Dr Kerry Schott AO
Chair: Energy Security Board
Level 6, 201 Elizabeth St
Sydney NSW 2000

13 July 2018

Sent by email to: info@esb.org.au.

Dear Dr Schott,

National Energy Guarantee – draft detailed design document (Jun-18) – Tesla Submission

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide feedback to the Energy Security Board (ESB) on the National Energy Guarantee (NEG) Draft Detailed Design Consultation Paper (ESB Design Paper).

As a noted in our response to the previous ESB Consultation Paper, as a general rule, Tesla supports both a strong bi-partisan approach to emissions reduction, and policies designed to create long-term investment signals for flexible, dispatchable energy supply. Our response below is in line with this and in particular aims to highlight areas where we believe more could be done to support (or clarify the support/lack of penalty) for the flexible and reliable capabilities that storage can provide to the Australian community and electricity grid.

General position

Tesla's general positions on the ESB Design Paper are as follows.

- **We believe that the emission targets are not sufficient to drive the investment in renewable energy that is needed and realisable.**
    - Tesla's mission is to accelerate the transition to sustainable energy. As the National Energy Guarantee (NEG) is currently drafted, Tesla does not believe it will support new investment into the level of renewable energy generation and dispatchable technologies, such as battery energy storage, that is needed to transition to sustainable energy.

    - This draft of the NEG differs significantly from the Finkel Report's recommendation to create a Generator Reliability Obligation (GRO). Under the Finkel proposal, new energy generators would have been required to invest in new dispatchable energy capacity. By contrast, the current draft of the NEG only requires generators to purchase short-term qualifying contracts. Tesla does not believe this will drive new investment in technology to deliver new dispatchable energy capacity such as storage.

- **Treatment of Distributed Energy Resources (DER)**
    - Tesla has two key concerns with the approach proposed in the ESB Design Paper 1. Firstly, the proposal is disadvantageous to Australians who have invested in rooftop solar, because benefits of their generation accrue to their retailers rather than end customers. Secondly, the current approach devalues small scale battery storage, as only a user's net export is considered, rather than their total net self-consumption.
    - We recommend that the output of small scale assets is considered on a gross generation basis, so that households and other assets owners are fairly compensated for their contribution.

- **Clarity required on liability:**
    - Emissions Liability: Tesla supports the current treatment of owners of energy storage being liable for reporting on battery energy storage system (BESS) losses only. However, there are still a number of additional areas that need clarification, specifically in respect of who is the relevant market customer, and what the impact of reporting on BESS losses might have on that market customer. In our detailed submission that follows, we have highlighted example situations where the current drafting is unclear.
    - Reliability liability – we recommend that Scheduled Loads should be excluded from liability, as this would better align with the purposes of the NEG.

Stronger investment signals needed

Tesla believes that stronger investment signals are required if the National Energy Guarantee (NEG) intends to drive investment to better support long-term, reliable and sustainable energy supply.

The position taken in the NEG differs significantly from the recommendation of the Finkel to establish a Generator Reliability Obligation (GRO). In the opinion of Tesla, the GRO created far stronger investment signals for dispatchable energy, because it created a requirement for new dispatchable energy capacity, rather than for short-term, qualifying contracts.

Based on the proposed NEG design, Tesla does not believe that the reliability component will create any positive long-term investment signals for technology such as battery energy storage and will not drive new investment above business as usual.

Under the proposed NEG reliability mechanisms, an investment signal will only be created if the Australian Energy Market Operator (AEMO) predicts a regional gap based on unserved energy (USE) forecasts. If a reliability requirement is triggered, liable entities are required to enter into qualifying contracts to cover their share of system peak demand at the time of the reliability gap.

Since retailer liability will only capture peak energy periods, the qualifying contracts entered into are likely to be short term (a single quarter or short period of quarterly contracts).

Based on these factors, the amount of additional capacity (battery storage or otherwise) required to meet the reliability component in its current form is uncertain.

As such, the incentives created for new investment in technology such as large scale battery storage projects by the NEG would be marginal at best, and project developers looking to invest in new storage capacity would have little certainty.

This design should be compared with international schemes that have been very successful at creating long-term investment signals for battery storage. These include:

- South Korea, which provides a renewable energy certificate (REC) multiplier for utility scale solar and wind assets which add battery storage capacity to improve dispatchability; and
- California and Massachusetts, which set energy storage procurement targets for investor-owned utilities.

It can also be compared with the Finkel GRO proposal, which placed an obligation on new generators to ensure adequate dispatchable capacity would be present in all regions to ensure consumer demand for electricity is met.

Tesla notes also that the emissions reduction component of the proposed scheme would not result in any investment certainty for battery energy storage. It appears from the detailed design elements that any electricity exports from battery energy storage will not be reported in the emissions registry.

Tesla's detailed comments on specific design elements included in the ESB Design Paper are included in below. Ultimately, the treatment of both utility scale battery energy storage and distributed energy resources (DER) are still relatively unclear; further clarification is recommended in a number of areas.

For questions on any of the commentary provided below please contact Emma Fagan (efagan@tesla.com).

Yours Sincerely
Tesla Motors Australia P/L

Mark Twidell
Managing Director, Tesla Energy Products,

Key design element: Liable entities - emissions reduction

The emissions reduction requirement is an annual obligation on retailers and large customers who directly purchase electricity in the wholesale market (market customers).

Tesla comments:

Tesla notes and supports the position by the Energy Security Board (ESB) to exempt the first 50,000MWh of a market customer's load.

We also note the position taken in respect of grid-connected batteries in section 3.3.3 of the ESB Design Paper that for assets registered in the National Electricity Market (NEM) as both a scheduled load and a scheduled generator, generation will be netted against load, so that only net wholesale pool purchases are included in the market customer load.

We believe this is a positive step, and addresses several of the issues raised by Tesla in our response to the NEG Consultation Paper in April-18, specifically:

- BESS assets do not consume energy in the traditional sense – they time-shift electricity produced by other assets for customer consumption at a later time.
- Placing liability on the BESS operator as the market customer will result in a double count of the electricity discharged from that asset.

This position requires a market customer to only report on BESS losses, which effectively considers the net difference between electrons produced by other assets, and electrons later consumed by end use customers.

While this is a positive step from the ESB, there are still a number of unanswered questions in respect of the application of this requirement for BESS owners and operators, as well as for retailers. These issues are outlined in detail below in respect of the "Pool Generation and wholesale pool purchases" design element.

It will be critical for project developers to have a clear understanding of what liability, if any, applies to the BESS asset under their control. This will be necessary for reducing project risk and removing negative investment signals.

Key design element: Market customer load - pool generation and wholesale pool purchases

For grid-connected batteries that are registered in the NEM as both a scheduled load and scheduled generator, their generation will be netted against their load, such that only their net wholesale pool purchases are included in their market customer load.

Tesla comments:

As noted above, the position in the ESB Design Document in respect of the emissions reporting liability of BESS assets is not as simple as proposed. There are several areas which still require substantial clarification:

- there may be two market customers associated with the operation of a battery energy storage assets, and it's not clear how reporting should be managed on a practical basis (on a charging or discharging basis). Practical examples are provided below.
- It is unclear as to whether or not any electricity discharged from the BESS (total MWh) is considered for the purposes of the registry, or how electricity discharged from BESS assets is netted off by AEMO at the transmission node identifier.

- If BESS electricity discharge is to be considered within the register, it is unclear what emissions factor needs to be applied.

Grid connected batteries

Market customer liability

When the ESB talks about "grid-connected batteries" in the ESB Design Paper as well as in the relevant technical working papers, we assume it is a reference to a BESS asset that is registered under the appropriate AEMO requirements, behind a single point of connection.

As noted in Tesla's earlier submission to the ESB, under AEMO's interim guidance for battery storage registration[1], BESS assets are currently required to register as both a scheduled generator and a scheduled load. This means that each BESS asset is registered as a market customer. All electricity that is ultimately discharged from the BESS operating as a generation asset is also either purchased by a retailer or a contracted party. As a result there may be two market customers associated with the cycle of a BESS asset.

Example 1: Gentailer X owns and operates a 20MW/40MWh battery energy storage system which is registered as a both a scheduled generator and a scheduled load (as per the current AEMO requirements). The battery is fully charged and discharged once a day into the grid and has a 90% round-trip efficiency.

All electricity discharged is used to serve the energy load of Gentailer X's customer base. Over the course of a reporting year the net difference between the load and generation is 1460MWh. Under this example Gentailer X is both the market customer for the wholesale pool purchases to charge the battery storage system, as well as the market customer for the end use customers served by the discharge of electricity.

Example 2: Generator Y adds a 20MW/40MWh battery to their generation portfolio battery energy storage system which is registered as a both a scheduled generator and a schedule load (as per the current AEMO requirements). The battery is fully charged and discharged once a day into the grid and has a 90% round-trip efficiency and also has a yearly net difference of 1460MWh.

Generator Y has a PPA in place with Retailer A to sell the full output of the battery energy storage system. Under this example, Generator Y is the registered market customer with AEMO, and the market customer at the point of charge for the battery. Retailer A has ultimate responsibility for all electricity used following the discharge of the battery and is the market customer at the point of discharge.

Issues to clarify

Based on these examples there are still a number of key questions that remain unclear from a liability perspective:

- In the event that there are two market customers, which market customer is responsible for the reporting liability – is it required at the point of charge or discharge?

[1] https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Participant-information/New-participants/Interim-arrangements-Utility-Scale-Battery-Technology

- If the liability is applied at the point of charge, and we assume that the stated exemption of 50,000MWh per year applies equally in this case, under Example 2 Generator Y would only incur an emissions reporting liability once net losses reach more than 50,000MWh. If this is the case, it will be important to confirm if this would result in net efficiency losses from storage assets going unreported.
- If liability is ultimately provided at the point of discharge, and applied to retailers, is this treated as additional load that will need to be offset with registry contracts? For instance if Retailer A bears the final responsibility for reporting on 1000MWh worth of BESS losses in a reporting period, will these losses need to be covered with additional contracts for 1000MWh of generation.

Further clarification will also need to be given to AEMO's consideration of the pool generation of a BESS asset at the transmission node identifier. The BESS asset will be exporting this as a scheduled generator. In the proposed approach from the ESB, it will be important to confirm who will be responsible for netting out these exports – e.g. AEMO?

Tesla believes that it is the market customer at the point of charging the BESS asset that should bear the reporting responsibility, noting the 50,000MWh threshold. This provides the least risk option for investors as it does not create negative impacts for the BESS output.

We recommend that these issues are either clarified in the final NEG documentation, or within a separate technical guidance, as any ongoing policy uncertainty will have an impact on investment decision making.

Emissions intensity of BESS exports

The approach proposed in the ESB Design Paper implies that no electricity exported from the battery energy storage system as a generator will be recorded in the registry. If this is the case then total generation should be metred at the original source of generation at the transmission node identifier.

If our assessment above is correct, and no electricity output from the BESS asset is recorded in the register, then there is no need for an emissions factor to be applied. The emissions intensity of all electricity stored and later discharged from the BESS will be calculated at the point of generation, as per the requirements of the ESB Design Paper.

If this is not the position, then the ESB will need to consider an appropriate emissions factor for BESS assets that is not punitive.

Behind-the-meter batteries

Tesla also notes that the ESB has separately considered the treatment of BESS assets co-located with wind and/ or solar generation behind a single connection point, in their "Market Customer Load for the Emissions Reduction Requirement" Technical Paper[2].

As the ESB would be aware, AEMO is currently also considering the treatment of BESS assets co-located behind a single connection point, for the purposes of registration[3].

[2] http://www.coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/TWP%20-%20Market%20Customer%20Load%20-%20June%202018.pdf

[3] https://www.aemo.com.au/-/media/Files/Electricity/NEM/Participant_Information/Emerging-Generation/Emerging-Generation-and-Energy-Storage.pdf

For the foreseeable future, BESS assets will be required to register with AEMO as a separate asset. While there are a number of registration scenarios being explored by AEMO, all scenarios see BESS assets still registering separately with AEMO, for the purpose of dispatch. As such, both the BESS asset and the co-located wind and solar assets will still be required to be metered separately, even where co-located.

As a result, we would expect to be able to net out the metered data for co-located wind or solar assets for the purposes of the registry, rather than measuring pool generation data at the transmission node identifier.

This position is based on our assumption above, that no electricity discharged from the BESS is actually recorded in the registry, and that it is all allocated back to the original generation source.

Any ongoing work in this space should be managed in collaboration with AEMO to ensure alignment with the Emerging Generation work underway to ensure consistency in the treatment between registration and liability.

Key design element: Non-market embedded generation and solar PV

Rooftop and other small-scale solar PV will be captured by adding the net exports from PV installations to the relevant market customer's load and will also be automatically allocated to that market customer in the registry as zero emissions generation.

Tesla comments:

Tesla believes there are two broad issues associated with the approach for the treatment of small scale embedded generation proposed in the ESB Design Paper:

- It rewards the retailer for consumer behaviour rather than directly rewarding the consumers for the contribution they are making to the markets.
- It considers only net exports, rather than the total gross generation of the behind the meter generation.

The major issue with the approach, outlined in the ESB Design Paper, is that it provides no discernible benefit to end-use consumers who have made a substantial capital investment in their own embedded generation infrastructure, and disincentivises market customers from making their own investments in large-scale, low-emissions generation. Additional risks associated with the proposed approach are:

- It devalues small scale battery storage as only the net export is considered rather than the total net self-consumption. This does not seem in line with recent views from AEMO and the Energy Networks Association who suggest more control from both passive and active DER through their Open Energy Networks review.
- It lets consumers do the heavy lifting while retailers are only required to compensate their contribution through minimum feed in tariffs – which are not mandatory in all jurisdictions. The argument that customers already benefit through small scale certificates (STCs) is also inapplicable, as the value of STCs declines year on year towards zero.
- It unfairly benefits retailers operating in areas with low competition and high penetration of small scale solar.
- It disincentivises state renewable energy targets (like the VRET and the QRET) to include small scale embedded generation in their schemes through STCs or similar.

Tesla also notes that alternative options are explored by the ESB in the "Market Customer Load for the Emissions Reduction Requirement" Technical Paper[4].

Of the three options considered, Tesla believes that Option 1, which considers the gross generation of the behind the meter asset, is the best. This approach is aligned with the current renewable energy target and does not penalise customers who have installed a home BESS to improve their self-consumption.

Option 1 (Gross) model considers all generation from the solar system. This approach favours storage as it allows for time-shifting of solar PV generation to better serve the end-use consumers energy consumption patterns. This approach recognises the value of both consumption and export.

However, we also believe it is critical that retailers compensate asset owners for the contribution they are making to the reduction in their emissions profile. This can be managed through an annual deemed payment that would effectively act as a registry payment for small scale asset owners or by allowing owners to opt out of providing their contribution to their retailer and instead have the right to direct it elsewhere.

Key design element: Liable entities – reliability requirement

If the reliability requirement is triggered, then all retailers and large customers will need to assess their likely share of system peak demand and secure sufficient qualifying contracts, by the compliance date, to cover this. Large customers will have the option to have their reliability obligation managed by a retailer on their behalf. Large customers are those with historical peak demand of over 5 MW.

Tesla comments:

We note the additional liability consideration for reliability requirements for large customers (customers with a higher than 5MW peak demand).

Tesla believes that this reliability liability should not apply to Scheduled Loads.

By definition loads that can be scheduled do not contribute to peak demand, as they can be managed by AEMO. It also is not the intention of the NEG to place an obligation on the owners of generation assets, with no end-use customer base, to enter into qualifying contracts for firm energy.

This approach is also supported by the following reasons:

- While there are a number of market customers registered with AEMO to manage their wholesale liability, only a small number of these participants are also registered with AEMO as a Scheduled Load. Participants that are registered as a Scheduled Load include battery storage and pumped hydro stations. As these facilities are the types of facilities that the NEG is looking to create investment signals for from a reliability perspective, including a liability seems to go against the broader objectives of the NEG.
- Batteries are tied to specific renewable energy generation sources – or import from the grid during periods of low prices, with energy quantities and cost settled with AEMO at the end of each month. It appears to be difficult to see how this requirement could be assigned to a retailer.

4 http://www.coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/TWP%20-%20Market%20Customer%20Load%20-%20June%202018.pdf

- This approach also places reporting liability onto generation companies and battery storage operators who do not have a retail portfolio or directly consume this energy – we believe this is not the intention of the NEG.

Key design element: Reliability requirement – triggering the reliability requirement

If the reliability obligation is triggered, transparency, liquidity and competition issues would be addressed through a Market Liquidity Obligation and a trade repository and reporting approach. The Market Liquidity Obligation could be imposed on vertically integrated retailers with generation shares in gap regions over a certain threshold. These participants will be required to post bid and offer spreads for swaps in the region to cover the period of the forecast gap. These bids and offers will be provided through a centrally cleared platform and provide access to qualifying contracts. This will enhance competition through access to tradeable contracts. A trade repository and reporting approach would seek to capture additional transparency in areas of wholesale contracting that are currently opaque.

Tesla comments:

Several times the ESB Design Paper mentions that the reliability component of the NEG is designed to support investment in new capacity, such as energy storage:

- If a material reliability gap is identified in the forecasts, the market would be expected to react. This could take the form of investment in new capacity (for example, generation, transmission, storage or demand response) (pg. 6)
- The Guarantee will require retailers to contract with generation, storage or demand response so that… there is a minimum amount of dispatchable energy available to meet consumer and system needs" (pg. 12)
- The Guarantee will incentivise investment in low cost dispatchable resources, which may include intermittent renewables 'firming up' their capacity, for example by investing in storage. (pg. 13)

However, based on the proposed design, Tesla does not believe that the reliability component will create any positive **long-term** investment signals for battery energy storage, and will not drive new investment in storage technology beyond business as usual.

If the reliability component of the NEG is to be successful, we would expect that retailers are either required to enter into long-term contracts for firm supply, or generators are responsible for making up this shortfall – such as what was proposed by the GRO recommended by Finkel.