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John Pierce
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

18 May 2017

Re: 5 minute settlement – Directions Paper (ref. code: ERC0201)

Dear John,

Tesla Motors Australia Pty Ltd (Tesla) welcomes the opportunity to provide the Australian Energy Market Commission (AEMC) with a submission to the proposed 5 Minute Settlement Directions Paper (Directions Paper).

Tesla is the world's only fully vertically integrated sustainable energy company, manufacturing advanced electric vehicles and battery energy storage systems, with sales and service operations in over 25 countries globally. While best known for our vehicles, Tesla also utilises the battery expertise and production capacity developed for its vehicles to make innovative, cost effective energy storage systems for use in homes, commercial buildings, and the electric system.

Tesla's battery energy storage products include Powerwall 2 – a 14kWh rechargeable lithium-ion battery designed to enable self-consumption of solar power, emergency backup, load shifting and other grid service applications; and Powerpack 2 – a commercial and utility scale battery energy storage system scalable from 200kWh to more than 100MWh.

Tesla fully supports the proposed transition to an alignment between the dispatch and settlement intervals. The proposed change provides a vital recognition of the current market distortions arising from the mismatch between dispatch and settlement trading intervals. The current 30 minute settlement does not provide an appropriate investment signal for flexible technology capable of quickly responding to fluctuations in demand and meeting the requirements of our modern electricity system

We also support an accelerated transitionary period as it is clear that:

a) battery energy storage is technically capable, and market ready, to participate in five minute dispatch intervals, and
b) that battery storage has the capability to be deployed at scale with short project lead time.

Based on the above, we believe that a 1 – 3 year transitionary period provides sufficient time for adoption of the rule change. Further, Tesla supports compulsory adoption of the 5 minute settlement rule. The optionality approach described in Chapter 5 of the Directions Paper is likely to create confusion in the market, and continue to distort price incentives for flexible generation.

5 minute settlement rule change – Tesla key points

As a leading global provider of battery energy storage, Tesla believes the following key points are relevant for the AEMC to note during the consideration of the 5 minute settlement rule change:

- Battery energy storage is technically capable of responding in a near instantaneous manner to price and demand signals, and as such, can provide required capacity during a five minute dispatch interval.
- We anticipate that the shift to a five minute settlement period will ultimately result in improved wholesale market participation revenue for battery energy storage leading to improved uptake trajectories.
- Increased uptake of utility scale battery energy storage will ultimately manage some concerns raised during this rule change process regarding the liquidity of the cap market as utility scale battery energy storage can increasingly be used as energy capacity by counter-parties participating in the cap market.

The Australian electricity market is undergoing significant transformation regardless of this rule change, through the Finkel Review; the state based renewable energy targets – particularly those introduced in Victoria and Queensland; and the 2017 Climate Change Policy Review. Ensuring that the national electricity market is set up to accommodate and properly compensate enabling technologies, such as battery energy storage, will be vital during this transitionary period.

Battery storage – technical capabilities and contribution to long term system security

As noted by the AEMC in the Directions Paper – battery energy storage technologies provide bi-directional inverter capabilities. The discharge time, in response to a demand signal, is within 1 second, and sub 50 ms for fast frequency response (FFR). The near instantaneous response times, in addition to the bi-directional capabilities, means that battery energy storage has a clear technical ability to participate in a five minute dispatch and settlement market.

Tesla battery energy storage systems are fully able to be integrated into the grid and provide standard wholesale market functionality. All systems have integrated optimisation software and battery management systems managed through the controller – which can in turn be linked via MODBUS/DNP3 to third party SCADA system or to an existing external controller used by market participants to participate in the wholesale market.

Response times to individual market price or demand spikes is similarly instantaneous. Individual Powerpack systems can response within 1000ms from a direct command. Aggregated systems, such as an aggregated collection of Powerwalls which are all network connected via the Tesla server, can respond within 2-3s on an aggregated basis.

Management of this grid integration through SCADA systems can be done locally or remotely – so ease of dispatch and market participation is ensured.

A further key technological advantage of battery energy storage when compared with incumbent technologies, is the speed at which new capacity can be deployed. Tesla Powerpack systems are fully integrated, scalable systems, designed to provide a ‘plug and play’ turnkey solution. As a result, Tesla has proven capability to contract, install and fully deploy 80MWh of capacity within a 3 month period.

Improving market revenue streams for battery energy storage – utility scale and residential participants

Tesla agrees with the position of the AEMC in the Directions Paper, that a key benefit of aligning the five minute dispatch and intervals is that it provides an improved price signal for the efficient use of, and investment in, generation assets and demand side technologies.

This is particularly so in providing an investment signal for flexible technologies that are capable of responding at a near instantaneous rate to both demand and price signals.

A shift to a larger penetration of renewable energy will require additional focus on enabling technologies to maintain system security. A key facet of this will be ensuring that batteries can be rolled out economically without government intervention.

We believe that the transition to a five minute settlement will reduce gaming behaviour and ultimately improve revenue streams for battery energy storage both from a spot market participation perspective, and through the sale of future caps.

The Melbourne Institute of Energy report by Dylan McConnell[1] demonstrated that the value of storage under a five minute settlement period is generally 60-80% higher than under a 30 min settlement.

The analysis also demonstrates that this variance could be much higher – pointing to a forecast example, where the value of storage under a five minute settlement is $617/kW/day compared to $115/kW/ day under a 30 minute settlement[2]. For utility scale energy storage applications, alignment of the five minute dispatch and settlement periods provides significantly increased revenue certainty, encouraging further roll-out.

On an aggregated residential scale Reposit estimates that switching to a five minute settlement approach would result in a 21% increase in GridCredits[3].

Both of these improved revenue streams are likely to increase the uptake of battery energy storage across Australia – providing vital system security functionality to the Australian electricity market as it transitions.

Liquidity of the contract cap market

We understand that a major concern of the AEMC in transitioning to five minute settlement intervals is the impact on the liquidity of the future caps market, as incumbent peaking generators aren't able to defend their caps.

Utility scale battery energy storage owners can act as appropriate counter-party in future cap markets. The technological capabilities outlined above demonstrate a clear ability to participate in 5 minute settlement market – and as such, ensure consistent energy supply, sufficient to defend caps sold.

We understand that Energy Edge has predicted a theoretical reduction in caps provided from peaking gas generators between 8% (CCGT technology) and 29% (OCGT technology) – totalling 625MW of potential capacity that will need to be substituted with alternative technologies.

Tesla believes that any increased roll-out of utility scale battery energy storage systems, as well as aggregated residential battery energy storage systems can be utilized within the cap market to hedge this risk of perceived reduced liquidity.

The speed of deployment of large scale capacity, in addition to the scalable nature of the technology, means that utility scale battery storage can manage this impact within short transition times.

Tesla looks forward to reading the draft rules published by AEMO and participating in the process going forward.

Kind regards

Mark Twidell

APAC Director – Energy Products

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[1] Dylan McConnell (Melbourne Institute of Energy), "Value of aligning dispatch and settlement", November 2016, available at http://www.climate-energy-college.net/files/site1/images/DM%20WP04.pdf

[2] Ibid

[3] Reposit Power, "5 minute settlement – Reposit's views on materiality", at http://www.aemc.gov.au/getattachment/adda88a2-e252-4126-a4a1-90986c2cf9dc/Reposit-presentation-Dean-Spaccavento.aspx