AEMC – Operating Reserves Directions Paper

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Sebastien Henry
Australian Energy Market Commission
Sydney NSW 1235

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RE: AEMC – Operating Reserves Direction Paper

Dear Sebastien

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide a response to the AEMC's Operating Reserves Direction Paper as part of the broader Energy Security Board reforms currently under consideration.

Tesla is acutely aware of the real and immediate need for action to improve the market frameworks in the NEM and agrees with the AEMC, ESB and AEMO positions that system security, frequency, and reliability have all been deteriorating over recent years and mechanisms to address this are not fit for purpose going forward. At the same time, battery storage has proven particularly valuable in managing both reliability and system security issues - providing valuable reserve energy capacity alongside premium stability, voltage and frequency services. As batteries can provide these multiple services across intraday trading periods, we believe a co-optimised design for an operating reserve mechanism is the only viable approach that should be progressed. Going forward, storage at all scales and in all forms – stand-alone, co-located, and aggregated – will be an increasingly critical component of Australia's energy mix. As such, it is essential that new reforms and requirements do not directly, or inadvertently disincentivise the uptake, or efficient operation, of existing storage projects and potential future investments.

Our feedback provides some initial considerations for context, supported by high-level recommendations for AEMC under three key themes:

1. **Complementarity and investment certainty:** a properly designed operating reserve market, co-optimised with a suite of existing and new energy and system service markets can combine with parallel reforms to adequately value new entrant, fast response and flexible assets. These reserve price signals may not underpin an entire business case on their own, but can provide a critical additional revenue stream for new entrants and can therefore send a positive investment signal in a transparent and efficient way (and avoid favouring the prolonged operation of incumbents).
2. **Operative reserve design principles:** Tesla has a strong preference for co-optimised & dynamic (5min) design – this will provide the most efficient market signal (interlinked with FCAS), best incentivise additional flexible capacity to enter, and avoid negatively impacting commercial and operational decisions for battery storage in the bidding and dispatch process
3. **Ramping requirements:** AEMC needs to remain focused on a future system with future requirements (i.e. value fast response flexibility - not slow ramp services based on legacy thermal plant capabilities). This will be even more critical following the introduction of 5MS. Tesla does not support a slow / out-of-market ramping market approach.

Kind Regards

Emma Fagan - Head of Energy Policy and Regulation

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Context: Identified Need

- **A 100% renewable energy system needs flexible mechanism to address operational uncertainty and near-term variability. This need will evolve as the power system transforms**
- The starting point is the need to consider design of a 100% renewables plus storage system (i.e. extending the scale of the optimal/least-cost analysis in AEMO's Integrated System Plan). Under this perspective, reserves may provide a useful lever to address operational uncertainty (alongside incremental improvements to forecasting, information sharing etc), particularly with regards to steep swings and unexpected variability in net demand over the short to medium term.
- The rapid pace of transition means this interim period will see the market grapple with variability in both demand and supply (particularly as thermal plant retires) and without any formal mechanisms to attach storage to rooftop solar PV or utility scale wind and solar in the NEM, this will need to be considered through other approaches. These risks are clearly demonstrated by AEMO's RIS stage 1 paper highlighting how changes in supply and net demand due to the increasing variability and uncertainty in the power system will need to be addressed, as well as AEMO's ISP work suggesting a critical role for up to 19GW of flexible storage at all scales by 2040.

- **A new operating reserve service could be introduced to address this evolving need – but needs to form part of a wider suite of reforms to be effective**
- As per Tesla's previous responses, we suggest there are higher order priorities under consideration such as FFR (an immediate quick win), valuation of virtual inertia and system strength services over the coming years, and further exploration of resource adequacy mechanisms which could all present a greater benefit to cost ratio than re-opening NEMDE.
- We agree with the sentiments that an operating reserve may be helpful, but we don't see this mechanism will be a particularly strong driver to encourage any new flexible capacity being built on its own. Going further, there may actually be a risk that operating reserves might artificially delay the closure of some less-efficient/ higher emissions plant.
- However, if properly designed to value new entrant, fast response and flexible assets, an operating reserve should (in principle) provide a valuable additional revenue stream for storage and can therefore send a positive (albeit soft) investment signal to the market in a transparent, efficient and complementary way.

- **Potential benefits – if designed appropriately**
- If efficient pricing is achieved, an operating reserve would provide greater incentive to invest in dispatchable resources to increase ramping capability and decrease start-up times (as higher pricing might only apply to a few dispatch period intervals). The approach could also provide increased incentives to invest in resources in regions experiencing more frequent or larger capacity shortages. Our initial view therefore is that impacts on battery storage projects will be net positive – providing another revenue stream in a battery's value stack – if appropriately designed.
- An additional benefit of a proposed reserve mechanism is its explicit technology neutrality – the market would be open to all types of technologies, and there would be no need for central determination of 'de-ratings' or other 'firmness' factors as with other capacity mechanisms. However, one potential and notable exception needing to be addressed is the eligibility and participation of demand side response – and how an operating reserve market would integrate with the Wholesale Demand Response market proposed, or other 2-sided market initiatives under development by the ESB. Both demand response and DER are valuable resources that should benefit more from the mechanism given their relative flexibility to be made available during scarce conditions.
- In general, we view the proposed operating reserve market aligning with optimisation flexibility – allowing current out-of-market resources (e.g. under RERT contracts) to be used in-market when appropriate. This holds as a relative advantage to other market designs been considered, such as the day ahead reforms under consideration by the ESB and AEMO.

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1. Complementarity & Investment Certainty

- **Complementarity with other work streams: Tesla supports the AEMC approach to align the design of an operating reserve with parallel reforms being considered by AEMC and ESB for essential system services and resource adequacy – progressing real-time and co-optimised market-based designs is the best approach to incentivise efficient entry of new plant**
- We agree that some form of capacity mechanism may also be required given market-based price discovery for capacity may not be sufficient for new generation investments. We also note a market-based, co-optimised operating reserve could be compatible with additional resource adequacy mechanisms – as each would address and introduce incentives at different timescales (should the ESB work determine additional investment signals are required for reliability). However, this mechanism needs to be technology neutral – and preferably include actual characteristics required in a post 2025 energy system (e.g. flexible, fast ramp, accurate dispatch output, low emissions).
- Further detail on potential or expected interactions with the RRO (or enhanced RRO) need to be further explored – including any greater reliance that may be placed on the RRO mechanism in the future, which is likely to create mixed investment signals and/or disadvantage assets that are seeking market-based returns relative to others that hold reliance on RRO-supported retailer contracts. All else being equal, a NEM with a co-optimised operating reserve market could be expected to reduce the use of RERT as well as the likelihood of the RRO being triggered.

- **Impacts on investment: The AEMC and ESB reform agenda must be cognisant of impacts on investment signals for low-carbon technologies – storage in particular requires removal of existing barriers and recognition of its capabilities to unlock the required levels of deployment in the NEM**
- The NEM currently provides mixed signals for investors looking to develop storage projects, highlighting a significant gap in meeting AEMO's forecast levels of storage deployment by 2030 (i.e. up to 19GW by 2040 as projected in the 2020 ISP 'step 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.
- As demonstrated in day-to-day operations as well as during non-credible power system events, storage technologies are well aligned with the objective of efficient provision of services to meet "multiple system needs, including security, reliability, and resilience". Storage assets have the ability to optimise across multiple services and multiple markets – to provide what is needed when it is needed the most – driving increased flexibility, improved competition and enhanced stability to the local grid and the NEM more broadly. Multiple services can also be provided by a single asset simultaneously – ensuring the cost of service provision maximises efficiency, and can be co-optimised across energy and system services.
- Should an operating reserve continue to be progressed, it has the potential to significantly impact the investment signals for storage. AEMC must ensure this is a positive impact, rather than designing a mechanism that simply prolongs the operation of incumbent generators.

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2. Operating Reserve Design Principles

If progressed, Tesla strongly recommends a co-optimised operating reserve design

- This is the only approach that would:
  - ensure the most efficient use of existing resources and best supports and incentivises additional flexible capacity to enter the market
  - provides an additional revenue stream in a way that does not curtail existing commercial opportunities (e.g. by partitioning limited capacity between ‘in-market’ and ‘out-of-market’ dispatch decisions)
  - provides the least complex dispatch optimisation for both individual and portfolios of assets
  - can minimise implementation complexity and costs relative to the alternatives
- Integrating with and maintaining real-time markets to simplifies dispatch and co-optimisation is critical for storage assets in particular.
- The more dynamic 5min rolling approach (option 1) appears to present the most efficient outcome of all - aligning with an operating reserve demand curve. It also minimises the need for participants to manage their own forecasts over multiple time horizons - which would add complexity to bidding optimisation already managing energy and FCAS forecasts for every 5 minute interval.
- Co-optimisation between energy, ancillary services and (potentially) reserves is also a substantial benefit to the market more broadly. As FTI noted in their previous advice:
  - *“The interlinkages between the two services and the partial overlap between the timescales on which they operate is particularly relevant for operating reserves and contingency FCAS. Greater procurement of contingency FCAS can help reduce the magnitude of reserves required to return the system to normal operating conditions following a contingency event, and vice versa.”*
- Tesla also points the AEMC to system operations utilising operating reserve markets in other jurisdictions, for example NYISO and MISO in the US both co-optimise frequency control and reserve services with bulk energy.
- Building on Infigen’s initial rule change proposal, Tesla recommends considering the benefits of a lower service (i.e. to incorporate the load-side services and address negative load issues such the recent minimum operational demand risks being experienced in SA). As it stands, it is unclear why loads are unvalued. Interactions with the load-side and WDRM also remain unclear.
- Further detail and analysis on interactions with existing RERT and RRO mechanisms would be valuable – as there would likely be overlap/complexity with the RRO that needs to be resolved. However, in general we believe a co-optimised operative reserve can improve optimisation flexibility - allowing current out-of-market resources (e.g. under RERT contracts) to be used in-market when appropriate – as enabled quantity can vary dynamically.
- As a design principle, the longer term impacts on battery storage projects should be designed to be net positive – providing another revenue stream in a battery’s value stack. In other words, we strongly encourage mechanism designs that accelerate the entry of new capacity rather than favouring the prolonged operation of existing capacity (see next page).

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3. Ramping Market

Tesla does not support the introduction of a slow-ramping mechanism as initially proposed by Delta and illustrated by the AEMC's Ramping Commitment Market Option (4)

- This design option would ignore the benefits of 5MS and improved forecasting (which will ensure high ramp intervals send high price signals). In practice, 'slow-ramps' will be better addressed by ensuring adequate levels of capacity are procured (via real-time price signals and/or complementary resource adequacy mechanisms). As discussed in the context section above, and extensively detailed in numerous AEMO studies, the NEM needs to be designed for fast ramping assets more than slow ramping in the future. In US markets, a combination of wind, solar and fast-response battery storage has already demonstrated an optimised portfolio solution that does not rely on slow-ramp services from thermal plant.
- The ramping requirements highlighted by the 'out-of-market' design examples can also be mainly addressed by inverter-based technologies, with large and rapid ramps well suited to the capability of fast-response battery storage in particular. The increasingly variable supply-demand mismatch will be improved from the introduction of 5MS, and therefore will be best supported by additional incentives to provide operating reserves 'in-market' and ideally co-optimised with other system services such as contingency FCAS (and any future services for inertia, voltage, FFR etc.).
- Tesla notes that the future NEM, under any credible future scenario, will see a significant contribution from distributed energy resources (DER), and aggregated fleets operating as VPPs that should be enabled to participate in all energy and system service markets given their ability to provide many of these services much more efficiently and at a localised level. Many of these capabilities are already being demonstrated as part of AEMO's Virtual Power Plant trials.
- As AEMO notes in its latest VPP knowledge sharing report, "evidence indicates that VPPs could alleviate operational challenges such as low generation reserves and low minimum demands as they grow in scale", highlighting the role VPPs will play in firming variable resources.
- As structured under option 4 of the directions paper (ramping commitment market), the design of a slow-ramp incentives would have unnecessary and negative impacts on efficient investment in the NEM. Aside from retiring synchronous generators who may receive additional incentives to defer their retirement timeframes, all other asset types being developed and deployed as part of a future energy market would face increased costs directly (e.g. via additional causer pays contributions as originally proposed by Delta), or indirectly through distorted real-time price signals and requirements for removing capacity from the real-time market.
- The AEMC assessment should not encourage a regulatory framework that is designed around the capabilities of old and retiring technology. New markets must incentivise flexibility and low-emission characteristics to avoid favouring incumbents and prolonging an ageing thermal fleet. Theoretically, a ramping service *could* be designed to provide a new price signal for demand response and all types of storage (hydro, BESS, hydrogen) – but this would necessitate a speed characteristic as gating criteria.
- We suggest this option / rule change is not progressed and instead the principles of co-optimisation, dispatch efficiency, and facilitating new investment capacity underpin the design of more appropriate markets and services to complement increasing levels of renewable generation, whilst ensuring both reliability and system security is maintained over the long-term.

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