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Energy Security Board
Capacity Mechanism Market design project team
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25 July 2022

RE: Response to Energy Security Board Capacity Mechanism High-level Design Paper

Dear ESB team,

We congratulate the ESB team for what is a detailed and comprehensive investigation of extremely complex issues. Overall Austela is supportive of the High level Design that is presented.

As your Design Paper notes, there is much detail to be settled. Care needs to be taken to avoid perverse outcomes and to avoid locking in new fossil based generation unnecessarily.

Austela is a non-profit association that advocates on behalf of the Solar Thermal industry. Concentrating Solar Thermal (CST) systems use solar concentrators to produce high temperatures in heat transfer fluids which ultimately transfer heat to superheated steam for use in steam turbines in the same way that heat from fossil fired boilers does. Most new systems and more than half of the existing CST systems incorporate intermediate storage of the collected heat using 'two tank molten salt' thermal energy storage. This is a strongly growing global industry which offers Australia many advantages given the wish to add firm capacity and increased competition in the National Electricity Market simultaneously with the wish to reduce greenhouse emissions.

CST systems offer all the characteristics of renewable dispatchable synchronous generation that are identified as being increasingly needed as existing coal plants progressively retire. To date Australia has not built systems because the RET and existing NEM rules have not offered the rewards for its combined values that are needed to cover costs of electricity that are higher than variable wind or PV.

In this response we provide high level commentary and response to the key issues in the order that they appear in the Design Paper. We provide responses to those of the detailed questions to which Austela feels qualified to offer a view and leave it to others to respond to the remainder.

We would very much welcome the opportunity to meet with the team and discuss our perspectives on Concentrating Solar and Market design in more detail.

Yours sincerely

Keith Lovegrove Craig Wood

on behalf of AUSTELA board

The high level design

Sumarising our understanding the position that ESB has reached on the high level design with some selective quotes:

Who is eligible
''The ESB proposes that all resources contributing to capacity requirements be eligible to participate in the capacity mechanism.
The ESB intends that the mechanism will consider the challenges faced by new capacity and provide it with additional support. This may take the form of longer-tenure contracts'',
The degree of centralisation of forecasting and procurement
''The ESB proposes a centralised approach to forecasting capacity requirements and purchasing what is required.''
Derating
''Another essential element of the forecasting process is how a capacity provider's capacity is 'de-rated'. De-rating is the process by which a capacity provider's nameplate capacity is scaled down to the level of expected output during reliability compliance events.''
The capacity providers' obligation
''The ESB proposes that the performance obligation should be principally tied to availability across the delivery year and bidding during periods of system stress (such as lack of reserve (LOR) 2 or LOR3) with weighted payments tied to both these obligations''.
Transmission capacity
''The ESB considers that the benefits of interconnection should be realised through the mechanism. The ESB has considered two approaches to doing this''
Cost allocation
''The ESB considers that cost allocation through retailers using actual demand is the preferred approach.''

Austela supports all aspects of the high level design as we understand them above.

Overall the discussion paper is detailed and insightful and touches on the many complex and subtle issues that need to be addressed.

The high level design developed so far has the potential to deliver a very good result or a bad one according to the approach finally adopted in the detailed design questions that are yet to be answered.

The design of the market mechanism has progressed during the many years of division over climate and energy policy in Australia. This can be seen in some of the wording chosen in the document. As we contemplate next steps in mid 2022, a strong national mandate for net zero by 2050 is now the starting point.

Ultimately the goal of this new market mechanism should be to provide the signals that lead to the progressive construction of the generation assets that together deliver the lowest cost reliable and secure zero emissions electricity supply by 2050. Doing this will require the progressive construction of a balanced mix of technologies that may not deliver the lowest cost of energy in the immediate term but will provide the foundations for the lowest cost in the longer term.

We assert that it is essential that this new market mechanism:

- Does not encourage existing coal plants to stay online for longer.
- Does not encourage new construction of fossil gas fired generation.

- Does sufficiently incentivize inherently dispatchable renewable generators such as Concentrating Solar plants or Bioenergy fired plants to configure as flexible / peaking generators rather than baseload.
- Does provide the financial certainty needed to finance high construction cost but long duration storage technologies.
- Does not excessively encourage batteries at the expense of longer duration storage approaches.

In general electricity parlance capacity is simply the name plate rating of a generator in units of power (eg MW or GW). In the Design Paper the term is more or less used this way, however the central issue that is recognized is the need for ''dispatchable capacity'' and in much of the discussion the word capacity is implicitly being used to mean this. Overall it is implied that the capacity market mechanism is intended to encourage dispatchable capacity in preference to non dispatchable or variable capacity (eg wind and PV). The key issue is addressed with the idea of de-rating of the nominal capacity of generators according to the qualitative value they offer the system. Various approaches to this are discussed and overseas examples compared. **It is apparent that very widely differing de-ratings can result from different approaches and so this issue will be key.**

2.3 How (ESB) assessed options

The five assessment criteria that have been used to date are listed, given the recent change in federal government priorities in regards emissions reduction, these should be re-visited. Specifically number 3 asserts that ''a mechanism should be technologically neutral'' . **We argue that technology neutrality is desirable so long as technologies are zero emissions**. Number 5 addresses emissions reduction explicitly and that ''a mechanism should be compatible with emissions reduction targets''. We would argue that this should be much stronger, rather **a mechanism should actively drive the uptake of new zero emissions dispatchable generating capacity, not just be compatible with it**.

3 Case for Change

This section clearly articulates that the case for change is overwhelming and it is clear that there is a national consensus on this point. It reports that *'' approximately 122 GW of new wind and solar firmed by approximately 45 GW of new dispatchable storage capacity AEMO's Step Change scenario estimates''*. Given that *'' The new capacity required over the next 28 years is more than seven times that built over a similar time frame since the NEM commenced 24 years ago and around fifty times the amount built by the Snowy Hydroelectric Scheme.''*

It is clear that huge growth in industry capability will be needed to achieve this. It is also the case that it is impossible to forecast with any certainty which technologies will ultimately provide which share of contribution to an overall least cost mix. Consequently **we argue that that it is important to recognise the industry development requirement that is inherent in the challenge** and this should be factored in to the development of market detailed design.

4 participation of new and existing capacity in the mechanism

The ESB has reached a view that both new and existing capacity should be covered by the scheme. They do make it clear that the two cases need to be considered differently. There are some obvious logical points around the economic inefficiencies of eg driving out existing gas fired peaking plants if they were not eligible and then building new ones if they were. Again the explicit consideration of emissions is missing.

The paper does make the key point *'' For the avoidance of doubt, the purpose of a capacity mechanism is not to extend the lifespan of ageing coal generators.''*

This point is welcomed, the mechanism should not extend the lifespan of ageing coal generators. It is good that this point is made, however if the design details yet to be determined are poorly chosen, this could still be an unwanted outcome.

Whilst managing existing dispatchable capacity in an optimal manner does seem to be common sense, the ESB has recognised the greater needs for the entry of new dispatchable capacity …*'' The ESB … has addressed this by considering the possibility of longer tenor contracts for new capacity only (existing capacity providers would only be eligible for single-year contracts) and potentially allowing different clearing prices for old and new resources…''*

We agree that longer tenor contracts for new dispatchable generators are essential.

5 forecasting demand

Forecasting the demand for (dispatchable) capacity is obviously a key input to auction based procurement. It is reported that the ESB favours a centralised approach and that: *'' AEMO should have responsibility for centrally forecasting the capacity requirement for the NEM..''*. **We agree that this seems the most sensible approach.**

Q1 What measures could be put in place to improve AEMO's forecasting process and to access the best information from retailers and large customers on their likely demand?

The biggest uncertainty has to be actual timing of coal plant retirements,

Forecasting a year or two ahead is something AEMO is likely to be good at.

It needs to be recognized that forecasting 15 -20 years ahead is pretty impossible to achieve with any certainty. What is certain is that the need for new zero emissions dispatchable capacity will grow. Thus the best strategy would be to over-build rather than under-build dispatchable capacity to both allow for the uncertainty and also to help drive the necessary industry development.

For the best forecasting of the need for dispatchable capacity it is important that the technologies being considered are properly understood. In this regard the understanding of CSP as demonstrated in past AEMO ISP's has been poor. Two key weaknesses being; a lack of understanding of the strong ability of CSP plants to dispatch strategically and a lack of appreciation of the options for much longer durations of storage that would provide for the most cost effective use of the technology.

5.2 derating capacity

This is one of the biggest issues that will determine whether the capacity market achieves an optimal outcome or not.

It is explained that *'' De-rating is the process by which a resource's nameplate capacity is scaled down to the level of expected output during at-risk periods.''* This is indeed an essential process to understanding the ability of a technology to contribute to overall system reliability. It is however extremely complex and subtle and many alternative methods have been applied internationally, Examples given later illustrate that the same technologies can have hugely different de-rating factors applied according to methods and circumstances.

It is further claimed that *''De-rating enables each MW of capacity across the system to be considered interchangeably (i.e. 'fungible')*".

We argue that the idea that all capacity is fungible after derating is only partially true, whilst derating factors will be an essential tool, a technology with a derating to say 10% may not simply replace a technology with a 100% rating by simply building 10 times as much of it.

Q2 Do you agree that the capacity mechanism should provide for multiple zones being the existing NEM regions?

Yes this seems logical, there is considerable variation in the nature of solar and wind resources, demand profiles and transmission assets within existing state based regions, thus use of zones sized for a reasonable consistency on these factors makes sense.

5.3.3 multiple at risk periods

Key to the idea of de-rating is the identification of at risk periods.

A key issue raised is if derating factors should be forward looking or based on historical data. **We argue that it does need to be forward looking but that the modelling of a technology should learn from historical data.** As the mix of technologies changes over time, the nature and causes of at risk periods will change and the ability of a given technology to contribute to them will change. The attributes and operation of technologies can also be expected to evolve. Thus de-rating factors need to be constantly re-evaluated. However it is important that if long term contracts are provided for new generators, the de-rating factor applied at their original assessment is used to determine the payments they receive through out their life for financial certainty.

For technologies with storage (batteries and pumped hydro are discussed explicitly), there are some obvious common sense observations that suggest a system with longer duration storage should have a higher rating than one with shorter duration. There is an interesting discussion on page 35:

''If a battery is assumed to be fully charged at the beginning of a reliability event (i.e. that the event can be anticipated) then its de-rating factor can be defined as the ratio of its storage duration at full capacity to the expected duration of the event. In the WEM, the at-risk period is defined as a continuous 4-hour period for assessing battery de-rating[3]. Hence, if a battery has only two hours of storage at full capacity, the de-rating factor is 50 per cent.''

A key aspect that does not seem to have been considered as yet would be what incentives or signals could be provided to generators with storage, to keep some energy in reserve to be used only on direct request of the system operator. Something analogous to the existing RERT could be developed for example.

Q3 Is there sufficient evidence to say that the at-risk periods can be defined on a time-based definition?

Probably not, it's the sun and wind drought that will be the biggest issue moving into the future. Trends with seasonal demand effects will still be overlaid of course.

Suggest detailed modelling annual scenarios of hour by hour demand, solar and wind resource along with optimization of generation mix and dispatch strategies will be needed to define likely examples of at risk periods. Stochastic modelling of hypothetical plant outages also needs to be factored in.

Q4 If there is a risk of the emergence of more than one at-risk period in the NEM how should that be addressed?

Repeat detailed modelling as above every year as the technology mix evolves.

Don't lock in exact time based approach.

Q5 The de-rating factors produced by different at-risk period definitions and modelling methodologies can show large ranges particularly for non-traditional technologies. How should this and potential year to year variability in de-rating factors be addressed?

Repeat detailed modelling as above every year as the technology mix evolves. Apply learnings from past years actual performance

Q6 What approaches should be used to de-rate different technologies? Should different approaches apply to different technologies?

This is such a complex issue that an iterative approach will be needed. It should be possible to conceive of technology agnostic approaches however it will be important to reality check the findings in consultation with the experts in each relevant technology to check that perverse results are not arising from inappropriate input assumptions.

Q7 What is the right balance between transparency/simplicity and accuracy?

Should probably favour transparency and simplicity as an attempt to chase apparent greater accuracy via greater complexity could actually fail on both counts.

Q8 Should de-rating factors be determined at a technology class/region level or at a station level?

At a technology class/ region level on the whole, however the technology class consideration should be quite granular and allow for adjustment around station level characteristics. Eg a CSP plant configured with more or less storage and more or less solar multiple may deserve a different rating factor.

5.7 forecast capacity requirement

The ESB proposes that:

Target Capacity = De-rated Capacity of *Participating* Existing Providers +/- Reliability Gap/surplus

Q9 Do you agree with the approach to setting the forecast capacity requirement and the target capacity in a region?

That seems reasonable although it seems like a short term (year ahead) view. To look further ahead for encouragement of new capacity it might be better expressed as

Target Capacity = (De-rated Capacity of *Participating* Existing Providers and already contracted new providers +/- Reliability Gap/surplus) x (1+uncertainty allowance)

We also suggest the addition of an uncertainty allowance that drives a conservative approach of procuring extra dispatchable capacity somewhat in advance of an absolute need.

Q10 How should the target capacity be determined where there are gaps in more than one region?

Determine the target capacity region by region, allow generators to participate in more than one region within transmission constraints.

6 Auction design

A key point that is welcomed is:

‘’ To ensure investment for capacity adequacy, the ESB considers that the preferred capacity mechanism should include longer-term support for new capacity entering the market for the first time.

When offering such longer-term support, the ESB proposes that criteria be developed to ensure that the resources procured will be consistent with the NEM's transition to net zero emissions.''

Q11 Should retailers have a role in a centralised capacity mechanism?

Maybe just in estimating future demand?

Q12 If you support retailer involvement in procurement, what are your views on how this could operate?

No comment.

Q13 Do you agree with holding two auctions for each delivery year and is this timing appropriate? If no, what auction frequency and timing is appropriate and why?

No comment.

Q14 How should the timing of the auctions align with the notice of closure obligation?

No comment.

Q15 What are your views on how existing and new capacity should be treated in the auction process?

The most important issue is that new capacity be only zero emissions and it be procured using contracts of sufficient tenor that large capital intensive projects can be financed.

Q16 Are there other considerations the ESB should take into account for the detailed design?

There are many issues to consider with this complex challenge. We request that that consultation with technology representatives like Austela should continue as details are developed.

Q17 Do stakeholders have a view on the optimal duration of certificates or price certainty for new capacity?

It is essential that new capacity has a duration of reasonable income certainty that is close to say 75% of its economic life. It needs to be recognised that high capex long duration storage technologies like CSP or Pumped Hydro have longer economic lives and larger financing requirements, thus a market design with too short a duration will tend to perversely disfavour such systems. To name a number, it should be at least 15 years and maybe 20 top 25 years.

Q18 Do stakeholders have a preference as to whether the investment support scheme provides guarantees of price only, or of both price and quantity?

Both price and quantity.

Q19 Internationally, capacity mechanisms rely on some multiple of the net-cost of new entry (net-CONE) assessment to determine the capacity mechanism market price cap. Is this appropriate or should an alternative approach be used?

This is probably appropriate if it is evaluated for zero emissions options and probably should be increased by a margin if it is a price cap.

Q20 How should the price settings interact with the energy market price? Over time, when settings are regularly reviewed, should the price settings in the capacity auction and the energy market be jointly determined?

No comment.

Q21 Are there other considerations the ESB should take into account when determining demand curves in the detailed design?

No comment.

Q22 While the RRO requires mandatory participation for the largest three participants in a region, the ESB considers a methodology for determining market power should be applied to account for changing market concentration over time. Are there specific market concentration thresholds of concern?

No comment.

Q23 Should market power mitigation measures be applied to capacity providers with large market shares in supply-side regardless of their market share in retail?

No comment.

Q24 Do stakeholders support the proposal to integrate capacity mechanism settlement with the existing NEM settlement process? If not, what alternative process would better meet the design objectives?

This seems to make sense.

7 Obligations on capacity providers

It is clear that if a provider has been awarded under an auction, there ultimate level of income needs to be linked in some way to their overall availability through the year and their performance during critical events.

The Design Paper notes that:
‘’ESB would prefer as much as possible for a regime that is simple and clear, and involves:

- *incentives that are automatic and self-enforcing*
- *a clear definition of performance that is capable of simple, objective determination, rather than relying on complex or arguable judgements*
- *a direct, formulaic link between performance and payments, as well as for non-performance and the withholding of payments*
- *works with the existing market design whose incentives and risks are well understood by market participants. ‘’*

We agree. Three options are discussed and of these we favour Option 3
‘’Option 3 *– performance obligations based on a capacity provider’s availability throughout the year plus additional obligations/incentives during actual lack of reserve events, which can be triggered at any time. ‘’*
Q1 Do you have preliminary views on compliance obligations for capacity providers?
Q2 Do you have views on compliance obligations for new entrant capacity in advance of the delivery year?
Q3 Do you support the ESB’s proposed performance model for consultation? If no, what other proposed model would be better and why?

Q25 Are there any issues with using LOR2 and LOR3 as the trigger for capacity payments? If yes, please explain the issues and any alternative triggers.

No comment.

Q26 How would an appropriate methodology year-round availability be determined?

Very subtle, needs thought,

How is availability even defined for a storage system partially charged?

We don't want a scheme that favours baseload behaviour, more one that rewards strategic dispatch.

Q27 Do you support the ESB considering capacity payments based on availability throughout the year and during periods of system stress?

Yes a combination of the two makes sense. Note that payments based on an average availability is the one that can offer most certainty in financing new plants. Some payments for performance under system stress motivates the best strategic behaviour once plants are in operation.

Q28 If you support payments based on two factors, what is the preferred distribution of the first and second payment? Should more or less weight be given to responding to events?

Maybe 70:30?. The majority of the payment should be such as to give the necessary financial certainty to allow financing to be obtained for construction. The second should be just sufficient to ensure optimal behaviour.

Q29 To support revenue smoothing, should the ESB consider grouping events within the delivery year? If yes, what frequency (such as quarterly or monthly) is appropriate?

Q30 Should an upper threshold of performance events in a year be considered? If yes, what is an appropriate threshold?

Q31 Are there any other interactions with the existing energy only market that the ESB should consider when designing the capacity mechanism performance obligation?

Q32 Are there any other compliance issues the ESB should be mindful of in detailed design?

Q33 Are there any other implications the ESB should consider in detailed design?

No comment.

Q34 What is the appropriate combination of performance obligation and capacity de-rating methodologies?

Performance obligations are appropriate, however the consequence of poor performance in a particular year should be limited to loss of direct revenue in that year, not carried over to a de-rating for future years. A new generator may run into technical issues in its early years of operation that do not reflect its actual technical potential. De-rating after a poor year, risks sending such a generator into insolvency.

Q35 Should de-rating be based on pre-defined time periods or a forecast of when the anticipated trigger periods are expected to occur?

No comment.

Q36 Given VRE is likely to be particularly affected by any mismatch in the forecast and actual conditions during performance events, should special consideration be given to VRE's compliance with the performance obligation?

Not really. It would be the expectation that over a long term consideration VRE would be subject to a high de-rating factor and not be technologies who's performance is going to determine overall reliability and security.

8 How will costs be allocated

Q37 Do you think the MPC should be reduced if a capacity mechanism is introduced, and if so, by how much? What key issues should the ESB take into account when considering this issue?

Slightly if at all.

Q38 Do you agree that costs should be passed on via retailers, rather than NSPs?

Yes it should be passed on to retailers and also wholesale market participants not NSPs. This is the best chance that the consumers of energy will receive appropriate price signals linked to the true cost of supply at the time.

Q39 What do you consider to be the most appropriate mechanism to allocate costs to retailers?

Exactly in proportion to the manner in which the payment is made to generators and prorata to the retailer's overall demand at the corresponding times.

9 How is transmission capacity reflected in the capacity mechanism design?

The assumption made earlier is that the capacity requirement would be considered region by region, with the size of regions yet to be determined. The implication is that within a region there is sufficient interconnection that generators can be located wherever a connection is possible and then be able to support the whole region.

It is sensible to allow for the possibility that generators outside a region could offer capacity to a region but that this would be subject to the transmission constraints between regions.

Q40 Do you think that Option 1 or Option 2 better meets the assessment criteria?

We suggest that Option 2 – *"explicit procurement of inter-regional resources: Allow explicit procurement of inter-regional capacity. Capacity providers located in one region would be eligible to sell capacity to meet reliability in another region".* Offers the best potential outcomes. For example it allows CSP systems to be located for better solar resources whilst contributing to reliability outcomes of the wider system.

Q41 Are there any other factors that the ESB should consider when assessing the relative merits of the options?

Q42 Are there other ways to ensure that procurement of interstate capacity resources does not exceed inter-regional transmission limits, in addition to the two approaches outlined above?

Modelling.

The point that could be made is that NEM regions (being states) are a bit historical and arbitrary and that the actual performance of a generator in meeting the needs of a region will be limited by the transmission constraints and this should be factored into actual payments received.

Q43 Do you think that where a market interconnector exists between two regions, it should be the entity that is eligible to submit inter-regional capacity bids?

It could be optional. The Interconnector could choose to act as an intermediary, procuring capacity and then bidding it to the capacity market as an equivalent generator or it could just continue to operate as part of the network supporting electricity transfers between regions.

Q44 Do you think that proposed new market interconnectors should be able to participate in the capacity mechanism?

As above it should be optional.

10. Assessment of high-level design

The discussion paper ends with a discussion of the assessment of the high level design against the assessment criteria adopted my ministers.

Some additional points are worth making in regard to this.

On page 68 it is noted that:

''The concern raised by several stakeholders is that AEMO is likely to be conservative and procure more capacity than required. In this case it will be consumers that will bear the costs of being "over-insured".''

We suggest that this concern largely reflects criticisms that have been levelled at the WA capacity mechanism that is said to have overinvested in (fossil fuelled) capacity that is hardly used. At the present time during the energy transition the greater risk is having not enough dispatchable capacity. **If new capacity is mandated to be zero emissions, then some over supply of dispatchable capacity is simply a wise investment in the future.**

The discussion of technology neutrality does not consider explicitly the idea that it should favour zero emissions.

On emissions reduction it is noted that:

'' *All Australian jurisdictions have adopted the goal of achieving net zero carbon emissions by 2050 if not sooner.''* And *'' Any emissions reduction guidance and operationalisation in the capacity mechanism will not alter, or limit, the principle that jurisdictions must be able to determine which technologies are eligible for participation in a capacity mechanism in their region.''*

Again **we argue that the market design should be explicitly helping to drive the path to net zero by 2050 as an agreed national goal**. It is a national commitment that Australia has made and whilst it is reasonable to allow states to exceed a national commitment they should not be able to undermine it by for example pursuing new build coal for regional political interest and then benefitting under a national market mechanism.

Further on page 69 it is noted that:

'' the ESB considers that the preferred capacity mechanism should include longer-term support for new capacity entering the market for the first time. When offering such longer-term support, the ESB

proposes that criteria be developed to ensure that the resources procured will be consistent with the NEM's transition to net zero emissions.''

We encourage the ESB to firm up on longer term support for new dispatchable capacity that is strictly zero emissions.

On page 70 the point is made that:

'' In addition, 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,''

We agree that agreements that give the industry certainty that coal generators will definitely exit as anticipated will very much help give certainty to future planning.

A further point on page 70 is:

''AEMO could … apply a de-rating that takes account of emissions intensity. ''

This would be a constructive approach to the pragmatic need to include existing fossil fuel generators in the mechanism. If new build fossil generators are allowed at all (which we do not support) then an emissions derating factor that increased to 100% over time, could be a pragmatic way forward.