



Joel Aulbury
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

16 October 2020

Re: Integrating energy storage systems into the NEM (Ref. ERC0280)

Dear Joel,

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the Australian Energy Market Operator (AEMO) with feedback on its Integrating Energy Storage Systems into the NEM consultation paper (consultation paper). Tesla appreciates the work conducted to date by the Australian Energy Market Operator (AEMO) through its Emerging Generation and Energy Storage (EGES) program to capture industry-wide concerns and identifying opportunities to work together in removing risk and uncertainty for energy storage projects going forward.

Tesla looks forward to working with the AEMC to achieve the following outcomes:

- Maintaining the existing 20 price bands available to battery energy storage units.
- Reviewing the Market Ancillary Services Specification (MASS) to improve the current treatment of utility scale storage assets in registering to provide contingency frequency control ancillary services (FCAS).
- Providing a clear and transparent regulatory position on network usage arrangements – including clarifying that energy storage assets should be exempt from paying transmission use of system (TOUS) charges. Tesla believes that this exemption should also be applied equally for distribution use of system (DUOS) as the exact same rationale should apply to a scheduled 25MW energy storage system connected at the transmission and distribution levels.
- Flexible participation arrangements that allows energy storage to co-locate with other renewable energy assets and loads, and optimises the operational benefits across multiple assets, providing clear incentives for renewable assets to do so (e.g. improved causer pays factors).
- Review of the Small Generator Aggregator (SGA) framework to further clarify the treatment of storage assets. We also recommend an expansion of the SGA framework to allow small generating units to provide FCAS.

We are also broadly supportive of the following priorities:

- Providing a clear approach to site metering – including consideration to avoid negatively impacting on other market fees or incentives for hybrid systems (e.g. renewable energy certificates); and
- Providing a logical framework in regards to intervention compensation, reliability obligations, ramp rates and network losses to ensure market signals are sufficiently cost-reflective and technology neutral.

1. Context

General Comments

As outlined in the consultation paper, the current national rules framework contains several distortions for emerging technologies. The unique capabilities and performance attributes of energy storage, particularly battery energy storage, are not yet fully recognised. There are also improvements that can still be made in respect of integrating storage into the NEM – including codifying specific exemptions and providing increased clarity for developers on registration options for hybrid sites.

Energy storage does not fit well within any of the categories for traditional types of participants in the energy market. As AEMO has recognised, while storage assets most closely resemble a generator in the services they provide to the market, they do not generate electrons – so are not, technically, a generator. The controllable nature of the load side of a storage asset, as well as the services that it can provide whilst charging, including both frequency and voltage support – also means that it's more than a traditional market load.

As an interim measure, grid-scale battery assets currently register as both a generator and a market customer, which has allowed participation of storage into the market (e.g. Hornsdale Power Reserve). Initially, this approach created some ambiguity in registration and participation for developers, though the market has since adapted to these conditions.

In parallel, from a wider system planning perspective, there is an established consensus of the need to promote the uptake of storage in the national electricity market (NEM) to ensure continued safe, secure and reliable operation over the coming decades, as well as promote efficient investment in infrastructure in the interests of consumers.

AEMO's 2020 Integrated System Plan (ISP) states that the NEM will require 6 – 19 GW of dispatchable resources, including storage by 2042 to enable the integration of up to 55 GW of new variable renewables¹.

A long-term, fit-for-purpose market framework to support reliability and system security will necessarily rely on the capabilities of fast-response and flexible resources, including demand side response, energy storage and distributed energy resource participation. Efficient incentive mechanisms for all market participants are critical to support the effective operation of the power system and are in the long-term interests of consumers.

Threshold question – should storage be defined in the NER?

A new storage category, whilst evidently not essential, would remove several operational and administrative inefficiencies associated with the current interim arrangements and accelerate the deployment of storage in the NEM. Tesla welcomes AEMO's strategic approach to improving the integration of grid-scale energy storage and enabling regulatory flexibility to incorporate new and emerging business models.

Tesla supports efforts to ensure terminology in the national electricity rules (NER) is sufficiently technology neutral, is future proofed for technological change, captures necessary distinctions between what constitutes a load versus a storage asset, and conforms with existing power system definitions. For example, existing terms such as "generation" and "load" do not sufficiently capture the attributes of energy storage – i.e. whether the definition of storage needs to explicitly refer to electricity conversion, or if it can be a broader reference to 'energy source' and rely on existing NER definitions.

The AEMC rightly notes the relationship between this rule change request and the Energy Security Board's (ESB) two-sided markets work that is currently underway. Energy storage will indefinitely play a critical role in any potential two-sided market design.

However, Tesla has an outcomes-based focus and we believe that there are changes that could be undertaken now that would improve the commercial case for the deployment of new storage. In particular these include:

¹ AEMO's 2020 ISP, p.12 <https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en&hash=6BCC72F9535B8E5715216F8ECDB4451C>

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- Reviewing the MASS to enable storage assets to register their full nameplate capacity for contingency FCAS services; and
 - Codifying exemptions for paying both TUOS and DUOS on energy grid imports.

These changes should not be delayed to post-2025, and if the most efficient way to improve the current settings for storage is through a new classification, we support this.

While we support all efforts to improve the business case and efficiency of new storage developments in the NEM, there are threshold issues that we are also unwilling to accept – specifically a reduction from the current 20 price bands available to energy storage assets.

A move to 10 price bands to align with the treatment of traditional scheduled generators would be a backwards step in the business case for storage assets, and would reduce the demonstrable flexibility of these assets that presents a major market benefit. It would halve the price band capability of storage assets – both relative to the current position, and relative to scheduled generators who are able to use all 10 price bands on the generation side (rather than trying to account for appropriate pricing to charge the storage asset as well).

2. Price Bands

Tesla is supportive of efforts to better facilitate the integration of energy storage systems into the NEM through removing operational inefficiencies, reducing barriers to entry and providing clear investment signals. However, Tesla is not willing to support this rule change if it includes a reduction in price bands available to energy storage units from 20 to 10.

As Tesla has made clear through feedback provided throughout the EGES program², we believe that 20 price bands should be maintained for storage assets – remaining at parity with the existing dual registration model. A reduction in price bands for storage units from the current 20 available would result in a market distortion whereby bi-directional resource units are effectively limited to 5 price bands for bids on energy exported and 5 for energy imported. This would result in significant reduction in bidding flexibility for storage assets.

Considering this, Tesla is supportive of any rule change that respects these principles, including the following options:

- a. 20 price bands made available to bi-directional units only;
- b. 20 price bands made available to all market participants; or
- c. Pairing of two battery DUIDs in NEMDE to avoid the need for conservative bidding behaviour. Tesla understands this capability currently exists but would require an update to NEMDE to facilitate a wider rollout.

We would particularly be interested in the AEMC exploring the first two options. Expanding the existing NEMDE settings from 10 price bands to 20 should provide more useful information and visibility to AEMO.

3. MASS review

One key action that was not explicitly included in the AEMC consultation, but should be undertaken as a supportive measure of this Rule Change, is a review of the MASS.

We understand that the MASS will likely be reviewed to better include provisions for virtual power plants (VPPs) as the AEMO VPP demonstrations trial progresses.

² Tesla submission to AEMO EGES Consultation Paper "https://aemo.com.au/-/media/files/electricity/nem/initiatives/emerging-generation/submissions/tesla_20181204.pdf?la=en&hash=60C7A07F9925444965B6332EAADE2DB2"

Any review of the MASS undertaken in early 2021 should be broader than just covering VPP related issues. We note that a review of the MASS was one of the key recommendations of the final AEMC Frequency Control Frameworks Review in July 2018³. Specifically the AEMC recommended that AEMO:

“conduct a broader review of the MASS that seeks to address any unnecessary barriers to new entrants, or any aspects of the MASS that may not appropriately value services provided by newer technologies where these services are valuable to maintaining power system frequency.”

This work has yet to be undertaken, and would be a valuable addition to this rule change process. In particular this review should consider the current settings for storage registering to provide FCAS services, and whether the full name-plate capacity of storage assets should be registered to provide contingency FCAS services.

It would be inefficient for AEMO to proceed with multiple reviews of the MASS over the course of a year or two, each concerned with individual issues. As such, we support a single, extensive MASS review that ensures all areas of concern are addressed concurrently to ensure maximum efficiency.

4. Hybrids

Developers are increasingly seeking to register storage systems alongside renewable plant through a hybrid model to manage various market risks, such as causer pays factors, curtailment, and increased wholesale price volatility. As AEMO notes in their rule change request there is some lack of clarity about the best mechanism for prospective developers to build a hybrid facility – that both allows the storage system to maximise the outputs of the renewable plant, whilst not sacrificing the market participation capabilities of the co-located storage asset.

For example, a market generator seeking to pair a semi-scheduled asset with a storage asset to reduce causer pays factors and/or curtailment would struggle to do so under the current framework. Additionally, a market generator seeking to register a hybrid facility under a single DUID to firm renewable output would likely need to register the entire facility as scheduled, in order to meet AEMO’s current registration guidelines for storage⁴.

The changes proposed will not improve the current optionality in respect of registering hybrid facilities.

Tesla supports ongoing work in this area, and supports continued flexibility in respect of how to best register variable renewable energy assets and co-located energy storage systems are registered. In our response to the AEMO EGES work program we indicated our support for continued refinement of AEMO’s proposed hybrid solutions. Specifically we support ongoing work on any hybrid approach that allows developers to:

- Provide fully firm output from the co-located wind or solar plant;
- Best enables BESS (or other storage) asset to charge from the renewable plant as well as the grid; and
- Reduces causer pays factors across the market participant portfolio.

5. Forecasting

Tesla is supportive of efforts to ensure AEMO’s pre-dispatch and forecasting systems are fit for purpose in a high renewables NEM. We support efforts made by AEMO to achieve consistency across the way that individual storage assets currently provide information to AEMO, and do not see any issues with providing available on a trading capacity basis.

As noted by the AEMC in the Consultation Paper, scheduled storage units are “using a high degree of automation” in organising and optimising bids over the course of a day. While this additional forecasting information will be valuable to AEMO, it will also be important to ensure that dispatch interval level data is not

³ AEMC’s Frequency control frameworks review, p.55 <https://www.aemc.gov.au/sites/default/files/2018-07/Final%20report.pdf>

⁴ Refer options 6 and 7 in the AEMO “Registering a battery system in the NEM – fact sheet” - https://aemo.com.au/-/media/files/electricity/nem/participant_information/new-participants/registering-a-battery-system-in-the-nem.pdf?la=en

used by AEMO to reject bids on an assumption of not having the appropriate capacity. Bids will generally be managed in an automated manner to achieve the best outcomes for that particular system. It will be important to ensure that the provision of additional information does not, in anyway, result in AEMO taking interventionary action, or reduce the flexibility of the storage system during a particular dispatch period.

6. SGAs

Tesla supports further clarity on the arrangements for small generator aggregators (SGAs) including batteries under 5MW in their aggregated portfolios.

We are interested in the practical implications of providing this additional clarity. Will the capacity of energy storage co-located with a small generating unit (solar for instance) be treated as additional to the solar generating capacity? I.e. will a site with 3MW of solar and 3MW of storage be able to register 6MW – and can this site register the aggregated capacity as a single small generating unit, or will each asset need to be registered as a separate small generating unit?

Separately we recommend that the scope of this rule change is expanded to also allow small generating units to register for FCAS as they have the technical capability to provide such a service. A further recommendation made by the AEMC in the Frequency Control Frameworks Review Final Report (July 2018) was that the rules should be amended to

“enable Small Generation Aggregators to classify small generating units as ancillary service generating units for the purposes of offering market ancillary services.”

The AEMO VPP Demonstrations trial has clearly demonstrated the technical capability of aggregated, distributed assets in providing appropriate FCAS services. The expansion of the SGA framework to allow participation in FCAS markets would reduce barriers to entry for new market participants, thereby facilitating further demand side participation and competition in the NEM. This is in line with the ESB’s two-sided markets work-stream and neutrality principles.

We also suggest that the treatment of VPPs should be reviewed as AEMO moves to operationalise their VPP arrangements.

7. Performance Standards

Tesla supports the proposed approach to address asymmetry in current standards between consumption and generation and to implement a single set of performance standards for each asset behind a connection point. Consideration will need to be given to how these new performance standards will impact existing generator performance standards for a market participant seeking to co-locate energy storage with an established wind or solar facility.

8. Intervention Compensation Frameworks

As noted in Tesla’s submission to the AEMC’s *Compensation following directions for services other than energy and market ancillary services* and *Compensation for market participants affected by intervention events* consultations⁵, Tesla agrees with the need for change in existing frameworks given increasing use (and cost impacts) of interventions, the Reliability and Emergency Reserve Trader (RERT), and the increasing utilisation

⁵ Tesla submission to AEMC’s Compensation for Intervention and Direction Consultations (ERC0284 & ERC0287) https://www.aemc.gov.au/sites/default/files/documents/erc0284_-_tesla_submission_-_16_july_2020.pdf

of new technologies - particularly in South Australia where several directions have already been issued to battery energy storage systems specifically.

Tesla strongly supports the need to address potential asymmetries in current framework design between generators and loads; and across energy and FCAS compensation.

If the rules are structured to ensure scheduled generators are compensated for energy and FCAS but scheduled loads are only compensated for energy, this is in clear violation of the neutrality principle.

This change should naturally extend to compensation for scheduled loads to include FCAS losses if they occur as a result of an intervention event.

9. Network charges (TUOS & DUOS)

Tesla supports the proposal to clarify the treatment of Transmission Use of System (TUOS) and Distribution Use of System (DUOS) charges for storage.

Ongoing network usage costs by utility scale storage is a key operational consideration for project developers looking to connect storage assets onto both the transmission and distribution networks. As noted on p.75 of the consultation paper, TUOS and DUOS are currently applied to energy storage systems on an ad-hoc basis, creating regulatory risk for network service providers (NSPs) and ambiguity for developers.

Tesla supports the proposal to codify the exemption from TUOS charges for transmission connected storage assets. This is common practice currently, but having an explicit exemption will provide increased certainty for prospective developers.

However we also believe that this exemption should apply equally to DUOS charges for energy imports. Tesla strongly encourages the AEMC consider an expansion of the current AEMO proposal, thereby exempting energy storage units from paying DUOS.

Applying a consistent exemption across both TUOS and DUOS assets is vital to optimising the operation of batteries on the distribution network. Utility scale storage connected at the distribution level can provide valuable localised services, and applying DUOS costs to these systems have a significant negative impact on the business case of these assets. Edify Energy's and EnergyAustralia's Operational Report for the Gannawarra Energy Storage system indicate that its 25MW/50MWh battery attracted roughly \$600,000 in DUOS charges over the course of twelve months⁶.

This additional exemption from DUOS should be considered on the following principles:

- a. Stand-alone utility scale energy storage does not provide the same function or operate in the same way as traditional commercial loads. Therefore, these assets should not be grouped together under the principles of rule 6.18.3(e);
- b. Scheduled energy storage assets should be treated with equivalence to stand-alone utility scale energy storage assets connected at the transmission level. These, in turn, are treated with equivalence to other large-scale generation assets; and
- c. Applying network charges to both the utility scale energy storage system and the end-customer results in a double counting of network charges on a per kWh basis. Storage systems do not consume the kWh grid imports. All kWh used to charge an energy storage system, as an example, are later exported to end-use customers. As such DUOS costs are applied twice to the same kWh.

As such, it is imperative that any proposed change to network use of system charges consider the role that energy storage assets play in supporting networks and in reducing total system costs. AEMC should consider a mechanism where DUOS charges are applied to energy losses only.

⁶ <https://arena.gov.au/assets/2020/09/gannawarra-battery-energy-storage-system-operational-report.pdf>

A recent rule change in the United Kingdom supports this position. The “Distribution Code and Use of System Agreement (DCUSA) DCP 341 and DCP 342 - Removal of residual charging for storage facilities in the CDCM and EDCM” document⁷, released 18 December 2019, notes the following:

“Further, our view is that charging arrangements should not discriminate between storage and generation... we indicated that storage facilities should not pay the distribution ‘demand residual’ element of network charges, when storage takes electricity from the network.”

10. Fees, charges & non-energy costs

Tesla supports the proposed approach to address asymmetry between energy exports and imports for the purpose of calculating participant fees, charges and non-energy costs. At a minimum there should be consistency between participants and technology types to level the playing field between different market participants.

However, application of these fees across all market customers and generators may have unintended consequences for distributed energy resources (DER), including VPPs and other flexible market participants. As such, Tesla urges caution in applying this same approach at all layers.

11. Retailer Reliability Obligation

Tesla supports this proposal to exempt storage units from obligations under the Retailer Reliability Obligations (RRO). Placing obligations on storage units to procure additional capacity to cover their load component is not aligned with the objectives and intention of the RRO. Additionally, as described on p. 100 of the consultation paper, "the current framework may unintentionally create a ‘feedback loop’ where ESS units built to provide firmness under the RRO also increase the need for additional firm capacity."

For any further information in this submission please contact Emma Fagan (efagan@tesla.com).

Kind

Regards



Emma Fagan

Head of Energy Policy and Regulation

⁷ <https://www.ofgem.gov.uk/publications-and-updates/distribution-code-and-use-system-agreement-dcusa-dcp-341-and-dcp-342-removal-residual-charging-storage-facilities-cdcm-and-edcm>