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650 Church St  
Cremorne, Victoria, 3121

Dr Kerry Schott AO  
Chair - Energy Security Board  
COAG – Energy Council

8 March 2019

**Re: Consultation on Draft Metrics for the Strategic Energy Plan**

Dear Kerry,

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the Energy Security Board (ESB) with feedback on its proposed metrics to track progress of the Strategic Energy Plan for the National Electricity Market (NEM).

Tesla supports the ESB's commitment towards a Strategic Energy Plan that can inform policy direction and provide clarity of direction to market bodies and market participants. The five high-level outcomes identified across affordability; system security; reliability; market competitiveness; and efficient network investment are each critical areas in themselves, and collectively form a useful long-term guide for the system as a whole.

Whilst not necessarily an outcome in its own right, facilitating (and tracking) 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. The central theme of this submission, therefore, is on how the ESB can refine and focus metrics to support the integration and participation of storage to achieve these outcomes, such as tracking:

- a) Deployment and forecast investment of storage (MW / MWh) by region**
- b) Extent to which fast response technology is able to participate and be rewarded in (existing / new) system security markets**
- c) Total electricity sector emissions**
- d) Progress towards implementing an appropriate non-network assessment framework**

More detailed comments on how the draft metrics can be enhanced to support these aims are included below. For further information on any of the points raised please contact Emma Fagan at [efagan@tesla.com](mailto:efagan@tesla.com) or Dev Tayal at [ataval@tesla.com](mailto:ataval@tesla.com) with any questions.

Kind regards

A handwritten signature in blue ink, appearing to read 'Mark Twidell'.

Mark Twidell  
APAC Director – Energy Products

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## 1. General Comments

As articulated by the Finkel Review blueprint, reinforced by AEMO's 2018 Integrated System Plan, and consistently advocated by senior Australian energy representatives<sup>1</sup> (across academia, industry, utilities and regulators), Australia's energy plan must prioritise additional energy storage, electricity transmission infrastructure and demand-response mechanisms, underpinned by supporting electricity-market reform that enables these technologies and fairly compensates for performance.

Future grid planning studies have often focused on facilitating higher renewable energy penetration levels (leveraging existing government subsidies for large-scale wind and solar); and/or on how to best manage the upcoming retirement of coal plants via replacement generation capacity and stronger transmission links.

However, as yet there are no overarching plans or direct mechanisms to support the integration of storage that will need to be deployed in parallel to contribute to both reliability and system security outcomes in the short term, and drive affordability and efficiency outcomes over the longer term (e.g. by providing an alternative to investment in network infrastructure, improving loss factors and reducing congestion, or enhancing market competition for energy and ancillary services). The ESB's Strategic Energy Plan can fill a key gap in this area, and aligning with its overall purpose, provide clarity of direction to market bodies and participants regarding the scale and speed of the future investment required.

### a) Deployment of Storage

If the ESB can embed a clear storage metric in support of the desired outcomes of the Strategic Energy Plan, this would then set the scene for tracking and progressing related market reforms and rule changes to unlock new value streams; create new markets; and provide alternative payment mechanisms to assist with the deployment of storage required (at both a utility and distributed scale).

Tesla notes the ESB's goal of defining metrics to be neutral "unless already proven to be addressing a clear long-term problem". We hope the ESB can recognise that energy storage embedded at strategic locations within the network (or 'behind the meter') has a key role to play in shaping Australia's future energy system that will lead to greater benefits for consumers across all five outcomes.

Aligning with the ESB's goal, it will be important to view any storage-related metrics from a technology-neutral perspective, whereby storage (be it pumped-hydro; grid-scale battery energy storage; distributed energy resources; or other developing technologies) can complement the ongoing investments in new generation capacity and network infrastructure, as well as support the integration of demand response.

### b) Enabling Participation and Rewarding System Security Benefits

Tesla notes the 5-year time horizon over which the Strategic Energy Plan will cover. Whilst longer term policy direction is valuable, the ESB must also recognise the speed of market integration required to extract full value from new technologies, many of which are already transforming market processes and network requirements (e.g. AEMO's Virtual Power Plant demonstrations<sup>2</sup> and call for more storage, smart inverters and management systems<sup>3</sup>).

In particular, the existing metrics for demand response and DER are only considering load-side participation. To provide appropriate direction within the Strategic Energy Plan, DER and demand-side measures must track the ability for both load and generation side participation, and also ensure DER assets can be optimised across both energy and ancillary service markets to maximise market efficiency. This will align with the AEMO and Energy Networks Australia (ENA) ongoing work program through its Open Energy Networks.

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<sup>1</sup> ANU Renewable Energy Workshop: <http://re100.eng.anu.edu.au/news/2019-02-19.php>

<sup>2</sup> AEMO VPP trials: [www.aemo.com.au/Electricity/National-Electricity-Market-NEM/DER-program/Virtual-Power-Plant-Demonstrations](http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/DER-program/Virtual-Power-Plant-Demonstrations)

<sup>3</sup> <https://www.afr.com/business/energy/solar-energy/aemo-chief-wants-smarter-coordination-of-rooftop-solar-20190219-h1bfnj>

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### **c) Emissions Reduction**

A strong and direct measure for low emission outcomes should be central to any Strategic Energy Plan, and we recommend this be separated out from the broader reliability metrics as currently drafted to provide the support and investment certainty required for low-emission energy technologies. This could also measure the emissions of the electricity sector as a proportion of national emissions.

### **d) Appropriate Network Investment Frameworks**

Similar to the commendable work the COAG Energy Council and ESB have initiated with the AER on expediting RIT-T processes, it will be useful to consider how the full value streams can be unlocked for 'non-traditional' sources of generation and network services in the immediate term (e.g. by tracking related metrics over the next 2 years), where there are clear market barriers currently preventing uptake. This will ensure true efficiency across the NEM's infrastructure requirements (more broadly than just network investments), whilst also improving loss factors, power quality and system security.

A key aspect of this will be reviewing the appropriateness of existing network investment frameworks (i.e. the RIT-T/D). If it continues to be the case that non-network solutions are all un-successful through these existing processes, then a review on market benefit/cost definitions may be warranted (e.g. to recognise the additional value streams being provided by storage to the benefit of the wider market). A broader review on the assessment frameworks may also be required to address existing biases towards traditional capital investments in the network, noting that alternative models have already proven successful in other markets, such as California's Transmission Economic Assessment Methodology<sup>4</sup>.

Specific feedback on the ESB's draft evaluation metrics are included in section 2 below.

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<sup>4</sup> CAISO: [http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology-Nov2\\_2017.pdf](http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology-Nov2_2017.pdf)

## 2. Feedback on Draft Metrics

The following table extracts relevant metrics that can be refined to include quantitative measures for energy storage. New metrics are outlined in **red**:

| Existing Draft Metric                                                                                                                                        | Tesla Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <b>OUTCOME 1: AFFORDABLE ENERGY AND SATISFIED CONSUMERS</b>                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Consumers are empowered to manage their demand and can access distributed energy and energy efficiency solutions                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>% customers with smart meters</b>                                                                                                                         | <p>As seen in Victoria, knowing the % of customers with smart meters is not particularly useful in and of itself, particularly if there is no plan for what to do with the smart meter data. This should be expanded as a metric to include:</p> <p>% of customers with smart meters;</p> <p><b>% of customers with DER</b> (based on the Clean Energy Regulator / AEMO DER register); and</p> <p><b>% of DER customers with smart inverter technologies</b> (e.g. batteries, load control devices, home energy management systems)</p> <p>This would give greater indication of the extent to which consumers can access demand / generation management technologies, and more accurately reflect the utilisation of rooftop solar to provide grid services. This will also future-proof the metric - as the ESB itself notes – “smart meter technology could be leap-frogged”.</p>                                                                                                                                                                                                                                                                                                                    |
| <b>Ratio of demand response MWs available/annual peak demand</b>                                                                                             | <p>We recognise the intention to capture consumer participation in demand response, but this first requires appropriate frameworks to enable full participation. As noted demand response as a metric only considers load-side participation and will be increasingly irrelevant to 2025 and beyond as we view resources from a bidirectional perspective. The market is rapidly seeing the convergence between demand response and aggregation of behind the meter generation and storage – e.g. through Virtual Power Plants (VPP).</p> <p>In addition, the ESB should explore how to optimise bidirectional resources for both energy (for load and generation-side participation) and system security services being provided. As currently framed, this metric would not capture these potential benefits.</p> <p>Recommend expanding the metric to consider:</p> <p><b>Ratio of DER MWs response available/annual peak demand</b> (e.g. through demand response mechanisms or aggregated generation platforms – VPPs; accounting for all bi-directional energy flows); and</p> <p><b>Ratio of DER MWs response that can provide system security services/Total DER MWs response available</b></p> |
| Vulnerable consumers are on suitable pricing plans, receiving concessions when needed, and can benefit from distributed energy and energy efficiency schemes |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>% public housing with access to energy efficiency, solar and/or storage programs</b>                                                                      | <p>Agree with intention to “engage with relevant portfolio areas including housing, and with state, territory and local governments, to identify ways to improve access to DER and energy efficiency for low income households”.</p> <p>Will be useful to break-out into sub-categories (% breakdown across energy efficiency; solar; and storage) to provide indication of what energy solutions and schemes are being taken up – as the greatest benefits to vulnerable consumers will be from accessing all solutions in combination, and historically many state, territory and local government schemes have not included access to storage solutions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>OUTCOME 2: SECURE ELECTRICITY AND GAS SYSTEM</b>                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Markets operate safely, securely and efficiently, under full range of operating conditions, with minimal intervention                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Number and nature of electricity supply interruptions due to system security concerns**

This metric could be expanded to 'include credible and non-credible contingency events' that do not necessarily lead to supply interruptions but have been resolved by targeted generator or load response. This would highlight the benefits of fast response frequency and voltage services being provided by market participants, as well as track underlying variability in key system security indicators such as frequency.

It will also be important to include ongoing reviews of the efficiency of these markets to deliver secure market outcomes going forward, to ensure low-cost, high quality service provision is being incentivised and rewarded.

**Number, duration and reason for electricity system interventions by AEMO in each NEM-region**

As noted by ESB under its 'value of system security markets' metric – system security markets are “expected to become more important as the proportion of synchronous generation decreases in the NEM”. Similar to comments above, an additional/sub-metric could monitor level of frequency control that AEMO has (e.g. excursions outside of normal operating band) given expectations on degradation of NEM frequency and increasing variability going forward.

### OUTCOME 3: RELIABLE AND LOW EMISSIONS ELECTRICITY AND GAS SUPPLY

Investors efficiently manage risk to support investment, operation, retirement and innovation decisions

**Committed investment in electricity generation capacity by region and forecast supply adequacy**

To be more instructive as a (leading) metric this could also consider the extent to which the forecast capacity is non-scheduled or able provide flexible response, relative to grid requirements (e.g. **Ratio of scheduled / non-scheduled generation; or ratio of storage / renewables**). This will also need to accommodate any process the Government may follow as part of setting or expanding targets (e.g. renewable energy target / emissions reduction target) and can tie in with the recommended metric on storage, below.

The additional regional reliability input to consider is loss-factors – **tracking marginal loss factors by region** will provide a useful metric for investors to manage future decisions.

#### NEW METRIC

**Deployment of storage (MW / MWh) by region (and forecast investment)**

Related to above, a focused storage metric tracking deployment levels required for reliability and system security (in the short term) and to drive affordability and efficiency over the longer term, will provide market participants with investment certainty, and market bodies with direction on the scale and speed of the future investment required.

This metric can then support tracking and progressing related market reforms and rule changes required to unlock new value streams; create new markets; and provide alternative payment mechanisms to assist with the deployment of storage required (at both a utility and distributed scale).

#### NEW METRIC

**Total electricity sector emissions**

Separating out the 'low emission' objective as an independent outcome will ensure appropriate direction is provided to the market on driving low-emission technology solutions. This should be underpinned by a dedicated emissions metric and supported through a direct reference to reducing emissions in the National Electricity Law / National Electricity Objective via a rule change.

### OUTCOME 4: EFFECTIVE DEVELOPMENT OF OPEN AND COMPETITIVE MARKETS

Wholesale and retail markets are competitive and deliver efficient outcomes for consumers

**Extent to which competition in the wholesale electricity and gas markets is identified as an issue by the AER.**

Potential to expand this to also include FCAS market competition – noting the ability for emerging technologies to drive lower price bidding behaviour in a typically concentrated market. Alternatively this could be combined with metric below on 'value of system security markets'.

Innovation is incentivised and enables value from new technologies

**Value of system security markets (e.g. FCAS)**

Expand to consider '**volatility of system security markets**'

Data points on spread/median/max/min will also be valuable as it is not just the size and value of the market but its inherent volatility that both drives incentives and creates barriers for new service providers.

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| <p><b>NEW METRIC</b></p> <p><i>Extent to which fast response technology is able to participate and be rewarded in system security markets</i></p> | <p>It is not just the value of existing system security markets but the potential value offered through new markets that will be instrumental to incentivise new technologies and faster/more accurate services going forward. This metric should be flexible to recognise that currently barriers exist but there is increasing potential for new markets/services to be introduced (e.g. fast frequency response; primary frequency control; inertial services).</p>                   |
| <p><i>Proportion of energy and system security services provided by DR and DER</i></p>                                                            | <p>Should also be expanded to more generally consider <b>proportion of system security services provided by utility-scale renewables and storage</b> – both individually and combined as hybrid projects – as barriers in market registration and participation still exist at the utility-scale for non-traditional technologies.</p>                                                                                                                                                   |
| <p><i>Number of projects, amount of RD&amp;D funding by governments</i></p>                                                                       | <p>Could also include <b>proportion of network services</b> (e.g. voltage regulation).<br/>         Agree with proposal to focus on energy system initiatives only (e.g. excluding hydrogen export industry expenditure)</p>                                                                                                                                                                                                                                                             |
| <p><b>OUTCOME 5: EFFICIENT AND TIMELY INVESTMENT IN NETWORKS</b></p> <p>Investment solutions are optimal across all resources</p>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p><i>Extent to which congestion is being examined through RIT-T/Ds</i></p>                                                                       | <p>As recognised in the ESB notes, this can be adapted/merged with other metrics but should also <b>track how congestion is being managed via non-network solutions</b> (i.e. via additional local generation, demand management initiatives, or strategically located storage). Tracking how many non-network solutions are successful through a RIT-T/D process is also an indicator of efficiency/innovation- see point below.</p>                                                    |
| <p><b>NEW METRIC</b></p> <p><i>Progress towards implementing efficient non-network assessment framework</i></p>                                   | <p>There is a more fundamental metric required - to assess whether RIT-T/D frameworks are/will be appropriate going forward. If it continues to be the case that non-network solutions are all un-successful through existing network assessment processes, then a review on market benefit/cost definitions may be warranted, or a broad review on alternative assessment frameworks may be required to address inherent biases towards traditional network capex.</p>                  |
| <p>Networks incentivised to be efficient platforms for energy services</p>                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p><i>Extent to which DER is able to participate in relevant markets – wholesale, ancillary services, deferral in network investment</i></p>      | <p>Beyond a purely qualitative discussion of barriers to DER participation, this metric could track the progress and implementation of relevant rule changes and market reforms proposed to address these barriers directly, with the ultimate objective of providing full access to all wholesale and ancillary service markets (across both utility-scale and DER), and with the metric including the ability for utility scale non-network solutions to defer network investment.</p> |
| <p><i>Progress towards implementing a DER coordination framework</i></p>                                                                          | <p>As above, beyond a high-level assessment of the Open Energy Networks work program, a record of targeted market or technical rule changes and market reforms should be tracked to inform progress.</p>                                                                                                                                                                                                                                                                                 |

### **3. Conclusion**

Tesla supports all ongoing work undertaken by market bodies alongside the ESB to provide clear direction as Australia's electricity system undergoes a significant transformation.

With substantial levels of investment still to come to drive the integration of new generation, transmission and energy storage (as highlighted in AEMO's Integrated System Plan), Tesla encourages a series of metrics that will maintain focus and track progress against the broader Strategic Energy Plan and in particular consider the future requirements and participation of emerging technologies such as utility-scale and distributed storage systems.

Tesla welcomes the opportunity to continue to engage with the ESB as this work progresses, to ensure the immediate reforms and market rule changes being developed at a working level are aligned and tracked against the longer-term vision for the grid and market in the decades to come.