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Anna Collyer
Chair
Energy Security Board

25/07/2022

RE: Energy Security Board – Capacity Market - Design Paper

Dear Anna,

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the Energy Security Board (ESB) with feedback on its Capacity Market – Design Paper. As a global leader in clean energy products and the largest provider of battery storage systems across Australia, we remain focused on creating a fit for purpose market design that can support our mission to accelerate the transition to sustainable energy. We are highly motivated to continue our engagement across all reforms being progressed by the ESB, including through the detailed design process that will ultimately finalise the form of capacity mechanism best suited for the NEM.

As the ESB progresses towards its final recommendation to Ministers by Q1 of 2023, it should use the next few months as an opportunity to ensure the NEM is a future-focused market that facilitates investment in new technologies that collectively support a zero-emission energy future – at both grid and DER scale. Rather than look to extend the role of large thermal generators or expand the scope of government interventions, the ESB can strengthen incentives for the characteristics required to complement a high-renewables-based system, namely fast response, flexible capacity and energy storage.

As noted in the latest Australian Energy Market Operator (AEMO) Integrated System Plan (ISP) ~14GW of coal generation is expected to retire by 2030, with ~19GW of additional storage (including behind the meter stationary storage and electric vehicles) expected to come online to achieve the optimal and most efficient Australian energy mix. This level of storage will be critical to tripling the new wind and solar capacity coming online by 2030 and achieving an 82% renewable energy mix.

As the ESB rightly notes, almost all recently built dispatchable capacity (battery storage, pumped hydro energy storage (PHES) and gas) have had some form of out-of-market incentives – funding through ARENA, state government policy schemes and other ad-hoc state government funding sources). This highlights the role that a new mechanism could play in supporting the uptake of the significant dispatchable capacity that needs to be built in the next 7.5 years (or 90 months) – be it a well-designed capacity mechanism, a well-designed storage target, or alternative methods of procuring smart, flexible, dispatchable capacity.

However, it is critical that any new mechanism is designed in such a way that it avoids locking in high-emissions, fossil fuel capacity; as well as reducing general gold-plating of capacity, which in turn drives up costs for energy consumers.

Within this context, we have concerns with how the ESB has structured the capacity market design in its latest Design Paper. The Design Paper appears to be looking at a capacity market as a mechanism that could solve several related, but still distinct, issues that currently exist in the energy market 1. Orderly retirement of coal capacity; 2. Incentives for new-build dispatchable capacity; and 3. Ensuring that there is enough capacity during reserve and non-credible contingency events (such as the recent energy crisis). Our concern is that a capacity market may not be the most appropriate mechanism to address all of these issues and it would be better for the ESB to consider each issue separately.

Tesla's key priority is considering the role that a well-designed capacity mechanism may play in creating a more optimal incentive framework for new, zero-emissions dispatchable capacity – point 2 above. We recognise that the current Design Paper is high-level by design, and that there is significant work still to be done on design in the following months, however Tesla makes the following early recommendations on critical elements that should be considered in the design of a capacity mechanism as best design principles:

1. **The orderly exit of coal should be decoupled from a capacity mechanism** – including existing coal generation within the capacity mechanism coverage will prolong the participation of coal plants, discourage and dampen signals for new capacity until after it is required, significantly increase consumer costs, and lead to the mechanism failing in its primary objectives including increasing reliability and being consistent with state emissions reduction goals
2. **Inclusion of emissions** – at the moment the Design Paper includes only a passing reference to emissions reduction objectives and the need for 'further guidance regarding Ministerial preferences' to align with state targets. Emission reduction should be a core principle and form an explicit design criterion from the outset (as is the case in EU capacity markets). There are several ways that this could be considered including the integration of emissions in the national electricity objective (NEO) or developing an industry wide emissions threshold through updates to the Safeguard Mechanism. Developing a mechanism that is "technology agnostic" should not mean that it is also "emissions agnostic".
3. **Treatment of new and existing capacity –** as noted by the ESB the requirements for new and existing capacity are different and there needs to be a nuanced approach in creating the right investment signals for new capacity without creating adverse commercial impacts for existing capacity. The ESB should look to create market design straw models for both limiting a capacity mechanism for new capacity only (zero or low emissions) or for including both existing and new capacity.
4. **Scale-neutrality -** with the high-penetration of residential customer energy resources in Australia, the ESB needs to be leading the way internationally in a fit-for-purpose design of a capacity mechanism that includes distributed energy resources and properly incentivises residential customers for the use of their assets within a capacity mechanism or alternative. This is particularly important if the capacity mechanism results in a decrease in the energy market price cap that currently incentivises demand response.

There are a number of other design features that will also be critical to the design of a capacity mechanism and will need careful consideration as they are developed over the next 12 months, including both the design of de-rating factors for different technology types and the design of performance guarantees and the compliance regime.

Tesla will continue to engage both at a detailed design level and on a structural level to ensure that a capacity mechanism or any alternative is well set-up for incentivizing new capacity. We look forward to continuing to work on the design for a capacity mechanism that drives investment in 19GW of new storage required by 2030 and does not prolong the life of existing high-emissions, fossil fuel generation assets.

For more information on any of the content included in this submission please contact the Tesla Energy Policy team at Energypolicyau@tesla.com.

Kind regards

Tesla Energy Policy Team

Inclusion of emissions needs to be embedded as a critical design element – rather than a generalized ambition

As noted, a critical metric for success of capacity mechanisms in properly incentivizing dispatchable, zero emissions technology is the presence of emissions thresholds. These can take the form of emissions thresholds applied to individual assets at a generator level, or cumulative sector-wide emissions target that could be introduced through amendments to the Safeguard Mechanism or through an alternative mechanism. Whichever way it is developed the inclusion of emissions will be critical to achieving an 82% renewable energy mix by 2030.

At a minimum, an emissions threshold should exclude participation from coal generation assets in a capacity mechanism from the outset. Tesla believes that the orderly retirement of coal generation is best dealt with outside of a capacity mechanism (see following section), and excluding coal under a NEM wide design approach will:

- Send a clear signal to the market that the focus of a capacity mechanism is focused on incentivizing new-build, zero emissions, dispatchable capacity to support a predominantly renewable energy generation mix by 2030; and
- Avoid derogation risks of each State Government introducing their own carve-outs based on generation technology type, which could result in disproportionate capacity between the States resulting in system security issues.

Noting that a number of states have already been vocal about excluding coal, introducing this as a key design element will also provide greater legitimacy to a capacity mechanism more broadly, and provide industry with confidence that it is something that can be effectively deployed in a uniform way across the NEM.

There are a number of options for how emissions may be included as a core design principle including development of a NEM wide, generator-based emissions threshold, with some flexibility for the states in their integration of such emissions threshold. This approach is similar to the work being done in the EU in respect of capacity market development with the EU Market Design Regulation on Capacity Markets[1]. A similar approach could be taken in Australia with the inclusion of emissions in the national electricity objective (NEO). As an alternative, emissions could be managed through a cumulative, industry wide emissions cap, with thresholds introduced per AEMO's Integrated System Plan (ISP) step change scenario with a view to achieving 82% renewable energy by 2030.

A common feature of capacity markets that have been successful in driving new build capacity, rather than incentivizing incumbent generation, is the presence of emissions thresholds. To call out some international examples:

- Spain (currently under design) is proposing a 0gCO2e/kWh requirement for new build capacity and a <330-550gCO2e/kWh threshold for all other plant.
- The EU Market Design Regulation on Capacity Markets, more broadly, sets a <330-550gCO2e/kWh threshold requirement for capacity market design in all jurisdictions. This has flowed down to other jurisdictions such as Poland[2]
- California has a electricity sector industry emissions cap.

Tesla's concerns with design proposed by ESB in the Design Paper, is that it appears to have mimicked typical design elements of capacity mechanisms used in the past – without any emissions thresholds, instead of looking to the NEM's future and ensuring a tailored mechanism for what is needed to drive sustainable investment in Australia for the decades to come. This risks rewarding incumbent generators with high-fuel cost exposure and high emissions, at the expense of new renewables and energy storage.

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[1] https://ec.europa.eu/commission/presscorner/detail/en/IP_19_1836
[2] https://www.iea.org/policies/12654-emissions-limit-on-the-capacity-market-regulations

De-coupling Coal from Capacity Mechanisms

Notwithstanding the above points on the need for the inclusion of emissions thresholds, for avoidance of doubt, Tesla does not believe that a capacity mechanism in any form is an appropriate tool to enable the orderly exit of coal generation.

The ESB needs to decouple the orderly exit plan for coal from its design of a fit for purpose mechanism to incentivise new capacity for the NEM. As it stands in the Design Paper, attempting to address both issues into one proposed solution will result in sub-optimal outcomes.

Tesla has concerns with the approach that the ESB has taken in the Design Paper in respect of determining eligibility. On the one hand the ESB seeks to *"avoid over-building new capacity before required"* (Justification 2), whilst on the other the mechanism must *"discourage premature exit"* (Justification 3). But these are two sides of the same coin. If existing coal capacity is adequately incentivised to be available and provide transparent, long-lead retirement schedules (with sufficient incentives/penalties to stick to them), then the level and timing of new capacity required will be known, and a targeted capacity mechanism auction can procure sufficient replacement MW volumes accordingly, and before coal-stations close on a case-by-case basis.

To attempt to broaden the capacity mechanism to include these same coal plants risks prolonging and distorting their retirement plans (or at a minimum increases investor uncertainty), which will dampen signals for new capacity and risk delaying its entry into the market until after it is required, which means the mechanism fails in its primary purpose - to reduce costs and increase reliability. (n.b. this is another risk asymmetry: over-building new capacity before it is required is not as significant a reliability and system security risk in the same way as having it arrive too late).

The ESB also notes that paying to keep an existing generator in market is cheaper than investing in new capacity. This is only true if all generators are assumed to be equal. As we saw in mid-June 2022, they are not, and many factors come into play when considering fuel costs, fuel availability, bidding behaviours, emissions profiles, network location, maintenance schedules, risk of shut-down, ramp rates etc.

As the ESB recognises, the NEM has historically been (and remains) largely reliant on old, emissions intensive coal plants. However, there are reliability, economic and environmental drivers that are accelerating the requirement for new, flexible, dispatchable capacity. This is well represented by AEMO's step change scenario MW data, visualized as a snapshot of GW changes in capacity by technology type below:

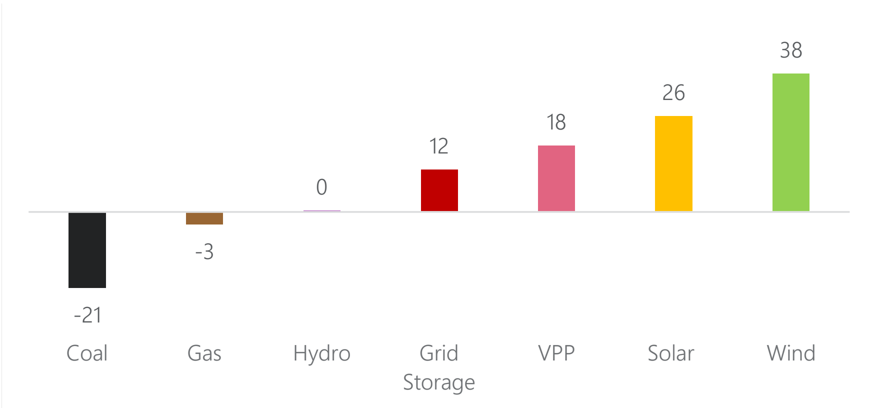

Figure 3: Forecast change in capacity mix 2023 - 2040 (GW)

Source: AEMO 2022 Final ISP

The NEM's energy transition is, by definition, a transition away from coal to wind, solar and storage – and therefore is inherently not going to be 'technology neutral'. Including existing coal generation risks delaying the transition, by dampening the signals for new build capacity, and creating further uncertainties in timelines for closure of existing plant. From a design perspective, the focus of the Capacity Mechanism design needs to be on the ~50GW of new dispatchable capacity required over the next 30 years.

While we do not believe that coal capacity should be included in the design of a capacity mechanism, we recognise that the orderly exit of coal generation from the NEM will be critical to ensuring long-term, ongoing energy security and reliability.

We encourage the ESB to consider alternative mechanisms that can directly address the risk of premature and disorderly exit of coal. The simplest, most effective and most demonstrated method has already been progressed by State Governments (e.g. Vic and NSW) – in the form of a bilateral contract with coal owners to provide certainty on closure dates. This already allows the ESB's capacity mechanism design to focus on the future, which could build on the work the ESB is already undertaking –

> *"the ESB has provided advice to Energy Ministers on the design of orderly exit management contracts (OEMCs) to support bilateral arrangements between jurisdictions and exiting generators, consistent with Ministers' agreement on the Post-2025 reforms. To the extent that jurisdictions rule out particular incumbent types from participating in the capacity mechanism, OEMCs provide an alternative way of ensuring a managed transition. The ESB will consider the implications of these on capacity mechanism design, and vice versa."*

The perceived risk of disorderly coal exists may be higher than the real risk, given that of the NEM's 19 remaining coal plants, most are either government owned, or owned by the major gentailers (AGL, Origin, EA) who are already planning portfolio level replacement through new renewables and GW-scale battery systems on/near the coal sites and/or have progressed bilateral contract discussions with state-governments to provide additional certainty on retirement timeframes and operating support required. This leaves only a small number private owners of coal plants that may require OEMCs or other direct agreements in place to manage the risk of early exit, and highlights the inefficiency of re-structing the entire NEM to account for what is in practice a focused risk management exercise.

To include old coal generators in scope is counter to the overarching emission reduction criteria set by Ministers and is incompatible with emissions reduction targets set by all state governments. It also does little to address the market power risk that the ESB has identified, with the NEM's thermal Generators concentrated amongst a limited set of participants. Accordingly, Tesla does not support the introduction of any mechanism that would artificially extend the life of existing thermal Generators. We urge the ESB to reduce the scope of the proposed capacity mechanism design to allow payments only to new (or new and existing) low-emissions capacity. This mechanism could then be complemented by the host of additional reforms being considered for orderly exit management as outlined above.

Inclusion of existing capacity versus limiting participation to new-build capacity

Tesla recognises that this is one of the most critical design points to be addressed: whether a capacity mechanism includes existing capacity or is limited to new build capacity only. The ESB Design Paper acknowledges the commercial differences of new-build versus existing plant (i.e. the challenges associated with raising debt financing) versus the sunk costs associated with new-build plant, but also assumes that the mechanism will be open for all capacity to bid into the auctions.

Where all capacity is included, international capacity mechanisms manage the commercial differences between new-build and existing capacity by offering differing contract lengths to provide greater investment certainty for new build capacity. Conversely limiting a capacity mechanism to new build capacity provides a genuine opportunity for it to be used as a targeted capacity mechanism to address the inadequate investment signals for new dispatchable capacity (such as storage) and replace the ad-hoc state and ARENA funding sources that have been deployed in the absence of a national mechanism. Limiting to new capacity would have the added benefit of potentially being developed with limited interference with the structure of the existing energy only market, particularly the market price cap.

Tesla suggests that the ESB should develop a more detailed strawman design looking at both options: firstly limiting the mechanism to new-build capacity only; and secondly Including existing capacity (outside of existing coal generation for the reasons included above).

More detailed straw-man design should provide more detail on the contract length and terms for different capacity types (new vs existing) and provide a lot more detail on the associated impacts on the existing energy market operation and market price gap. Providing a more detailed strawman will enable industry to adequately assess whether a capacity mechanism will drive investment in new build capacity, and whether it will create a non-commercial operating environment for existing capacity, increasing the risk of AEMO intervention events such witnessed with the recent energy crisis.

Other critical design parameters

Scale-neutrality

A key point in the design of any capacity mechanism will be scale neutrality. Tesla has been a leader in developing Virtual Power Plants (VPPs) in Australia over the last five years, and currently has 21MW of capacity registered with the Australian Energy Market Operator (AEMO) for the purpose of providing frequency services. This will also be increasingly important with the constantly increasing EV charging load in the NEM, and incentivising a price response for this highly controllable load.

A key lesson in market reform for VPPs is that it may not be enough to create a “one-size-fits-all” set of parameters for assets of all scales to participate in a capacity mechanism. Consideration may need to be given for alternative parameters for the aggregation of small-scale, customer owned resources. It will be important for the ESB Distributed Energy workstream to work in parallel with the capacity mechanism design when it comes to the development of how orchestrated DER (home storage and controllable EV charging load) can be incentivised through a capacity mechanism.

De-rating

We note the ESB’s high level discussion on the need to de-rate capacity across different technology types. Whilst the need and influence of these parameters will be inherently linked to the overarching capacity mechanism progressed, we agree that accreditation is an incredibly sensitive issue for all technology types and can ‘make or break’ the entire efficiency of a capacity scheme. Getting it wrong can either completely restrict the participation of particular technologies or create overly generous incentives for its participation.

De-rating is one of the biggest design elements that will determine how effective a capacity mechanism is in incentivising new-build capacity. The de-rate element should be designed in a way that fully recognises the unique capability of each technology class. For example, for battery storage capacity, rewards must value the fast and accurate response, flexibility to stack services, full swing from generator to load, and ability to address all peak reliability events.

Conversely, new obligations placed on storage participating in capacity markets should not simply mirror existing thermal plant that may have lower performance capabilities and should reward participants based on the actual service provided when it is needed, recognising new technologies can act differently (to the benefit of consumers and system operators).

Other

We support the ESB progressing the design for a future NEM that will be very dynamic and have rapid fluctuations on demand and supply side as renewable energy penetration (both sides of the meter) increases.

Other high-level considerations for capacity accreditation are included below, based on our experience supporting the assessment, detailed design and development of similar market reforms globally:

- Depending on the final procurement approach, additional flexibility in capacity accreditation will be required to future proof against known and unknown reforms (e.g. new spot markets or other network service markets).
- Capacity accreditation should be based on expected output. We only support a de-rate approach so long as de-rate factors do not artificially penalise storage relative to incumbent thermal plant and/or introduce extra barriers (e.g requiring unnecessarily long run times greater than 4 hours delivers minimal market benefit but imposes huge penalty and can exclude entire asset classes, noting most system stress events are less than 4 hours).
- It is worth ESB considering the value provided when storage acts as a load (i.e. charging from the grid), as it may actually be providing a system benefit at times of high generation and low demand. This could include additional payments to storage when it is charging at the 'right' time, and aligns with the workstream exploring congestion management that is seeking to incentivise additional dynamic loads on the system.

On compliance and obligations – the design should recognise and reflect that the primary purpose of a capacity mechanism is for meeting reliability criterion and addressing resource adequacy over the long term. It should not be designed to address unplanned contingency events (e.g. trips of generation/network) on an interval basis – as that is what contingency markets are for. There is no need to overlap on objectives or tie obligations or penalties to try and restrict operations for these other purposes.

A capacity mechanism should not be considered as a single solution to manage all of the structural design and emerging NEM issues

As a final key point, Tesla believes that the capacity mechanism does not need to solve for all market issues. The ESB has discussed a number of separate and distinct issues that are looking to be addressed, which includes:

a) insurance for unknown unknowns - e.g. the June market 'crisis' and market suspension

b) the lack of investment signals for firming technologies - e.g. achieving over 50GW of storage by 2050

c) the risk of premature and disorderly exit of coal plant, and

d) other current and future market issues – e.g. appropriately incentivising 'active' distributed solar and storage.

We commend the ESB for attempting to solve these multiple problems through a single mechanism - but this is too important an issue and too complex to attempt to create a theoretical silver bullet solution that in practice becomes so diluted and conflicted that it fails to address any objective successfully. Each of these items deserves to be considered separately and it may be that multiple mechanisms are needed.

Tesla's primary focus is on whether the current design of a capacity mechanism is likely to incentivise new-build, zero emissions capacity, as we consider this to be the most critical objective that any form of capacity mechanism needs to achieve over the next seven years to 2030.

The key risk to achieving this outcome is that without any emissions criteria or exclusion of coal, investment signals for new technologies are diluted and investment uncertainty is increased, with a high opportunity cost (passed through to consumers) from payments going to existing coal plants paid to extend their life at the expense of bringing on new, replacement capacity.

As noted in detail above, Tesla does not believe that coal generation should be included, and believes that the orderly retirement of coal capacity is best dealt with via alternative mechanisms.

In respect of the other priorities (a), (b) and (d) above, the ESB should consider whether a capacity mechanism provides an optimal solution for resolving all of these issues. There are a number of alternatives that have been put forward and not considered with the same level of detail as the capacity mechanism, that could provide a complementary solution or an alternative to addressing the issues above, and are worth exploring in more detail

These include:

- A stand-alone "Energy Storage Target". A High-level scheme design has been well documented by the VEPC[3] and Tesla supports the central elements of the proposal,
- An enhanced Renewable Energy Target (RET) for new renewable investments – noting that the current structure of the capacity mechanism, and the approach to de-rating will do little to incentivise new renewable capacity, and/or
- The introduction and/ or role of a Strategic Operating Reserve

Each of these alternatives warrants further consideration in respect of the key problems that the ESB is trying to solve through the introduction of a capacity mechanism. It may be that a combination of multiple solutions is needed to ensure the long-term reliability of the NEM while supporting the transition to 82% renewable energy by 2030.

Tesla encourages the ESB to consider the best mix of mechanisms that:

- provides a clear signal to value capacity that best supports the needs of the NEM
- complements existing energy only market design and well-functioning markets for financial contracts, and other reforms in development (and avoids duplication of costs to secure reliability)
- ensures consumers only pay for new capacity that requires support to bridge financing gaps (which could be further minimised through a 'revenue guarantee' style arrangement), rather than double-paying for existing capacity that is already in market (and typically less reliable, with higher emissions intensity)
- minimises regulatory burden for market participants – as NEM dispatch and market price settings would effectively remain in place
- maximises the advantages and flexibility of new technology – e.g. participation of storage (both grid scale and aggregated DER) could be through 'partitioning' of its MW and MWh to ensure even if the asset(s) have reserved capacity for system stress events, the rest of the unit does not sit idle and can actively participate in the market.

Lessons from other markets

Whilst the NEM is unique, the proposed high-level design of the capacity mechanism is not. We can therefore take lessons from other markets that have used these mechanisms for decades to support their reliability outcomes (arguably less clear on optimal price outcomes) - but are now needing to refine and reform their central design parameters to account for and/or encourage increasing levels of VRE and storage that has different operating and commercial characteristics to fossil fuel technologies. For example:

- Whilst the ESB holds up the WEM as an example of a successful representation of their proposed model, the reserve capacity mechanism working group in WA[4] is now actively considering fast ramp criteria to ensure any

[3] https://www.vepc.org.au/_files/ugd/92a2aa_3abddb7f37994760b86e0c921a692b5b.pdf
[44] https://www.wa.gov.au/government/document-collections/reserve-capacity-mechanism-review-working-group

MW paid under WA’s reserve capacity mechanism (RCM) is not being allocated toward slow ramp, inflexible and outdated definitions of 'peak MW'

- Similarly for the NEM, the ESB is doing great work progressing various essential system services markets and the unbundling of services required in an inverter-based resource future (e.g. inertia, system strength, voltage stability etc). Careful consideration needs to be given to ensuring complementarity between any capacity mechanism and this suite of operational markets. In other words, the ESB needs to prevent an outcome where old, unreliable, or even new single use assets are provided payment in one market, but offer no value in others - as this would be the most expensive way to manage reliability and system security.

- There are also many precedents of capacity mechanism having emissions intensity thresholds as noted in the section on emissions above which provide a roadmap for how to design a capacity market with a view to transitioning to a high renewable energy environment.

There is a wealth of international examples in the market currently – both in respect of capacity market design, and Energy Storage Targets, that the ESB can draw upon in design principles. It will be critical for the ESB to look to these new and emerging market mechanisms for insights as opposed to traditional capacity mechanisms (such as the WEM) that were set up decades ago to support a very different energy generation mix. Tesla has experience in APAC, EMEA and North America and can continue to support the ESB with work in this space.