at driving the right outcomes or not efficient from a cost perspective.
- Provide industry with certainty through the Rule Change process.
- Ensure that all mandatory services are technology agnostic.

From a policy design perspective, our concern with AEMO's proposed rule change is two-fold 1. It changes a previously (and recently) settled position to include additional mandatory requirements, ahead of a market-based solution being given an opportunity to effectively solve an issue; and 2. The effect of this change will not be entirely technology agnostic.

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Changes to existing PFR requirements

Our first concern is that the AEMO proposed Rule Change, introduces a new requirement that was explicitly rejected by the AEMC in the Final Determination on Mandatory PFR[1]. The AEMC Final Determination noted:

> *"However, unlike other generation technologies, battery energy storage systems are capable of providing a frequency response when they are neither charging nor discharging, ie neither supplying nor consuming energy from the grid. Under the final rule, generators that are not dispatched in the energy market to generate electricity are not required to operate in a frequency response mode in accordance with the PFRR. As such, the final rule includes a provision that generators are only required to provide PFR when they have received a dispatch instruction to generate at a volume greater than 0 MW"*

While we acknowledge AEMO's point regarding the pending introduction of the new BDU classification from June 2024, this will not change how BESS assets participate in FCAS markets (or from an energy dispatch/ charge perspective), so does not seem to be an effective justification.

Our preference would be to first introduce the two-sided PFR payments, or an overview of how they will work, ahead of changing the mandatory PFR provisions. This will ensure that additional PFR requirements are only used to address genuine market gaps.

The importance of technology agnosticism

Our second concern is that the implementation of these requirements will not be fully technology agnostic. Updates made to clause 4.4.2(c1) will impact on scheduled generators, semi-scheduled generators and scheduled bidirectional units – specifically BESS assets. Bidirectional units will be the assets most impacted by providing PFR when operating at zero dispatch or less (on charge). Currently clause 2.2.2(b2) of the NER requires AEMO to approve the classification of a bidirectional unit as a scheduled generator and scheduled load, if that asset is not capable of transitioning linearly from consuming to producing electricity and vice versa (clause 2.2.2(b1)(1)). This effectively creates a carve-out provision for non BESS forms of storage, such as pumped hydro energy storage (PHES) assets.

Noting that these changes apply only to bi-directional units, it does effectively start to treat other forms of storage differently in respect of mandatory obligations. While we understand the principles on excluding scheduled loads, we do have concerns on whether this sets a precedent for a less technology agnostic approach to market reforms.

Alternative recommendations

As noted above, it is worth AEMO providing more detailed information on how the two-sided PFR payments will be structured ahead of this Rule Change progressing further, to determine whether this resolves any of the AEMO concerns.

[1] https://www.aemc.gov.au/sites/default/files/2020-03/ERC0274%20-%20Mandatory%20PFR%20-%20Final%20Determination_PUBLISHED%2026MAR2020.pdf

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AEMO will also receive the same benefits from more BDUs operating as grid-forming inverters rather than grid-following. Anecdotally, it seems as though the majority of BDUs currently registered or going through registration are either directly registering as a grid-forming asset, or considering whether to retrospectively update their generator performance standard (GPS) to change their operating mode. Importantly, with the implementation of the Efficient Procurement of System Strength rule change, there is a competitive process to access system strength payments, so there are incentives attached to providing this service.

AEMO may achieve the same outcomes as this Rule Change by updating their guidance information regarding the most streamlined way to update connection agreements from GFL to GFM.

For more information on any of the content included in this submission, please contact Emma Fagan (efagan@tesla.ocm).

Kind regards

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Response to AEMC questions

1. **Issue 1 – non-inclusion of scheduled bidirectional units in mandatory PFR obligations when discharging**

As per our response above, Tesla agrees with the AEMC characterization that this is an inadvertent drafting error we have no concerns with a clarification being made to rectify this.

2. **Issue 2 - Long-term provision of PFR**

As per our content above, we do understand AEMO's concerns, however from a policy development perspective it is unclear how the introduction of the scheduled BDU gives rise to relitigating this point. Tesla is not overly concerned that the change will have a substantial impact on project revenues, however we would still like to see more information on the two-sided PFR payment mechanism to understand if this addresses AEMO's concerns.

3. **Proposal to include scheduled BDUs in the mandatory PFR obligations**

We are supportive of the AEMC proposal to require scheduled BDUs to provide PFR while discharging.

4. **Stakeholder views on AEMO's proposal for scheduled BDUs to be required to provide PFR when they are consuming electricity from the grid.**

As per the content included above. In respect of charging, Tesla does not see this change to be overly impactful.

5. **Stakeholder views on AEMO's proposal for scheduled BDUs to be required to provide PFR when enabled to provide a market ancillary service**

As per content included above, we do not see this change as being impactful in respect of regulation FCAS services. In respect of contingency FCAS enablement, we note that there will be a nominal impact. However for the most part we do not believe this change will be overly impactful.

6. **Commission's other proposed changes to promote the long-term provision of PFR**

As an alternative to AEMO's recommendations, Tesla believes that the same system benefits would be achieved through increasing the uptake of grid-forming inverters, which should be prioritised with current rule changes focused on improving connection arrangements for grid-forming inverters.

We would also like more information to be released from AEMO on the design of the two-sided payment approach to determine whether this may resolve some of the issues raised by AEMO.

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7. Implementation considerations for providing PFR while discharging

No additional considerations

8. Implementation considerations of long-term provision of PFR

As noted in our content above, we anticipate that providing PFR while enabled for contingency FCAS will have some impact on the short-run marginal cost of operating a utility scale battery, however we do not anticipate this to be material.

This position may change if AEMO introduces head/footroom reservation requirements.

9. Assessment criteria

N/A