



Tesla Motors Australia Pty Ltd  
650 Church St  
Cremorne, Victoria, 3121

Mr Ben Hiron  
Australian Energy Market Commission  
PO Box A2449  
Sydney South NSW 1235

14 February 2020

**Re: Mandatory Primary Frequency Response Rule 2020 – Draft Determination (ref: ERC0274)**

Dear Ben,

Tesla Motors Australia, Pty Ltd (Tesla) appreciates the opportunity to provide the Australian Energy Market Commission (AEMC) with feedback on its Draft Determination regarding the Mandatory Primary Frequency Response (PFR) Rule Changes (the Draft Determination).

Tesla's mission is to accelerate the transition to sustainable energy. Within this objective, Tesla is committed to working with all market bodies to improve power system security in the National Energy Market (NEM) in a manner that is efficient for consumers, timely for system operations, and sustainable over the long-term. Emissions reduction should be central to any future market design and we recommend AEMC assess the costs and benefits of reform against this criterion - to support the integration of low-emission, secure, low-cost energy technologies into the NEM.

We recognise the real and immediate need for action to improve the current frequency issues in the national electricity market (NEM) and agree with the AEMC and AEMO position that frequency has been deteriorating over recent years. At the same time, battery storage has demonstrated a superior ability to provide a rapid and accurate response to frequency excursions<sup>1</sup>. Battery storage has proven particularly valuable in areas of high variable renewable energy in managing system security issues, as recently demonstrated in South Australia's islanded power system - where grid-scale batteries are being controlled by AEMO to support grid stability following extensive storms, bushfires and unexpected outages<sup>2</sup>.

Tesla is concerned that the near-term approach of mandating PFR will erode the value of existing frequency control ancillary services (FCAS) markets and dull investment signals for developers looking to invest in new technologies like utility scale storage or virtual power plants (VPPs). This concern appears to be shared by several respondents to the consultation paper, across the spectrum of the energy sector and including renewable developers, large gentailers, demand response providers and consumer representative groups.

Tesla's feedback to the Draft Determination builds on our response to the Consultation Paper<sup>3</sup>, and aims to re-focus the AEMC's attention on a fit-for-purpose mechanism that can be deployed in the short term - meeting AEMO's requirements for urgent frequency improvement for systems security, whilst also complementing the ongoing development of a market-based solution to ensure long-term reliability and cost efficiency. We believe there does not need to be a trade-off between these objectives.

---

<sup>1</sup> [www.aemo.com.au/-/media/Files/Media\\_Centre/2018/Initial-operation-of-the-Hornsedale-Power-Reserve.pdf](http://www.aemo.com.au/-/media/Files/Media_Centre/2018/Initial-operation-of-the-Hornsedale-Power-Reserve.pdf)

<sup>2</sup> <https://reneweconomy.com.au/aemo-takes-control-of-s-a-big-batteries-to-help-manage-isolated-grid-77344/>

<sup>3</sup> Submission: [www.aemc.gov.au/sites/default/files/2019-11/Rule%20Change%20Submission%20ERC0274%20-%20Tesla%20-%202020191101.pdf](http://www.aemc.gov.au/sites/default/files/2019-11/Rule%20Change%20Submission%20ERC0274%20-%20Tesla%20-%202020191101.pdf)

---

Key recommendations are for the AEMC to:

1. **Reconsider alternative approaches for introducing PFR in the short term to better align with energy market and commercial developments.**

The AEMC must provide appropriate weighting to the AEC's offer of a voluntary trial, which Tesla supports, as well as explore other contract-based proposals. This will allow the frequency design workstream to progress in parallel, whilst also ensuring investment signals are improved to introduce new flexible capacity and maintain reliability in the near-term.

2. **Introduce a market-based mechanism (with AEMO support) as quickly as possible, given the investment signal impacts on new entrants.**

There was strong consensus supporting a market-based approach in the long term, and near-universal consensus *against* implementing a mandatory approach in the short term, particularly given the unknown impact on existing FCAS markets, and how this might influence the business case for any private investment in new dispatchable energy generation. We recommend the AEMC continue to test the factors that are driving AEMO's decision making to be limited to a fleet-wide mandatory approach, ahead of the final Determination.

3. **(Should a mandatory requirement be pursued) Ensure implementation is staged and processes are made transparent ahead of a final rule change.**

AEMO should be required to explore options to involve only scheduled generators based on capacity thresholds (e.g. starting with 200MW+ scheduled plant, and adding additional, smaller plant or semi-scheduled generators based on observed frequency impacts). It is recommended this is codified in the National Electricity Rules, restricting the interim Primary Frequency Response Requirements (interim-PFRR) to only apply to generators above 200MW. AEMO can then consider application of PFR to smaller / semi-scheduled generators as part of developing the finalised PFRR to be published end-2021 (including transparency around compliance deadlines), should frequency performance not have improved sufficiently. This would allow for both greater quantification of the actual PFR requirements of the NEM and provide valuable operational insights to assist with longer-term mechanism design; and also soften the business case impacts on fast-response, flexible assets looking to enter the market in the short-term.

The AEMC should also consider incorporating a shorter sunset period of 18 months, with annual reviews conducted in the event of any extensions to the mandatory requirements, to facilitate the transition to a market-based approach as quickly as possible.

Additional detail relating to each of these points is included in the response following. For more information on any items raised please contact Dev Tayal ([atayal@tesla.com](mailto:atayal@tesla.com)).

Kind regards



Emma Fagan  
Head of Energy Policy and Regulation

---

## 1. PFR should be introduced in a way that aligns with wider energy market and commercial developments

Tesla re-iterates its position that implementing short term arrangements that minimise impacts on the broader investment and commercial outcomes, and do the least to prejudice future market reforms, will be the most effective way to implement primary frequency response in the NEM.

We recognise the principle driver behind the AEMC progressing a mandatory approach in the short term is addressing the immediate system security needs, as highlighted by AEMO. Tesla agrees that developing any market-based mechanisms should not come at the expense of a secure and stable power system. However, there has been little development of alternatives to a fleet-wide mandate approach. We believe there does not need to be a trade-off between introducing requirements that promote market efficiency in the long-term versus ensuring system security.

We also recognise AEMO has erred on the side of caution and proposed a “conservative and prudent approach”. However, given the pace of the energy transition, the AEMC must balance this conservatism with the reality of broader generation and network changes occurring and forecast to accelerate (as highlighted by AEMO’s Integrated System Plan).

It is worth considering that primary frequency control, whilst critical, is just one of the elements of maintaining a secure power system. For example, in addition to frequency degradation, AEMO highlights in its 2019 Electricity Statement of Opportunities report:

*“the forecast reaffirms that targeted actions must be taken now to provide additional dispatchable capacity to reduce the risks of supply interruptions during peak summer periods.”*

As such, this Draft Determination must be placed within the broader context of the NEM’s and complementary reforms that are required to support the transition towards a high renewables generation fleet, whilst simultaneously ensuring a coordinated and coherent market and regulatory framework. It would be unhelpful to introduce one element of a secure system (mandating PFR) that makes it harder for AEMO to achieve another element (ensuring investment signals are improved to introduce “additional dispatchable capacity”).

Tesla is concerned with the lack of clear reform pathway that would introduce appropriate incentives for fast-response and flexible generation – particularly in the near-term when capacity is needed to replace retiring thermal fleet.

### Investment signals to ensure reliability

From Tesla’s perspective, enabling the integration of energy storage into the NEM will be critical to achieving an efficient, secure and low-emission future grid, as outlined by the Finkel Review blueprint and now consistently recognised by the AEMC and AEMO.

Tesla supports the development of a PFR market as one element to provide adequate commercial drivers to incentivise new flexible plant to enter the market. Creating the right incentive structures will be critical to ensuring that appropriate flexible and responsive capacity is built to replace the existing synchronous fleet as it closes over the coming years. The use of market mechanisms to procure primary frequency response will enable fair competition between all technology types providing this service. Markets for frequency response would support resource efficiency, price formation and additional value streams for resources, and comparable treatment between new and existing resources.

Mandating requirements across the entire fleet of scheduled and semi-scheduled assets, even as an interim solution, risks stymieing investment and prejudicing market design decisions in the longer term – reducing the investment case for new technologies in the meantime. Even with the inclusion of a sunset clause, it will be challenging to address investor uncertainty –reflected as higher cost of capital (and commensurately higher revenue requirements from projects) due to the uncertainty from what is effectively a commitment to

---

work up some form of market mechanism within a 3 year timeframe (susceptible to scope change, delay, or other reform influences).

**Innovation will flourish when design principles focus on achieving outcomes, rather than mandating specific short-term requirements.** This is particularly true for the energy sector, where technical requirements are critical to maintain the safe, secure and reliable operation of the system. However, clean technologies can often meet equivalent outcomes through non-traditional means.

From an energy storage perspective, whilst still a growing sector, the NEM currently provides mixed signals for investors looking to develop private storage projects, highlighting a significant gap in meeting AEMO's forecast levels of storage deployment by 2030 (i.e. over 10GW by 2030 as projected in the 2018 ISP 'fast change' scenario). These projects are crucial to contribute to both reliability and system security outcomes in the short term, and to drive affordability and efficiency outcomes for consumers over the longer term. From a wider market design perspective, AEMO highlights the increasing role of storage to provide an attractive alternative to investment in network infrastructure, provide key grid services, and enhance market competition for wholesale energy and ancillary services as stand-alone or aggregated assets in the form of additional dispatchable generation capacity.

It is within this context that the AEMC must consider these incremental rule changes, weighted against a broader assessment of what potential market design features will be necessary to stimulate the requisite levels of private investment, whether through the ESB's post 2025 work stream, or parallel explorations around day ahead markets, capacity mechanisms, pay for performance, and equitable access with technology neutrality. Structuring markets to value service provision (rather than mandates based on asset type or size) becomes increasingly relevant for evolving market designs that will need to integrate a suite of technologies providing comparable services across the grid. As a principle, all technologies should be able to access all revenue streams for which they can provide services.

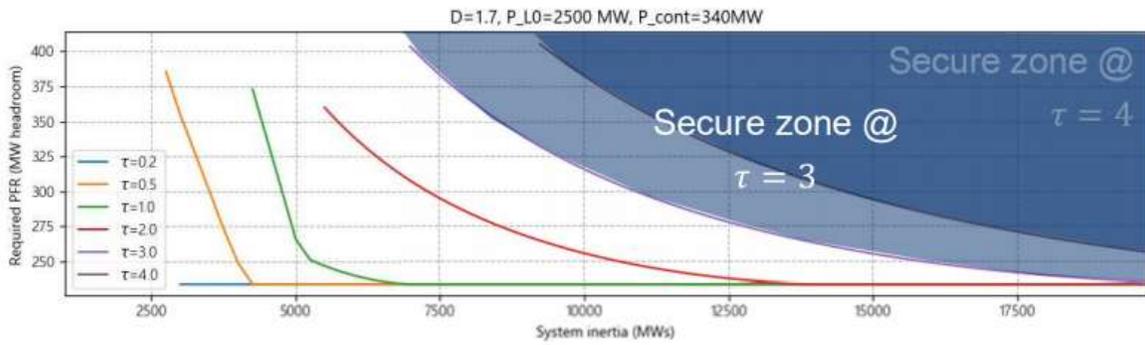
## Quantification

AEMO still needs to work with the AEMC to better quantify the PFR requirements of the NEM. Once the required level of PFR is determined, industry will then have a much clearer idea of the best long-term mechanism for providing PFR in the NEM.

A trial as proposed by the AEC would provide valuable information on how 9GW worth of scheduled generators who are PFR enabled are able to improve frequency, assisting all stakeholders in ensuring effective design of a long-term mechanism. Tesla supports the AEC proposal as a pragmatic interim approach that can be quickly implemented. We note AEMO's concerns that a trial is a "stop-gap mechanism". However, as both AEMO and AEMC have already acknowledged, an interim (stop-gap) solution is exactly what is required to address immediate system stability concerns should a more holistic market mechanism need more time to be designed, developed and implemented.

Whilst operating as an isolated system, this illustrative example from the SWIS also re-enforces the idea that the quantity of PFR required is strongly correlated with the quality of provision (i.e. if the response is faster, the secure zone is larger, and the system is secure with less PFR and at lower levels of inertia):

**Figure 1: SWIS illustrative example of PFR quantity vs quality trade off**



Note: traditionally SWIS has operated with approx.  $t=2$  (red curve). Fast response (e.g. from batteries) would be  $t=0.2$  (light blue curve).

The DIGSilent analysis referenced in the Draft Determination is also clear on this point:

“A relatively small amount of primary frequency response can make a significant difference to the regulation of frequency”<sup>4</sup>

**Short-term alternatives**

As noted in our previous response, Tesla supports further exploration of a bilateral contracting mechanism that could be introduced in appropriate timeframes to satisfy AEMO’s system security requirements. This doesn’t appear to be considered by the AEMC in the Draft Determination.

As previously noted, Tesla points to the UK’s introduction of an ‘Enhanced Frequency Response’ (EFR) service through direct contracting, with National Grid citing significant economic benefits and operating a procurement level of only 200MW in conjunction with tighter deadbands than the NEM – allowing EFR to be largely satisfied by fast responding inverter based technologies competing on price<sup>5</sup>. The AEMC could build on this model (and avoid incentivising single-use, short-duration assets), by also allowing service stacking - with tenders for PFR requiring: high response accuracy; fast response (e.g. <500ms); and complementary service provision (e.g. availability in other FCAS markets). Different contract specifications could also be designed to ensure an appropriate mix of fast and slow start technologies to ensure adequate PFR levels.

These alternative approaches, alongside the proposed trials, will still satisfy AEMC’s hierarchy of priorities for decision making – and would also provide industry more confidence that a move to a market mechanism would be effectual. Tesla recommends the AEMC continues to test these positions with AEMO.

**2. Introduce a market-based service (with AEMO support) as quickly as possible**

Given the potential impacts of a mandatory approach, the AEMC should continue to explore whether alternative approaches can balance operator concerns with longer term market design efficiencies. These key issues are raised below:

**Urgency**

It would also be helpful for market participants to understand AEMC’s constraints on meeting the urgent timeframes highlighted by AEMO – i.e. to ensure adequate frequency control procedures are in place ahead of next summer (2020/21).

<sup>4</sup> DIGSilent, Frequency in the Normal Operating Frequency Band - Update report for AEMO, 18 September 2019, p.31

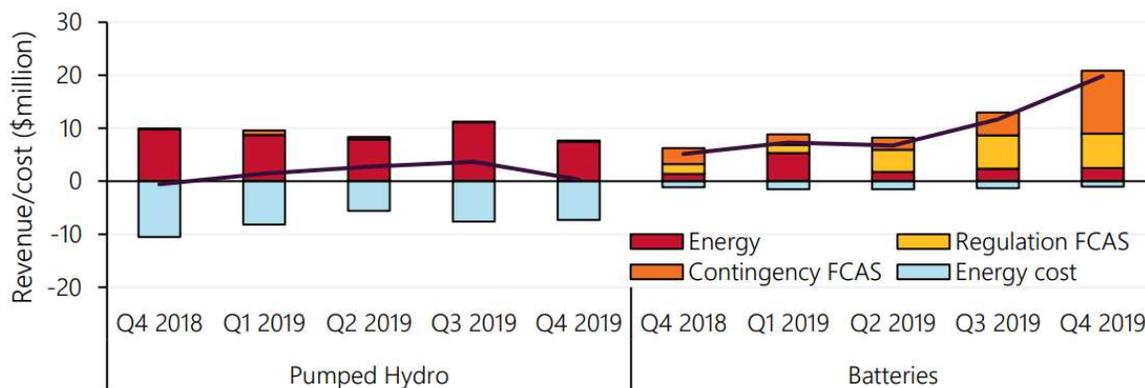
<sup>5</sup> See <https://www.nationalgrideso.com/balancing-services/frequency-response-services>

The Final Determination provides an opportunity for the AEMC to test the flexibility of our regulatory processes and frameworks to adequately respond to a rapidly evolving market – where best-practice reforms could have an ambitious target of being implemented within a 12-month timeframe. It is one thing to recognise that our regulatory and market frameworks “have not kept pace”, but to continue to ignore the need for a pro-active approach would only further embed reactive, incremental decision making - one element, one summer at a time. Given there is clear consensus on a preferred outcome (an effective incentive arrangement) across all stakeholders, it appears the challenge lies in refining the details of the mechanism itself, which could be informed from previous years of consultation and recommendations, such as the Frequency Control Frameworks Review. As such, we recommend a much shorter sunset period of 18 months to send a stronger signal to market of the commitment to move to a long-term incentive arrangement as quickly as practicable.

### FCAS impacts

Looking at historic revenue sources, AEMO data highlights the importance of FCAS regulation and contingency revenue streams to battery business models, noting combined FCAS revenues formed a record proportion (up to 88%) of total market revenues in Q4 2019:

**Figure 3: Quarterly analysis of Revenue sources – Pumped Hydro & Batteries<sup>6</sup>**



These figures, while illustrative of future revenue potential, clearly demonstrate the importance of incentive-based frameworks to be introduced as quickly as possible - preferably as an immediate solution, but at the very least as quickly as possible and well ahead of the 3-year sunset clause timeframe.

### 3. Ensure implementation is staged and processes are made transparent

Should a mandatory requirement be pursued as an interim solution, Tesla supports a staged implementation approach to better support market transition and allow for additional observations ahead of long-term mechanisms are designed.

The following should be considered as part of the staging:

- Capacity thresholds codified in the NER (i.e. mandatory PFR only applying to scheduled generators above 200MW as part of the interim PFRR, ahead of further assessments by AEMO in preparation for the PFRR being published at the end of 2021 on whether additional, smaller/semi-scheduled plant will be required to support, depending on observed frequency impacts over first 6 to 12 months. For example, only expanding the mandatory requirement on the condition that:
  - Frequency performance during normal operation has not improved sufficiently;

<sup>6</sup> From AEMO Q4 2019 Quarterly Energy Dynamics report: [www.aemo.com.au/-/media/files/major-publications/qed/2019/qed-q4-2019.pdf](http://www.aemo.com.au/-/media/files/major-publications/qed/2019/qed-q4-2019.pdf)

- 
- The chance of under-frequency load shedding and over-frequency generation shedding following non-credible events has not reduced sufficiently; and
  - Incidences of frequency oscillatory events have not reduced sufficiently
  - Upfront transparency around compliance timelines – e.g. how long scheduled generators above 200MW will have to implement PFR, with similar timeframes outlined for semi-scheduled/ generators below 200MW outlined in the PFRR should mandatory PFR be expanded
  - A shorter sunset period at commencement of 18 months, beyond which annual reviews are conducted by AEMC (in the event of delays to implementation of a market solution) – to support the immediate introduction of a market-based mechanism as soon as it is designed

This last point was not raised in the Consultation Paper, but the AEMC should consider introducing annual reviews of any interim (e.g. mandated) requirements ahead of the implementation of a market-based mechanism as it would provide comfort to market participants by demonstrating there would be regular opportunities to re-engage and review decisions being made on such a critical item.

### **Conclusion**

Tesla notes the AEMC will be considering the design of alternative options via the related disincentives rule change process and supports thorough consideration of PFR incentives given the scale of the rule change and potential impacts for market participants. Tesla will continue to engage closely with the AEMC and AEMO on ensuring the NEM continues to work on the Frequency Control work plan, to deliver optimal market and system services.