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Re: Frequency Control Frameworks Review Draft Report (ref: EPR0059)

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the Australian Energy Market Commission (AEMC) with further feedback on the Frequency Frameworks Review. The recommendations included in the Draft Report show clear progression of thinking in respect of the most efficient approach to manage system security issues across the national electricity market (NEM). Further progress of these recommendations, and clear associated timelines, are likely to play a role in encouraging investment in new technologies that provide accurate and immediate frequency support in the changing energy mix within the NEM.

Summary position

Our position is based on the following principles linked to Tesla's company mission of accelerating the world's transition to sustainable energy:

- We believe that by ensuring all system security services provided are appropriately incentivised the recommendations included in the Draft Report should assist with the efficient market integration of high penetrations of renewable energy,.
- To further achieve this aim, investor certainty in emerging technologies is vital. The AEMC can assist with investor certainty by setting transparent timelines in respect of each of the recommendations included in the Draft Report. Tesla would like further clarity on the prioritisation of each recommendation and the timing for their implementation. Tesla believes that a number of these recommendations can be progressed immediately.
- Tesla supports evidence based solutions. We would welcome the opportunity to work with the AEMC and the Australian Energy Market Operator (AEMO) to test all proposed solutions and options at both a utility and aggregated distributed energy resource (DER) scale, to support the successful implementation of the recommendations made.

Our comments on the specific recommendations included in the Draft Report are outlined below. We look forward to continuing to work with both the AEMC and AEMO on these important issues. Please contact Emma Fagan (efagan@tesla.com) with any questions on any of the content included in this submission.

Kind regards

Mark Twidell

APAC Director – Energy Products

Response to Draft Report recommendations

Recommendation 1: Causer pays procedure

a) *That AEMO investigate whether:*
   i. *the average period used for calculation of contribution factors could be aligned with the period over which the costs are incurred, preferably on a 5-min basis*
   ii. *the ten business day notice period between publishing and applying contribution factors is appropriate or could be removed.*

b) *That AEMO provide greater clarity of the causer pays procedure and the specific variable that generator performance is measured against.*

No comment from Tesla on the causer pays procedure recommendation.

Recommendation 2: Provision of primary regulating response

That the providers of a primary regulating response should be remunerated for the costs of providing the service, in particular where the opportunity costs of maintaining the capacity to provide the service (e.g. maintaining headroom to be able to increase output) are likely to be high.

The implementation of one of the following options is likely to build on the existing market frameworks and support improved frequency control during normal operation:

- *provision of a primary regulating response through the existing regulating FCAS markets*
- *changes to the causer pays arrangements to facilitate the provision of incentive payments for primary frequency response during normal operation.*

Within the scope of the Frequency Frameworks Review, the AEMC could further improve this recommendation by considering two separate variables regarding the existing regulation frequency control ancillary services (FCAS) settings, and primary frequency response.

The first is on the current incentive structures for secondary regulating frequency services (the current regulation FCAS raise and lower markets). The second issue flows from this, and relates to whether additional incentives are required for providing primary frequency services. Our comments on the draft recommendations below apply to both of these points.

Tesla supports improvements to the way that regulation FCAS is incentivised. Specifically Tesla supports arrangements that provides incentives based on:

1. Speed of response time, and
2. Accuracy in responding to AEMO signals.

This approach recognises that 1MW of regulation FCAS provided is not always equal in the market outcomes delivered.

The effect of this was outlined well in the recent AEMO report on the initial performance of the Hornsdale Power Reserve. Figures 1 and 2 in this Report highlight the different ability to respond to regulation FCAS signals from a large, conventional steam turbine, when compared to the Hornsdale Power Reserve[1].

Under international market mechanisms, such as the California Independent System Operator (CAISO) 'Pay for performance' regulation, assets providing regulating frequency services receive mileage payments, which account for the increased system requirements associated with these different response capabilities. These mileage payments provide a more accurate incentive structure for delivery of regulation frequency services.

In respect of the two options proposed by the AEMC, our feedback follows:

- Introducing positive incentives under the causer pays scheme appears to most closely match the CAISO pay for performance regulation – without requiring the introduction of a new market for primary frequency response. However there are clear limitations associated with this approach that will need to be managed. Under this approach incentives would be limited to scheduled market generators and market loads. This raises the following concerns:
    - Semi-scheduled generators, such as the Hornsdale Wind Farm are looking to provide the NEM with critical frequency services. If they are capable of providing primary and secondary frequency response, they shouldn't be excluded from accessing additional incentives on the basis of market classification.
    - The current approach for classifying battery energy storage as a scheduled generator and a market load is based on interim guidance from AEMO only. This position is subject to change over time – and may also impact on how causer pays obligations are calculated.
    - The current market registrations for battery energy storage are also under review which may also impact on the future performance of battery energy storage under causer pays arrangements. For instance, where there are multiple assets registered behind a single connection point, performance will need to be registered on a generator by generator basis.
- Additional incentive arrangements for primary frequency control should be considered as a separate issue to the reform outlined above. Introducing performance based payments is likely to address a portion of the frequency performance issues from scheduled generators and loads, but it won't provide a complete NEM wide solution across all generation assets and customer loads. The AEMC should consider adapting the existing regulation FCAS settings to introduce a Primary Frequency market, as an additional measure – rather than an alternative. We support the position of the AEMC that any requirements to provide primary frequency support should be compensated, rather than introduced as a regulated requirement.

Recommendation 3: Frequency monitoring and reporting

That a rule change request be submitted to amend the NER to require:

AEMO to monitor, and publish reports on, frequency outcomes with respect to the requirements of the frequency operating standard

[1] https://www.aemo.com.au/-/media/Files/Media_Centre/2018/Initial-operation-of-the-Hornsdale-Power-Reserve.pdf

AEMO to provide information to the AER on the performance of FCAS markets and for the AER to monitor, and report on, the performance of FCAS markets

Tesla supports increased reporting on frequency performance across the NEM particularly in respect of the performance of the FCAS markets.

Recommendation 4: Aggregator regulatory frameworks

That a rule change request be submitted to allow Small Generation Aggregators and Market Ancillary Service Providers to classify small generating units as ancillary service generating units for the purposes of offering market ancillary services.

This recommendation partially accounts for a critical design concern in respect of the current market ancillary services provider (MASP) rules, in that only the ancillary load can be registered. For assets, such as energy storage assets, that provide a controllable bi-directional energy flow, limiting aggregated energy resources to providing only load side services is inefficient.

A further issue associated with the current regulatory frameworks for aggregators, is that an aggregated asset base cannot provide the full suite of wholesale energy and frequency services under a single market classification. Small Generator Aggregators, for instance, can provide energy but not frequency services. An aggregated asset base registered as a MASP can provide frequency services for the load side of the aggregated asset base, but cannot also participate in the wholesale energy markets.

We recommend that the AEMC further explores the current barriers in the NER preventing aggregated DER assets from being able to actively participate in all existing wholesale markets in a simple and streamlined manner.

As a broader suite of reforms to the current aggregator regulatory frameworks, Tesla supports the following:

- A rule change allowing an aggregated asset base to provide services from both the generation side of the asset, as well as the load side. We also support AEMO trials that explore the implications of this, as part of the distributed energy resource (DER) trials recommended in recommendation five below.
- A rule change that explores expanded market classifications that allow an aggregated asset base to provide both energy and frequency services under a single market classification – as well as demand response and any future critical services that may evolve over time.

Recommendation 5: Market ancillary services specification

That AEMO:

- *provide more information regarding particular service characteristics that may be able to be trialled under the MASS*
- *undertake trials of DER providing FCAS that consider various technology types and different options for metering and verification, with a view to sharing the outcomes of the trials with relevant stakeholders*

- *conduct a broader review of the MASS and consider how the value of DER can be appropriately recognised.*

Tesla fully supports all of the recommendations made in respect of reviewing the market ancillary services specification (MASS). We support open trials for DER assets, to prove technical capability, and review necessary changes to the current MASS requirements for aggregated DER assets.

This provides a good opportunity to assess the current treatment of both battery storage at a utility scale, and to run trials to assess future FCAS settings for an aggregated DER asset base. Tesla supports a collaborative working approach between aggregators, AEMO and the relevant distribution network service providers (DNSPs). See further comments on recommendation seven for more detail.

Recommendation 6: DER connection arrangements

That Energy Networks Australia, in developing its national connection guidelines, provide guidance on:

- *what capability is reasonable to require from distributed energy resources as a condition of connection in order to address the impact of that connection*
- *the expected application of AS 4777 to different connection types and sizes*
- *the technical justification for any mandated services*
- *the extent to which any mandated services would detract from the ability for distributed energy resources to offer system security services.*

General principles

Tesla supports the ongoing work by Energy Networks Australia in developing a nationally consistent connection framework. This approach should be based on the principles of:

- flexibility and agility to adapt to changing technologies and market conditions;
- compliance with all relevant regulations and legislation; and designed in a way to facilitate maximum adoption.

Tesla supports an approach that does not prescribe hard limits on connectivity, and is flexible enough to allow for dynamic export – which supports the broader objectives of the Frequency Framework Review in respect of improved conditions for DER participation in FCAS markets.

This dynamic approach to export, which is likely to be tested in the trials outlined in recommendations six and seven, will also test current thinking on export limits versus import limits at an individual household level.

Reasonable capability

In respect of the AEMC's first dot point in the recommendation regarding reasonable expectations from DER resources, Tesla believes that this is a critical piece of work that needs to be included in the DER trials, and considered carefully by both Energy Networks Australia and the AEMC in all future DER work streams.

This will be particularly important for the following requirements:

- Voltage support requirements

- Aggregation support to help reduce transformer loading

It is most important to recognise that many services required by DNSPs as a condition of connection are not free to provide for households and other behind the meter customers.

Where a DNSP directs a household battery energy storage system to charge, in order to improve local voltage settings, that household pays for electricity used to charge the battery, with no ability to recoup costs. As more DER resources are installed, this is likely to become a bigger issue. The current thinking on reasonable requirements should be tested through the DER trials proposed.

Ongoing reform

As an additional recommendation to support the ability of DER assets to participate more actively in future energy markets, Tesla recommends that the Australian Energy Regulator (AER) plays a bigger role in publishing average connection approval times from DNSPs. More transparency will encourage streamlining of processes. This also feeds into the broader focus on improved transparency for DER assets currently undertaken by the AEMC's register of distributed energy resources rule change process.

Recommendation 7: Impact of DER on local network

a) AEMO, in conjunction with DNSPs, conduct trials of aggregated DER providing FCAS to assess their ability to provide services under different network conditions, and how the provision of those services affect the local network and the power system more broadly

b) DNSPs and aggregators share information about the types of network conditions that may constrain the operation of DER providing system security services, and the types of services that may affect network conditions, with a view to determining how the value of DER can be maximised for both parties.

As noted above in our response to recommendation five, Tesla supports DER trials to test efficiency options for MASS frequency settings for DER assets.

We believe it is critical that DNSPs are involved in those trials, and are active in supporting the testing of these alternative settings. This will be necessary to support networks looking to transition to more of a distribution system operator (DSO) role, than the traditional DNSP role.

Recommendation 8a: Future FCAS frameworks

That, in the medium term:

a) AEMO conduct a broader review of the MASS to recognise the capability, and more accurately value the response profile, of new technologies that are capable of providing frequency control services

b) the AEMC and AEMO refine the time frames and develop a work program for making any substantive changes to FCAS frameworks, informed by:

   i) an assessment of any consequential impacts arising from the implementation of any revisions to frequency control arrangements in the normal operating frequency band

   ii) investigations undertaken by AEMO into:

- *the emerging capabilities of fast frequency response technologies, including trials of various technology types, with a view to publishing the outcomes of the trials with relevant stakeholders, and to inform the development of future service specifications*
- *the evolving technical and operational requirements of the power system and the inter-relationships between different system services, including frequency response, inertia and system strength.*

Tesla supports a broader review of the MASS. In addition to the points outlined above this could also include a review of the additional items outlined in the Draft Report, in particular:

- Valuing fast frequency response (FFR) as a service
- Reviewing existing contingency FCAS settings – with a view to updating any services as required.
- Future opportunities for contracting frequency services to create bankable revenue streams

As noted in our summary position, greater certainty on timelines for emerging markets, and changing technical settings is critical for both investor confidence and for the continued development of new business models and market opportunities.

We would encourage these broader changes to be explored in the short term, rather than medium term. We would also encourage the release of very clear timelines in respect of all of the ongoing work in this space.

To support any of these broader areas of review, and progress the timelines, Tesla would welcome the opportunity to undertake trials with AEMO to provide critical market information needed at a utility or DER scale.