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GE Hydro Response to Capacity Mechanism Project Initiation Paper

Energy Security Board
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Lodged by email (info@esb.org.au)

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To the Energy Security Board,

We would like to thank you for the opportunity to participate in this consultation process, which we regard as greatly important to the timely, cost-effective development of the National Electricity Market.

More specifically, we view the Post 2025 Market Design program as a vital process for the consideration and adoption of measures to address the lack of bankable signals required for the investments needed in firming technologies such as pumped hydro.

Refer below our responses to the questions posed in the Initiation Paper (released December 2021), noting that we have focused on the areas of greatest relevance to our business and expertise.

Assessing the capacity mechanism

1. Considering the design principles from Energy Ministers, are there any additional assessment criteria the Board should use when assessing identified issues and possible solutions?
   Reliability requires the system to be in balance. This is often described as the need to have dispatchable or firm capacity available 'when the sun doesn't shine or the wind doesn't blow'. However, as the penetration of VRE in the NEM continues to increase, we will increasingly see reliability risks due to an *excess* of output from VRE.

   These scenarios are currently addressed by curtailing VRE output and/or directing thermal capacity to dispatch out of merit order. This is not an efficient approach for the long term and is a situation the capacity mechanism should seek to resolve by ensuring reliability is understood as an imbalance between supply and demand that can be solved by a combination of additional dispatchable supply and additional dispatchable demand, each operating to 'smooth out' the net demand and hence secure a reliable operating environment.

2. Do you agree with the proposed approach to how the ESB will incorporate and address the Energy Ministers' design principles?
   The proposed assessment criteria appear to capture the key themes raised in Appendix A, noting

that additional thought should be given to the implementation of the first assessment criteria in line with our comments above.

Approach to design

3. Are there specific design choices from international capacity markets the ESB should explore in a NEM context?
   The approach described makes sense – i.e. exploring different schemes around the world and then combining the elements of these that best suit the Australian context.

4. Are there other international examples of valuing capacity that the ESB should consider?
   None noted.

5. What design choices do stakeholders consider would work well for the NEM?
   In general, one would expect a centralised approach to work best for the NEM.

   Firstly, requiring each participant to forecast and procure their own firming capacity would lead to over-procurement as it would fail to capture the diversification benefits associated with different participants' having different demand and VRE output profiles. Undertaking the analysis at a centralised/aggregated level would necessarily allow optimisation in a more holistic manner, and hence a more cost-effective solution.

   Secondly, as reliability is a systemic challenge, there is a risk in decentralised models of the errors or oversimplifications of a small number of participants undermining the reliability of the overall system. A suitably robust, conservative, centralised approach would avoid this risk.

   Thirdly, a decentralised approach to forecasting and/or procurement necessarily shifts these tasks from a central authority (presumably AEMO) to many individual participants. Not only does this preclude the economies of scale associated with a single party doing the task, but it creates additional cost and compliance risk for participants that would disproportionately impact smaller players, hence risking greater concentration of market power.

6. Are there design choices from these international examples that stakeholders consider will not work well in the context of the NEM?
   Refer #5 above.

Core design areas for any mechanism that explicitly values capacity

7. Do you have any views on whether there are other design areas the ESB will need to consider in the design of a capacity mechanism?
   As noted above, the estimation of 'capacity supply' needs to reflect the need to keep the system in balance and the fact this can be done by affecting either the demand or supply side of the electricity system depending on the level of net demand at any given time.

   It should not be understood as simply and purely an estimate of peaking capacity, as this would entail a more costly and less flexible outcome for consumers and the market. Consider that 1GW of long duration storage can provide 2GW of ramping by switching between charging (-1GW) and discharging (+1GW) across the ramping period, while 1GW of peaking capacity is able to provide

only 1GW of ramping.

8. Has the ESB accurately reflected the trade-offs to be considered for each core design area?
   No comment.

9. Do stakeholders have views on the definition of reliability at risk periods?
   It makes sense to reward capacity most for being available when it is most needed. We note the capacity mechanism is intended to be additive to the underlying energy market, which already provides near-term incentives (in the form of high prices) for units to generate (and likewise incentives in the form of low prices for storage to charge).

   In this respect, focusing the capacity mechanism on 'reliability at risk' periods that energy prices may not be well-suited to address makes sense. For instance, >8-hr periods of above-average gross demand in the case of VRE and >8-hr periods of imbalance in the net demand in the case of storage.

   In defining 'reliability at risk periods', reliability must be understood in relation to the balance between supply and demand at any given moment. In this way, 'reliability at risk periods' should be understood as periods in which this balance is at risk due to either *'the sun not shining or the wind not blowing'*, or *'the sun shining too brightly, and the wind blowing too strongly'*. In both cases, an imbalance arises between supply and demand that threatens reliability and a correct definition of 'reliability at risk periods' should allow for this.

10. Which of the above derating methods would work best and why?
    For wind and solar, a third option could be to undertake both analyses and then pick the one yielding the higher number. This would lead to a lower risk of reliability problems as it would always take the more conservative of the two outcomes. It would create a higher risk of over-procurement of capacity, however this risk could be mitigated if the analysis was done in a centralised manner, due to the diversification benefits associated with different VRE projects in different locations being imperfectly correlated.

    For storage, the approach described makes sense, noting the need to consider reliability across multiple time horizons, as described in 5.1.1. For instance, the diurnal profile of wind and solar are such that a 4-hour storage duration would be insufficient to address the first of the three time horizons outlined, as the expected future capacity of VRE will create frequent low-load periods extending to 10 hours and beyond. Likewise, such a short duration is clearly not sufficient to address the third 'prolonged renewables drought' time horizon (as noted in the initiation paper).

11. Are there any other issues the ESB needs to consider when developing the approach to defining capacity?
    Refer comments above in relation to the definition of reliability.

12. In the context of the NEM, what do you consider to be the main advantages and disadvantages of the three options outlined above?
    As mentioned above, requiring each participant to forecast their own firming capacity would lead to over-procurement of firming as it would fail to capture the imperfect correlation between the VRE (and demand profiles) of the different participants, and hence the 'diversification benefit' this imperfect correlation would bring. Undertaking the analysis at a centralised/aggregated level would

allow for a more efficient and cost-effective outcome.

13. Which of the procurement approaches is best suited to the NEM and why?
As mentioned above, reliability is a systemic challenge, hence there is a risk in decentralised models of the errors or oversimplifications of a small number of participants undermining the reliability of the overall system. A suitably robust, conservative, centralised approach would avoid this risk.

    Likewise, a decentralised approach to forecasting and/or procurement necessarily shifts these tasks from a central authority (presumably AEMO) to many individual participants. Not only does this preclude the economies of scale associated with a single party doing the task, but it creates additional cost and compliance risk for participants that would disproportionately impact smaller players, hence risking greater concentration of market power.

14. Which of the options outlined above can be expected to work best in the context of the NEM?
A priori, a centralised approach to forecasting and procurement would appear most likely to yield the required reliability outcomes at the lowest cost.

15. Are there any other issues the ESB needs to consider when developing the approach to transmission constraints and interconnectors?
As storage assets tend to operate counter to VRE (i.e. charging when VRE is generating at its highest levels and then discharging when VRE is not generating at all), their operation is likely to reduce constraints and congestion in the network. As such the transmission approach used in the capacity mechanism should reward them for this behaviour.

16. Are there any suggestions for other ways that market power could be mitigated?
As noted above, centralised approaches to procurement and forecasting would appear to reduce the burden on smaller participants, avoiding the potential concentration of market power that could accompany decentralised approaches.

17. What kinds of market power issues are likely to be of the greatest concern?
A centralised approach to procurement would allow each project to compete on its own merits, with the best projects being selected on the basis of system-level optimisation, regardless of whether the proponents of those projects are major or minor players in the market.

18. Are there any other issues the ESB needs to consider when developing the approach to market power mitigation?
None noted.

19. Which of the options for demand side incentives and compliance would work well, or not work well, and why?
For the reasons noted above, a centralised approach to forecasting and procurement appears preferable, as such it makes sense to structure the incentives and compliance in a similar manner.

20. Which of the options for supply side incentives and compliance would work well, or not work well, and why?
Supply side incentives linked to market outcomes appear to best align the cost of non-delivery incurred by the defaulting provider with the cost experienced by market participants. It also appears to align with the ESB's principle of integrating the capacity mechanism as much as possible with the

energy market.

21. Are there any other issues the ESB needs to consider when developing the approach to penalties and compliance?
None noted.

Orderly Exit of Thermal Generation

We note that AEMO's analysis in the Draft 2022 Integrated System Plan (ISP) highlights a significant difference between announced coal closure dates and the dates indicated by AEMO's modelling. For instance, 5GW of coal capacity closures by 2030 have been announced, however AEMO's analysis indicates 14GW of capacity is likely to close by that time.

Given the historic trend of coal closure dates being brought forward, and in some cases, closures occurring ahead of their announced dates anyway, it would seem prudent to design an exit mechanism with AEMO's analysis in mind rather than the current publicly announced dates.

Interaction Between ESB Capacity Mechanism Project & AEMO ISP

To ensure a clear and consistent plan for the evolution of the NEM, it is important that the Capacity Mechanism Project (and Essential System Services) and AEMO's work on the ISP are aligned. In particular, the ISP has identified that the least-cost pathway down which the NEM should evolve would see:

- A 9-fold increase in utility scale wind and solar PV
- A 5-fold increase in rooftop solar PV
- A 3-fold increase in 'firming' capacity, including 45GW of new storage (at various durations)

As the ISP itself does not provide an actionable pathway to invest in generation and storage capacity, the realization of the least-cost pathway depends critically on the ESB's work on a Capacity Mechanism (and Essential System Services), combined with the signals in the underlying energy market, collectively providing sufficient investment signals that the above-mentioned capacity is able to be built in a timely fashion. In this sense, a key question the ESB should be asking itself is: what level of support does the capacity mechanism need to provide, for the above levels of investment to occur?

Should it be possible to do so, we would welcome the opportunity to further discuss any or all of the above matters with the ESB team, as we see this process as an important opportunity to create the market conditions needed for the optimal evolution of the NEM.

Best regards,

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