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Department of Climate Change, Energy, the Environment, and Water
4 Parramatta Square
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Parramatta NSW 2150

Via email to: lds.review@dpie.nsw.gov.au

18 June 2024

Dear NSW Department of Climate Change, Energy, the Environment, and Water,

RE: Review of Long Duration Storage (Part 6 of Electricity Infrastructure Investment Act 2020)

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the NSW Department of Climate Change, Energy, the Environment, and Water (DCCEEW) with a response to Review of Long Duration Storage (Part 6 of the Electricity Infrastructure Investment Act 2020) consultation paper.

Tesla's global mission is to accelerate the world's transition to sustainable energy. Tesla has the largest energy storage team in Australia (over 150 employees) and an unrivalled track record in successful deployments of large-scale batteries. Tesla has delivered and connected more Australian utility scale battery energy storage systems (BESS) projects than any other provider, including the globally acclaimed Hornsdale Power Reserve (HPR) in South Australia, the Victorian Big Battery, and Lumea's Wallgrove Battery in NSW among others. Recently, Tesla was announced as the OEM for NSW's Tender Round 1 of the LDS LTESA (Long-Term Energy Services Agreement) for the Limondale BESS, Australia's first eight-hour battery.

Tesla commends the NSW Government on supporting additional storage investment in the state (beyond Snowy 2.0), and for re-opening the definition of 'long duration storage' to be more reflective of market needs and costs. Ultimately, every proponent will seek to encourage mechanisms that support their particular technology – and in the long run a mix of storage types and durations will be needed. However, in the near to medium term, AEMO Service's modelling clearly shows "that a portfolio comprised entirely of 4-hour storage is lowest cost to meet the 2 GW and 16 GWh objective".[1] This aligns with the AEMC's Review of the Reliability Standard, which identified that 96 per cent of unserved energy (USE) events have a duration of less than 6 hours.[2] This is also consistent with the findings from numerous global studies from NREL and CAISO in the US, the UK Capacity Market, and WA's Electric Storage Requirements all fully accrediting 4-hour storage (see pages 2 – 7 below).

Furthermore, we encourage the NSW Government to address 'unknown unknown' tail risk events as efficiently as possible in the best interest of NSW consumers. Blanketing all 2 GW of storage requirements to be built as 16 GWh adds significant real cost (over $500 million based on AEMO Services reporting) to consumers, while also delaying the transition that is already underway by gold-plating storage build.

Consequently, Tesla supports a data-backed approach to NSW's duration requirements and a decrease in the duration definition from eight to four hours, to minimise costs for consumers while meeting this decade's needs. To address long-duration storage (12+ hours) requirements, there is sufficient time (15+ years) to design a fit for purpose mechanism (e.g., via ARENA) or evolve

[1] https://www.energy.nsw.gov.au/sites/default/files/2024-05/NSW-202405-AEMO-Services-Long-Duration-Storage-Advice.pdf
[2] https://www.aemc.gov.au/sites/default/files/2024-04/Draft%20Report%20-%20Review%20of%20the%20Form%20of%20the%20Reliability%20Standard%20and%20APC.pdf

LDS requirements when/ if needs arise. Current BESS technologies are highly flexible and dynamic to price signals, responding in real time to AEMO signals to contribute to reliability and system stress events. In the confidential attachment to this letter, Tesla has provided an example from May 2024 contingency events, where operating BESS were able to support the NSW grid through existing market signals.

We look forward to engaging with the NSW Government and supporting ongoing discussions about the role and requirements of storage and duration.

Kind regards,

Tesla Energy Policy Team
energypolicyau@tesla.com

Question 1: What is an appropriate minimum duration for long duration storage infrastructure in NSW for 2030? Please outline why.

Tesla calls to attention a range of evidence that demonstrates that the most cost-effective approach to meeting reliability needs supports a minimum duration of **four hours**.

Meeting NSW's System Needs

This is demonstrated by several findings within Australia, including AEMO Service's 'Review of storage infrastructure requirements for the NSW market' report[3]; the AEMC Reliability Panel's 'Review of the form of the reliability standard and administered price cap' draft report; and NSW EnergyCo Advisory Board member Alex Wonhas' modelling in the recent article: 'How much storage? What's the cost? Now you can build your own Integrated System Plan".[4]

Tesla notes that according to AEMO Services own data, the lowest cost way to meet all reliability requirements until 2040 is through the deployment of four-hour storage solutions. This has been confirmed by the NSW Government on the May 30th webinar, to be including considerations of tail risk events.

Figure 1: AEMO Services Storage Build Cost Estimates by Duration

Table 3: Build cost estimates to meet the 2 GW and 16 GWh objective

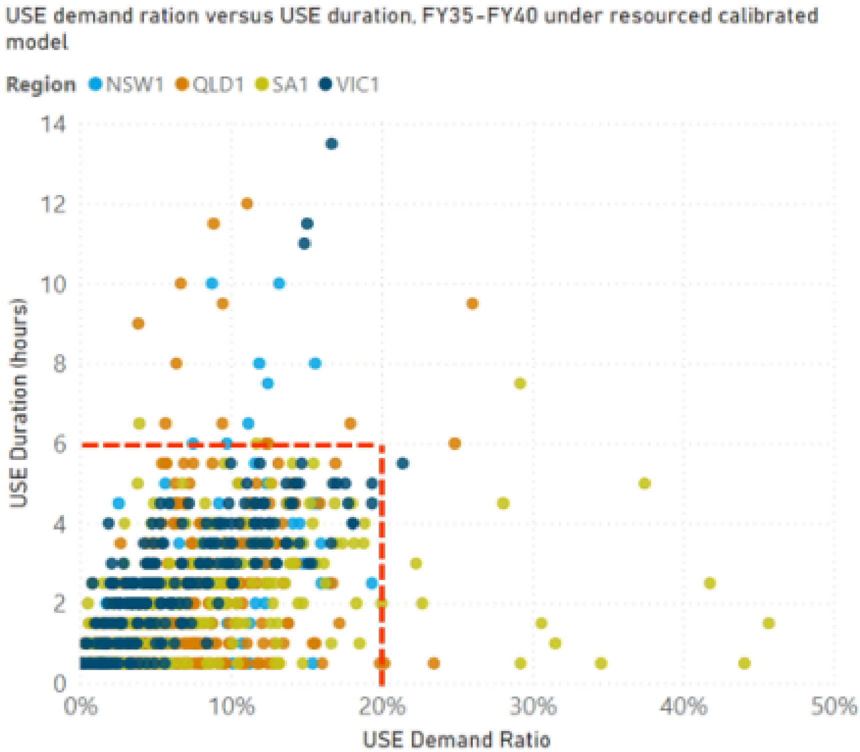
Portfolio	Configuration			Additional build cost to meet 2030 minimum objectives (A)	Additional build cost to meet IRM in 2030 (B)	Additional cost to meet IIOs by 2030 (greater of A and B)
	2 hour	4 hour	8 hour	$ b	$ b	$ b
Portfolio A	100%	-	-	2.99	7.05	7.05
Portfolio B	-	100%	-	4.70	4.68	4.70
Portfolio C	-		100%	4.77	5.93	5.93

The cheapest portfolio to meet the IRM objective is a portfolio of 95% four-hour storage, and 5% eight-hour storage at $4.66 billion, which is marginally cheaper compared to the $4.68 billion required for purely four-hour storage. Therefore, changing the LDS definition to a duration of four hours will meet the EIR Act and IIO objectives in an approach best aligned to the long-term interests of NSW consumers. Furthermore, this cost can be lowered through allowing aggregated assets to contribute where practicable (which Tesla commends for consideration in question four).

Similarly, the AEMC's Review of the Reliability Standard, identified that 96 per cent of unserved energy (USE) events have a duration of less than 6 hours.[5] This is a forward-looking model for financial years 2035 to 2040, and thus is a model with higher levels of renewable penetration that is reflective of NSW's longer-term objectives of reliability.

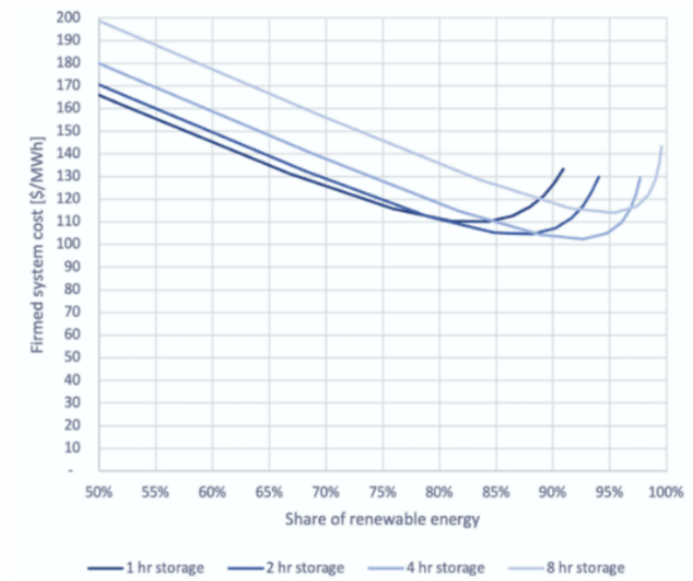
[3] https://www.energy.nsw.gov.au/sites/default/files/2024-05/NSW-202405-AEMO-Services-Long-Duration-Storage-Advice.pdf
[4] https://reneweconomy.com.au/how-much-storage-whats-the-cost-now-you-can-build-your-own-integrated-system-plan/
[5] https://www.aemc.gov.au/sites/default/files/2024-04/Draft%20Report%20-%20Review%20of%20the%20Form%20of%20the%20Reliability%20Standard%20and%20APC.pdf

Figure 2: AEMC Reliability Panel USE Demand and Duration



Furthermore, Wonhas anticipates the extensive build-out required in the National Electricity Market (NEM) over the coming decades, noting that "if you are looking at a least cost outcome, adding 2-4 hours of battery storage can increase the amount of renewable energy to 90%-95%, the remainder will have to be again provided by fully dispatchable generators, e.g., gas or longer duration storage."[6]:

Figure 3: System Cost vs Share of Renewable Energy (



[6] https://reneweconomy.com.au/how-much-storage-whats-the-cost-now-you-can-build-your-own-integrated-system-plan/

As shown in Figure 3 above, four-hour storage is significantly cheaper on a $/MWh basis than eight-hour storage as a whole of system cost, until we reach a grid in which there is over 95% penetration of VRE, which is likely to occur in the 2040s or beyond. Subsequently, Tesla advocates for a data-driven approach to NSW's duration requirements and recommends reducing the duration definition from eight to four hours to minimize consumer costs while satisfying energy needs.

Tesla acknowledges that the role of the NSW Electricity Infrastructure Roadmap's minimum objectives is to deliver sufficient storage by 2030 to support the retirement of coal-fired power stations. As the state's generation mix evolves to meet these goals, it is crucial that storage requirements focus on achieving the primary objective of 90% renewable generation. Long-term storage solutions should be addressed separately, designed to meet specific needs that may arise in the 2040s and beyond. The current data and modelling of the NEM shows that both leading-to, and after 2030, the vast majority of storage requirements can be addressed by durations under eight-hours. If there are concerns for reliability risk or low probability tail-risk events occurring in the future, Tesla advocates for policy decisions to be made based on the underlying research and data that outlines the scope of these potential considerations, given: a) the significant additional cost to build out a portfolio with longer storage durations and b) the flexibility and modularity that short and medium duration storage assets have to expand their energy capacities over time if and when needed.

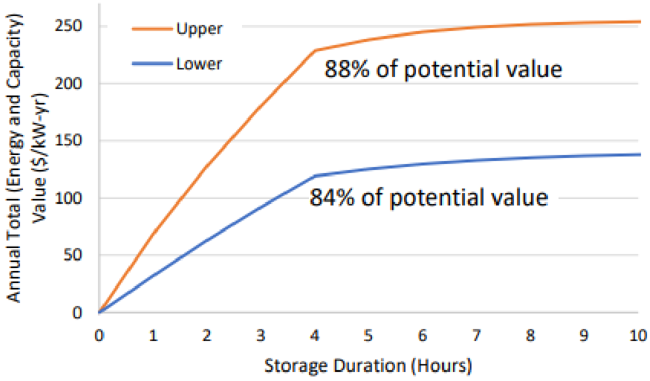
Alignment with International Best Practices

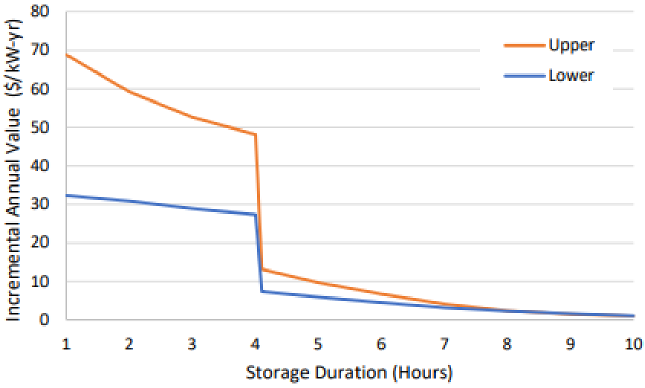
Globally, Tesla is not aware of any market jurisdiction that has mandated a general requirement that ties 8-hour storage capacity to registered name plate rating. To date, the average duration of storage provided by Tesla globally is in the range of 2.5- to 3-hours, dominated by a 4-hour requirement in several US jurisdictions including California (4 hours is driven by the peak load duration requirement to allow vertically integrated utilities to capture the full capital cost of the generator in their rate base; as well as the fact batteries are now out-competing gas peakers as the optimum technology for fast-ramp reserve capacity). Numerous studies from the US also show 4-to 5-hours of storage in a network is sufficient to maintain reliability with up to 80% penetration of variable renewable generation[4]. The United States National Renewable Energy Laboratory (NREL) 2021 study shows US storage requirements "dominated by 4-hour battery technology" past 2040 in all scenarios[3].

NREL has conducted several in-depth investigations into optimum storage duration requirements in the evolution and operation of the U.S. power sector. Multiple reports reiterate the majority of benefits of storage are met by four-hour storage, with additional duration coming at significant additional costs to the market. In its 2022 Report 'Moving Beyond 4-Hour Li-Ion Batteries: Challenges and Opportunities for Long(er)-Duration Energy Storage'[7], the NREL identified that 'in locations with a 4-hour capacity rule, a 4-hour storage device captures well over 80% of the total capacity plus energy time-shifting value that could be captured by a much longer device (see top figure below). The incremental value of adding additional duration beyond 4-hours (see bottom figure below) is less than the annualized cost of current Li-ion battery capacity', visualised in Figure 4 below:

[7] https://www.nrel.gov/docs/fy23osti/85878.pdf

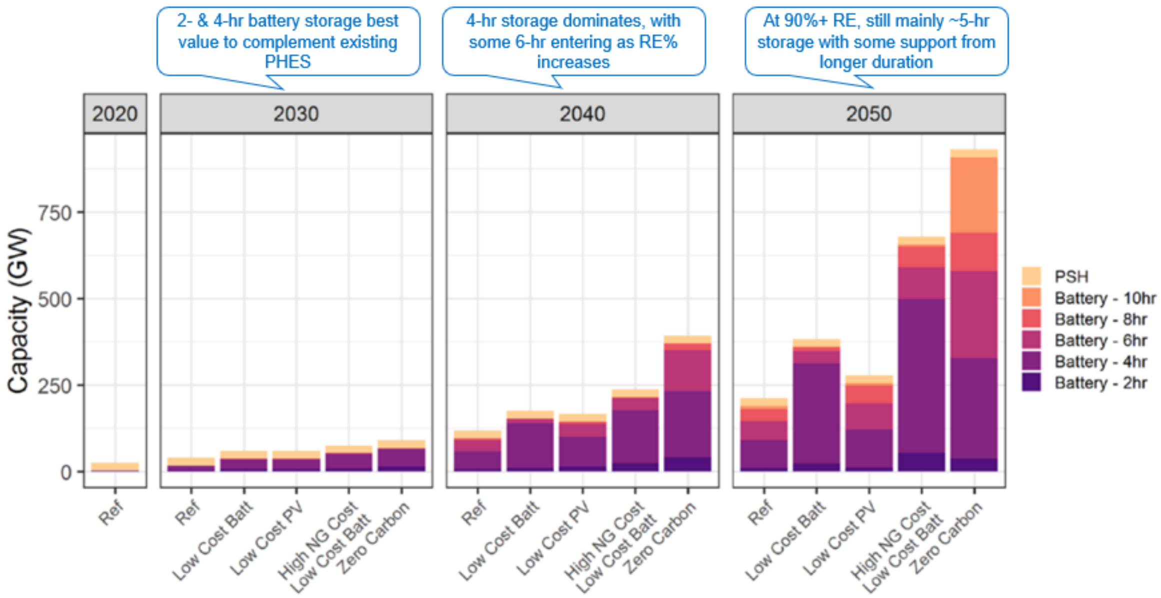
Figure 4: NREL Comparison of Value per Storage Duration





Further NREL research that takes a specific look at how storage capacity needs will shift in response to changing grid dynamics in the coming decades reveal how US storage requirements are dominated by four-hour battery technology until the 2040s, and even then in 2050, mainly five hour storage is required:

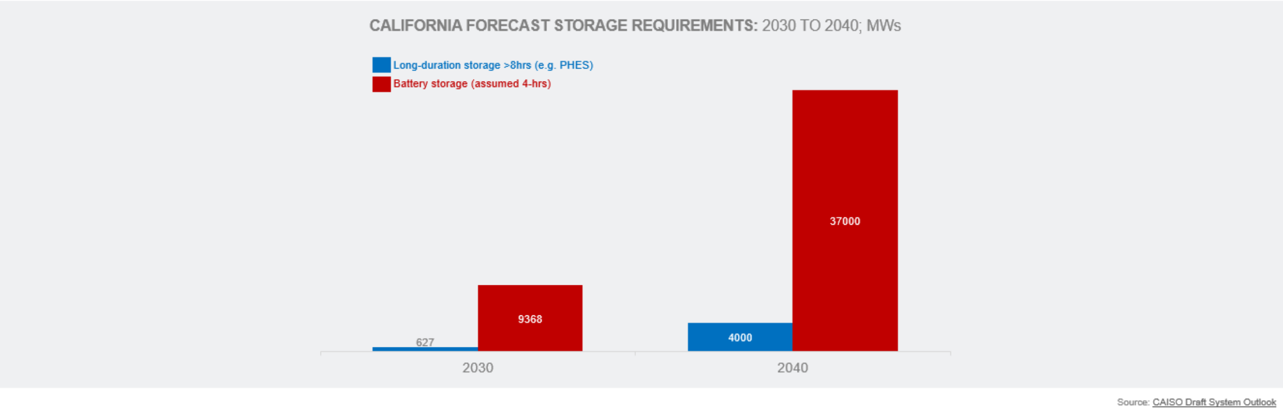
Figure 5: NREL Storage Build Out to 2050



https://www.nrel.gov/docs/fy22osti/80688.pdf

Similarly, research focusing on California's grid – as a leader in deploying energy storage and with a striking range of similarities to Australia's own grid characteristics – reinforce 4-hour requirements for storage needs. California Independent System Operator (CAISO)'s system outlook supports this split between four-hour and greater-than-eight-hour storage, highlighting the dominance of shorter duration storage in system requirements.[8]

Figure 6: CAISO Forecast Storage Requirements



Additionally, CAISO's expanded and refreshed 2024 study further reinforces the comparative roles between storage durations, highlighting the need for ~50GW of battery storage vs 5GW of other clean firming/LDES and 4GW of pumped hydro storage out to 2045[9]:

Figure 7: CAISO Transmission Planning Costs

Portfolios – 2023-2024 Transmission Planning Process and 20-Year Transmission Outlook

Resource Type (MW)	2023-2024 Transmission Planning Process		20-Year Transmission Outlook	
	Base Portfolio (2035)	OSW Sensitivity (2035)	May 2022 2040 SB100 Starting Point Scenario (MW)	Update New Resource Assumption in the 2045 Scenario (MW)
Natural Gas Fired Power Plants	-	-	(-15,000)	(-15,000)
Utility-Scale Solar	38,947	25,746	53,212	69,640
Distributed Solar	125	125	-	125
In-state wind	3,074	3,074	2,837	3,074
Offshore wind	5,497	13,400	10,000	20,000
Out-of-state wind	5,618	5,618	12,000	12,000
Geothermal	2,037	1,149	2,332	2,332
Biomass	134	134	-	134
Battery-energy storage	28,373	23,545	37,000	48,813
Long-duration energy storage (pumped storage)	2,000	1,000	4,000	4,000
Generic clean firm/long-duration energy storage	-	-	-	5,000

California ISO

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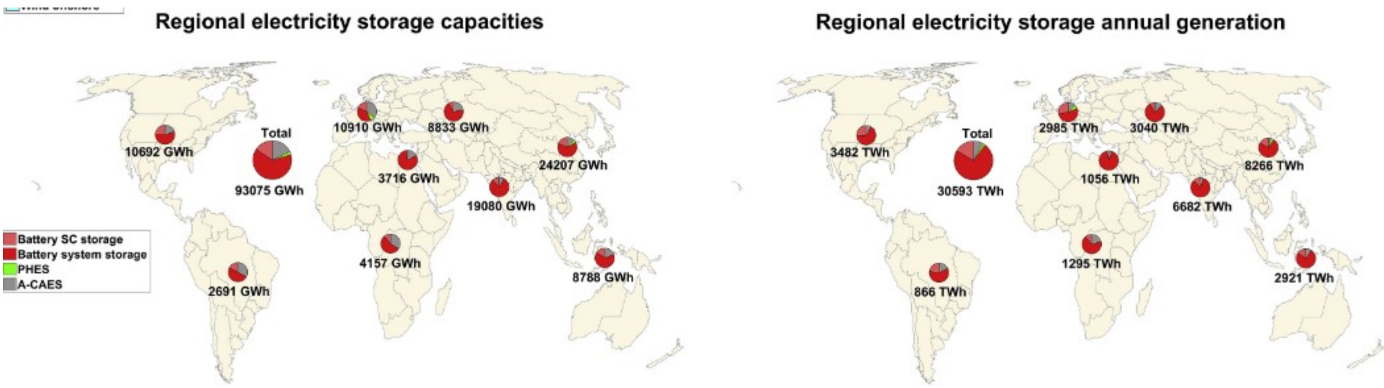
[8] https://stakeholdercenter.caiso.com/initiativedocuments/draft20-yeartransmissionoutlook.pdf
[9] https://www.caiso.com/Documents/RevisedDraft-2023-2024-TransmissionPlan.pdf

This perspective aligns with leading academic research on global storage requirements, which underscore the prevalence of medium duration storage as the dominant storage technology required in achieving high renewable energy penetration in several grids. According to such studies, “batteries, both prosumers and utility-scale, deliver the largest shares of output by 2050, as shown in figure 8. The share of output from prosumer batteries is relatively higher in the most developed regions with high PV prosumer capacities”[10].

Figure 8: Regional Energy Systems Storage Capacity



Consequently, Tesla advises the NSW Government to align their storage duration requirements to be evidence based – similar to these examples of global best practices that are all seeking to optimise the efficiency and reliability of their respective energy grids and projecting potential impacts of an increasingly renewable supply in the coming years and decades. As research and modelling of the NEM and NSW in particular shows, shorter duration 4-hour storage is sufficient for the majority events; and when combined with the integration of other storage such as Snowy Hydro, Queensland PHES, Battery of the Nation (BOTN), and in the context of complementary changes – e.g. interconnector upgrades, legacy gas plants, accelerated renewable energy connections, demand-side participation, and load flexibility, along with aggregated assets like Virtual Power Plants (VPPs) and community BESS, the system needs for reliability and meeting USE metrics will be achieved – at a cheaper cost – using a four-hour definition of LDS.

Whilst the market need for additional energy capacity may increase as large, centralised thermal generators retire, modular technologies such as battery storage can be built to value power capacity now (as per system needs), with additional storage capacity added over time, if and when it becomes required. This will also allow the Roadmap to benefit from the technology cost improvements over coming decades – which means consumers won’t have to wear the risk of over built infrastructure and the Consumer Trustee can drive an optimum, and dynamic economic solution that evolves based on market requirements and price signals. Further, it will unlock the inherent flexibility and optionality advantages of deploying shorter duration storage from the outset of the Roadmap, or at least allowing them to compete for LTESAs, connect to REZs, and participate in NSW energy markets on an equal basis.

[10] https://www.sciencedirect.com/science/article/pii/S0360544221007167

Question 2: Should the Minister have regulation making powers to change the minimum duration of long duration storage infrastructure over time? Please outline why or why not.

As evidenced by this review, an electricity market under transition requires a flexible and evolving regulatory framework to ensure it remains fit for purpose. As such, Tesla supports the ability to evolve the minimum duration requirements of long duration storage over time to meet evolving needs of the NSW electricity system, and recommends the Consumer Trustee to be the appropriate decision maker for such actions. This is based the approach in Western Australia, in which starting from the 2025 RCM cycle, AEMO will annually determine the Electric Storage Resource (ESR) Duration Requirement, influenced by AEMO's assessment of the Availability Duration Gap.

Tesla notes that the ESR Duration Requirement is currently set at four hours and has specifically been designed in the WEM Rules to ratchet up over time if required as per system needs as WA's thermal coal generators retire. Tesla is strongly aligned with an evidence-based approach to policy-making and believes a similar approach should be replicated in NSW, and supports the Consumer Trustee, instead of the Minister, as an independent and transparent decision maker that can work with industry to adapt the Roadmap requirements over time.

Question 3: How can the infrastructure objectives and LDS tenders be improved to support a diverse range of long duration storage projects? Are new measures required, such as:

- Requiring the Consumer Trustee to explicitly consider the benefits of duration in calculating financial value to consumers.
- Requiring the Consumer Trustee to discount the capacity of projects with duration less than 8 hours (if allowed) as though the duration is 8 hours when calculating financial value to consumers.
- Establishing a minimum LDS objective for 2035 to provide more certainty for proponents with long lead time projects.

Tesla recommends avoiding any measures that could directly or indirectly maintain an 8-hour duration preference, especially given the market evidence demonstrating that shorter durations can achieve reliability goals at a lower cost. The NSW LDS definition can target the least cost solutions for achieving 90-95% renewable energy (as outlined above) first through reducing the duration requirement to four-hours. Tesla raises concern that the suggestions outlined in this question would imply the potential for clear, data-backed metrics then being subject to non-transparent eligibility biases, with a lack of technology-neutrality leading to additional costs due to distortions in selection criteria. This would unnecessarily distort calculations of financial value for projects to favour certain technology types or longer durations with more complex and costly deployment profiles – with very marginal benefit for actual reliability or system security outcomes.

Instead of additional carve outs, de-rates or discounts, we recommend recognising the inherent flexibility of existing, commercially-viable storage solutions that can already:

1. **Extend their MWh duration by de-rating MW**: Storage is fully flexible on energy and capacity and can simply adjust the power output to extend the duration of energy delivery.
2. **Concatenating operation with other storage assets**: Coordinating multiple storage systems to work together efficiently (e.g. 2x 4-hour storage assets dispatching as 1x8 hour asset).

3. **Leveraging the modularity to expand energy capacity**: Scaling up storage assets behind the same connection point and power inverter infrastructure, as needed over time.

The NSW Government posits that the challenge is finding a cost-efficient path between addressing near-term system needs for 2030 and building the storage and system strength infrastructure required for higher VRE penetration on a longer timescale. We don't dispute the need for more than just 4-hour battery storage to support the transition to a high renewable grid by 2050, but would encourage a staged and phased approach be taken – in recognition that longer duration 'non-battery' storage technologies still have time before thermal plants retire and potential tail-risks might impact reliability – as per the modelled outcomes above.

Portfolio Flexibility

Another demonstration of the flexibility of four-hour storage is recognising that multiple four-hour batteries offer superior reliability and versatility in value stack over a single eight-hour battery, and at reduced costs per kilowatt ($/kW). To take a high level example, in the figure below, both battery storage assets can provide 1 GW for eight hours, and while the total capital cost for the 2GW four-hour BESS is 20% higher (using AEMO's ISP cost assumptions), this is more than compensated by it being able to provide double the power capacity (and associated benefits of charge/discharge flexibility, capacity reserve, ancillary service provision, network services etc). Therefore comparing the 2GW/8GWh option with a 1GW/8GWh BESS shows the 4-hour BESS is ultimately better value – and indeed 40% lower cost when using a $/kW basis for comparison:

Figure 9: Comparison of AEMO Cost for BESS (from 2023 IASR)

	GW	GWh	AEMO 2030 $/kW	Total Capital Cost $M
BESS 4hr	2	8	1,253	2,506
BESS 8hr	1	8	2,087	2,087
			- 40%	+ 20%

The flexibility benefits of storage have also been recognised by AEMO Services themselves, as demonstrated by the selection of the eight-hour Limondale BESS for the first round of the LTESA LDS tender. This project demonstrated the advantages of flexible BESS solutions, while as discharging was de-rated to eight hours, the charging activity of the BESS was maintained to have a duration of four hours to maximise solar-soaking benefits.

System Strength Benefits

Four-hour BESS can also significantly enhance system strength, which is critical for maintaining the stability and reliability of the grid. From Transgrid's upcoming Wallgrove Grid Battery ARENA knowledge sharing report, "The primary objective, as set out in the ARENA contract, was to support technical innovation by improving the understanding of how the selected Tesla technology could substitute for the inertia that would be leaving the system with the retirement of thermal generation", concluding that "both Transgrid and Tesla believe with further tuning of the inverter controllers, the active power inertial response can be as fast as a typical synchronous generator."

The report concluded as follows: "The VMM modelled through both Megapack 1 and Megapack 2 platforms appear to be faster and more effective than typical grid following technology which only respond to the variation in frequency. This can be seen both at Wallgrove and the hypothetical large-scale BESS, as they respond to the variation in the supply and demand of the active power rather than variation in the magnitude of the frequency. This feature is particularly useful and creates the capacity to contribute to the network inertia.

The implemented technology can have a very fast frequency response which is also helpful with general frequency control. This response is found to be faster than what a typical synchronous generator can provide using its governor. In conclusion, subject to careful tuning, Tesla's VMM technology contributes to both frequency control and system inertia support in pure frequency events. This response can reduce the system frequency nadir following a system frequency disturbance event."

Summary

Tesla recognises that short-duration storage is not the sole element required for a decarbonized electricity system. A diverse portfolio of storage types and technologies—varying in scale, duration, and grid levels (behind the meter, distribution, and transmission)—will be essential. However, for the near and medium-term targets outlined by the NSW Infrastructure Investment Objectives (IIO) and LTESA objectives, a focused data-backed approach on cost-effective, medium-duration storage is recommended. This strategic focus will ensure that the primary goal of transitioning to a high-renewable generation mix is met efficiently and effectively. The policy intent of the EIR and IIO are focused on reliability, and thus consideration should be given to the $1.25 billion uplift in costs for optimal four-hour versus eight-hour storage solutions (outlined by AEMO services) and exploring alternative methods to address adjacent objectives for tail risks.

Tesla supports funding future LDS technology innovation through alternative policy mechanism that can be designed over time to be more fit for purpose for their role. For example, using ARENA grants, which are better suited for early-stage proof-of-concept projects. ARENA's focus on innovation provides an ideal platform for developing and testing alternative LDS technologies, ensuring their viability and cost-effectiveness before wider deployment – similar to the role ARENA played for grid-scale battery storage from 2017-2020. Directing early-stage LDS development through ARENA allows NSW to achieve near- and medium-term renewable energy goals efficiently while fostering next-generation storage solutions. This balanced approach ensures current objectives are met economically, while laying the groundwork for ongoing innovation in energy storage technologies that may only be required from 2040 and beyond.

Under status quo, or if this review continues to preference 8-hour projects, the Roadmap would drive 2GW of over-investment in long duration storage infrastructure that is more costly on a $/kW basis[5], when shorter duration, faster-response, and more flexible storage would still be required to provide system services (e.g. system strength) or firming at the local level (e.g. if the Security Target is breached). **Ultimately, a much lower storage capacity is required to ensure reliability and system security in NSW, which in turn ensures lowest cost outcomes for consumers.**

Question 4: Should the NSW Government introduce amendments to the LDS definition to clarify it can include aggregated LDS infrastructure across multiple sites? Should aggregated LDS infrastructure need to register on AEMO's NEM Registration and Exemption List and participate in central dispatch? Please outline why or why not.

Tesla recommends the inclusion of aggregated storage in the LDS definition, and in particular Virtual Power Plants (VPPs) which can address the same reliability risks and high consumer prices as utility-scale storage can. We are encouraged by the NSW Government's initiative to promote the uptake of VPPs through actions like the expansion of the Peak Demand Reduction Scheme (PDRS).

Tesla notes that the Capacity Investment Scheme (CIS) is currently considering the design mechanics for potentially including VPPs in future tender designs and encourages the NSW Government also consider the design options and trade-offs for inclusions of aggregated storage. Tesla has one of the largest fleets of residential battery storage (Powerwall) in NSW, and more broadly in Australia, and looks forward to engaging with the government to explore the integration and benefits of aggregated storage in the scope of the LDS definition.

General Comments and Conclusion

Worked Example

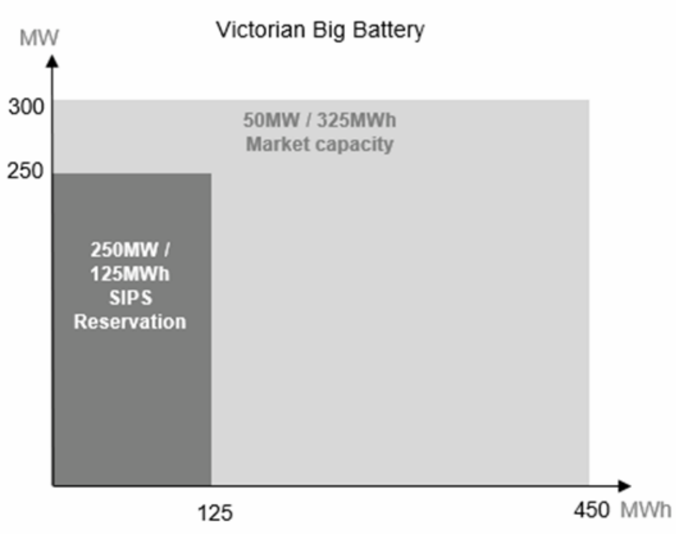
In 2021, Tesla delivered the 300MW Victorian Big Battery (VBB), a multi-purpose storage asset, underpinned by a System Integrity Protection Scheme (SIPS) contract with AEMO and the Victorian Government and operated in energy and FCAS markets by Neoen. As noted by Victorian Minister for Energy Lily D'Ambrosio at VBB's commercial launch in December:

> *"The Victorian Big Battery will deliver cleaner, cheaper, and more reliable power and help us reach our ambitious target of halving emissions by 2030. The big battery will help protect our network in summer, create jobs and drive down energy prices. Victoria is embracing new technologies that will unlock more renewable energy projects than ever before."*

A key value proposition for the successful selection of VBB as a SIPS solution was its rapid deployment timeframe – beginning commercial operation in December 2021, within 12 months of contracting. This highlights the deployment advantages of shorter-duration storage relative to other large-scale storage technologies and network infrastructure build out, which must navigate several years of approvals and social licence acceptance, before even commencing its multi-year construction time horizons. As such, battery storage can help expedite connection of renewable assets immediately, whilst still support REZs scaling over time as both a valuable complement to network infrastructure (as 'virtual transmission'), as well as being a fully flexible asset that can be re-purposed and adapted to other applications as grid needs change over time (for example providing additional firming services once network build-out is complete).

In the case of VBB, the reduction in wholesale energy prices that will be delivered from the battery's operations will mean that Victorians pay less for their power – with independent analysis showing that every $1 invested in the battery will deliver more than $2 in benefits to Victorian households and businesses[6]. This is enabled by the flexible suite of applications and ability for the 300MW / 450MWh battery to be virtually partitioned to maximise value by providing a range of services, similar to the model used by the original 'big battery', Hornsdale Power Reserve (HPR), deployed in 2017 and also underpinned by a contract with the South Australian government to maximise network, system and energy market benefits.

Figure 10: Operational Capacity for VBB with SIPS Reserve



As shown in Figure 10, VBB has 250MW/ 125MWh (30-min) reserved for SIPS for summer, with the remaining 50MW/ 325MWh (6.5 hours) available for market participation, increasing to 300MW in non-summer periods. This ensures the value of SIPS, energy and FCAS services can be realised from a single asset, avoiding the need to build a short duration SIPS battery *and* additional storage for the market (which would duplicate costs in land, development, construction, power electronics and inverters etc and be an inefficient use of capital). Building a separate 8-hour battery system not only increases both the capital and operating cost requirements, it also leads to lower overall revenue potential due to the inefficiency of not having a single (fully flexible) 300MW facility that can optimise dispatch across the full range of power and energy capacities. The analogy is having a harbour bridge that does not allow lane changing during peak traffic periods.

Further, if the market need for additional energy duration were to increase in the future, additional storage capacity can be added to the existing power electronics at marginal additional cost and with no impact to Generator Performance Specification (GPS).

Figure 11: Deployment modularity allows additional duration capacity to be added over time (in-line with market needs)

Recommendation

The Consumer Trustee (on behalf of NSW Government and all consumers) has an opportunity to increase competitive outcomes of the Roadmap and ensure technology neutrality principles are upheld for storage LTESAs. **Importantly**, t**his can be achieved** by reducing the minimum duration of LDS from 8-hours to 4hrs – as recommended by both Marsden Jacobs and AEMO Services.

This additional benefit of opening up LTESAs to include shorter-duration storage and leverage the speed and modularity of deployment (as well as minimising social licence and land-use impacts) should not be understated or left unvalued. Reliability risks forecast 12 months out (i.e. a breach of the NSW Energy Security Target) or potential AEMO identified system strength or inertia shortfalls can still be addressed by the accelerated procurement and deployment of battery projects that have qualified for storage LTESAs, as well as supersede the need for additional firming LTESAs or expensive system strength contracts for single-use assets such as synchronous condensers, further reducing scheme costs and increasing Roadmap benefits for all NSW consumers.

We welcome further discussion on any of the points raised and look forward to continuing to work closely with NSW Government to support the ambition and vision of the Roadmap as this review progresses.