July 27th 2022

Ms Anna Collyer
Chair
Energy Security Board

Submitted via email to info@esb.org.au

Dear Ms Collyer,

Submission for 2022 Capacity mechanism High-level design paper

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia. We represent and work with over 1,000 of the leading businesses operating in renewable energy and energy storage. We are committed to accelerating the decarbonisation of Australia's energy system as rapidly as possible, while maintaining a secure and reliable supply of electricity for customers.

A key focus of the CEC is developing regulatory frameworks to support efficient investment in the large number of new renewable generation and storage projects needed to deliver secure, reliable and zero emissions energy for consumers.

The CEC welcomes the opportunity to comment on the Energy Security Board's (ESBs) 2022 Capacity mechanism High-level design paper (the paper). The paper provides a good opportunity to explore the range of policy reforms that can accelerate the transition. We stand ready to work with the ESB to streamline and adapt its proposed high level capacity mechanism design, so that it more closely resembles the targeted policy measures needed to maintain reliability of supply.

The CEC considers there is an urgent need for the development of targeted policy measures to support investment in new renewable, storage and transmission capacity. While the economics for new clean energy generation continues to improve, the continued market and policy uncertainty - which will be further aggravated by a poorly designed capacity mechanism – means there is risk that critical new investment in storage, transmission and renewables won't occur quickly enough, to deliver a reliable supply of energy to consumers when it is most needed.

We welcome the ESB's recognition of the absence of such a mechanism, and the potential consequences this may have for consumers. However, the urgency of the underlying need is such that we cannot afford to go through the lengthy process of a full capacity market redesign, as proposed by the ESB. Such a reform will take at least 10 years to be completed and will act as to impede efficient investment in the meantime.

The CEC and the clean energy industry therefore consider that targeted policy mechanisms are needed to encourage and accelerate investment in renewables, storage and transmission. These could be implemented ahead of a capacity mechanism, as separate but complementary mechanisms.

The CEC and clean energy sector remain open to the form of targeted policy mechanisms that might be developed. We note the effectiveness of the LRET in driving investment in large scale renewables over

Phone: +61 3 9929 4100
Fax: +61 3 9929 4101
info@cleanenergycouncil.org.au

Level 15, 222 Exhibition
Street, Melbourne, VIC
3000, Australia

cleanenergycouncil.org.au

ABN: 84 127 102 443

the past decade and consider that an expansion / extension to the LRET would be a relatively easy to implement and very effective way to accelerate renewable buildout.

Similarly, other mechanisms based on a revised NEG, a clean energy target or some other form of renewable / storage pricing mechanism could be effective in providing a clear and investable signal for new clean energy resources. We have identified a few such mechanisms, such as a storage target or an advance capacity reserve mechanism, which could be readily implemented and which we consider are fit for purpose.

The CEC's proposed approach consists of coordinating existing processes and introducing some tailored new policy mechanisms.

This approach recognises the separate requirements of driving new renewable, storage and transmission investment, against controlling the rate at which fossil fuel generation is removed from the system. A single mechanism is unlikely to deliver both requirements – any mechanism that prolongs the life of coal will inevitably delay entry of new renewable generation and storage capacity.

We therefore recommend that targeted policy reforms are explored on the basis of separating out the two key underlying issues of driving investment vs controlling the exit of thermal coal. Our general approach is described in the figure below.

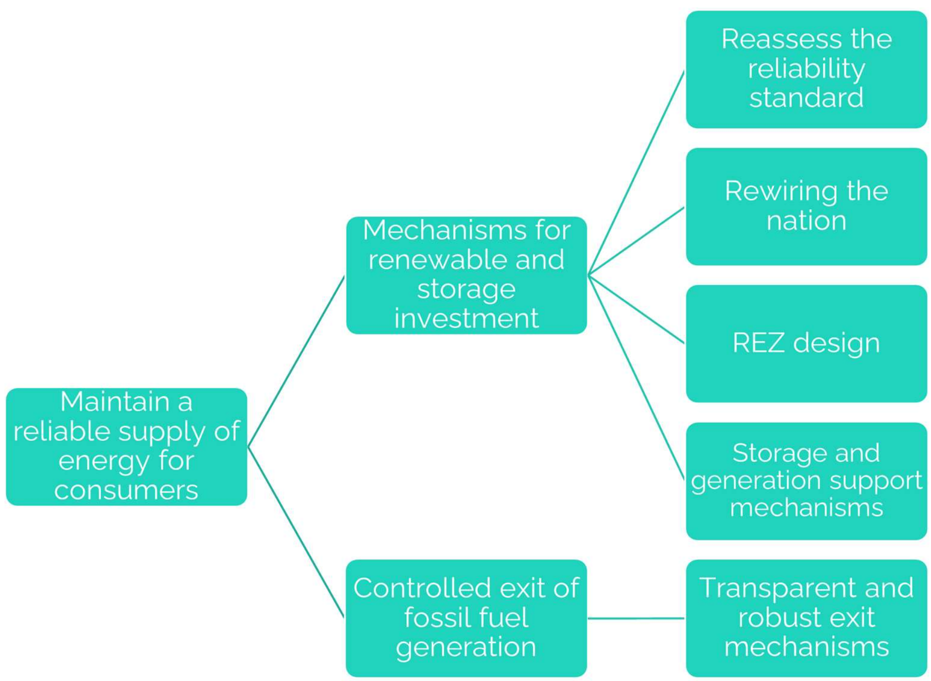

Figure 1: a tailored approach to managing the transition

Building on the above, this submission is presented in three parts. Firstly, we describe the changing nature of reliability risks, and why we need to tailor policy responses so they are appropriate. Secondly, we detail a range of targeted policy measures that can be implemented relatively quickly, to alleviate market pressures and encourage investment.

Finally, in keeping with the spirit of collaborative working the CEC endeavours to bring to all market reform processes, we step through our thoughts on the changes that would need to be made to the high level design of the capacity mechanism to improve it.

PART 1: What's actually the problem?

The recent energy crisis has highlighted that the reliability risk profile of the NEM is changing. 'Reliability risk profile' is a complex way of describing the periods when there is an elevated risk there won't be enough energy available to meet consumer demand, as defined by the reliability standard.[1]

Historically, reliability at risk periods were fairly predictable, normally occurring as 'super peak' demand periods in mid-summer, when short but significant increases in residential demand for energy for cooling, coupled with reduced output from coal generation assets, meant the supply demand balance became tight. This has occasionally led to 'rotating' customer load shedding, as AEMO and network businesses turn off blocks of customer load to keep the system secure.

The reliability standard and settings (the market price caps) have been designed around managing these kinds of short, sharp 'at risk' periods. The Reliability Panel, which is responsible for setting the price caps of the wholesale energy market, sets the price caps in a way that encourages investors to build the right kind of generation to meet demand on these short, sharp 'at risk' periods.

The assumed reliability at risk period has begun to change and will continue to do so as the transition to a decarbonised power system accelerates. We have already seen an example in the recent energy crisis. Input drivers for this event included increases in the cost of fossil fuels, planned and unplanned outages of coal generators and lower levels of available supply from renewables and storage.[2] On the demand side, a prolonged cold snap saw sustained increases in demand from residential heating loads. The combined result was an *extended* tight supply demand balance, high prices, and an elevated risk of supply shortfalls.[3]

This was a very different kind of reliability at risk period than historically has been experienced. These different types of reliability at risk periods require different solutions. When managing traditional super peak events in Australia, it was necessary mainly to focus on available *capacity* – or *megawatts* (MW) - without paying much attention to how much *energy* – or *megawatt hours* (MWh) – was actually available over a period longer than six to twelve hours. However, these new reliability at risk periods, where sustained increases in demand combined with prolonged reductions in supply, require a greater focus on ensuring sustained provision of *energy,* or MWh, over time frames measured in days, or even weeks.

Other kinds of reliability at risk periods may also emerge in coming years, particularly related to daily changes in renewable generation availability. The so called 'duck curve' issue occurs where large volumes of solar generation are available in the middle of the day, but then fall away sharply as the sun

---

[1] The reliability standard is defined in the national electricity rules (Clause 3.9.3C) as: The reliability standard for generation and inter-regional transmission
elements in the NEM is a maximum expected unserved energy (USE) in a region of 0.002% of the total energy demanded in that region for a given financial year. This basically sets the limit on the amount of consumer demand for energy that is not met by the power system. It informs the way the market price caps are set and how AEMO operates the power system.

[2] These reduced levels of energy available from renewables can be attributed to two factors. Firstly, relatively low levels of wind and solar energy during the period meant that existing renewables produced less energy than average. However, the greater driver here is the lack of investment in storage and renewable generation capacity over the preceding decade, due to federal policy inaction.

[3] Its worth noting that despite the tightness of supply and demand during the crisis, AEMO did not have to implement load shedding, which meant that no consumers actually lost supply in this event. However, it was a close call.

goes down. If there isn't enough flexible replacement capacity available in time, there's a risk of not enough energy being available to meet evening peak demand.

The key drivers of these new reliability at risk periods appear largely on the supply side. Firstly, uncertainty in regard to climate policy has delayed investment in renewables, particularly storage, which has reduced the availability of the needed *energy* supply to address these kinds of events. Secondly, decreasing economic viability and physical reliability of coal generating units means these units are exiting faster than expected, further tightening supply side outcomes.

The CEC considers these physical drivers of reliability risk must inform the way we select subsequent policy solutions.

- Firstly, the dual nature of the supply side drivers means ***two separate policy mechanisms are needed*** – one to control coal generation exit, and another to incentivise replacement capacity, particularly bulk renewable and storage capacity that can help with sustained supply of *energy*.
- Secondly, ***these mechanisms must be developed in tandem and operate concurrently.*** This is necessary to ensure that new renewable generation and storage capacity can be brought online as rapidly as possible *and ahead of coal exit*, to allow for coal generation to be safely removed as rapidly as possible.
- Finally, the urgency of the issue means that ***these mechanisms must be targeted and implemented quickly***. A highly complex market redesign, such as the introduction of the capacity market mechanism as proposed by the ESB, will simply take too long to develop and implement. In particular, the potential speed of thermal coal exit, caused by both physical, economic and ESG drivers, means such a complex mechanism may only be implemented after the crisis it was designed to prevent has already occurred.

For this reason, the CEC considers it preferable to focus on a multi-part approach, utilising existing and relatively incremental policy reforms, to control the exit of coal generation while separately and concurrently incentivising provision of energy supply from renewable generation and storage.

PART 2: Targeted measures to enhance energy supply availability, and reduce reliability risk

The CEC's general approach to assessing the process for transitioning the power system to renewables is based around recognising the significant asymmetries of risk that sit on either side of a 'just in time' approach to replacing thermal coal generation with renewables and storage. Put simply, 'risk asymmetry' means that the costs to consumers of going a bit too late on transmission and generation build, are likely to far outweigh the costs for consumers of going a bit too early.

For example, moving a little bit 'too soon',[4] and bringing on renewable and storage capacity *before* coal generation exits, may bring some limited additional costs for consumers – potentially, some capacity may be underutilised for a short period of time. However, moving 'too late', and delaying renewable and storage investment until after thermal coal has exited, brings with it the likelihood of significant wholesale

[4] The use of the term 'too soon' is used only for the sake of simplicity, noting the significant flaws that have repeatedly identified with the 'just in time' school of economic reasoning.

market price spikes and potentially reliability issues. These costs are likely to be far higher and more material for consumers.

The CEC's key concern with the ESB's proposed capacity mechanism is simply that it is too complex to be introduced in time to address the urgency of the issue. While the ESB has stated their intent to have the mechanism operational by 1 July 2025, prior experience with similar market reforms suggests this is unlikely to be possible – for example the introduction of five minute settlement took 6 years to implement, while the system strength frameworks will likely take around 5 years. A fundamental market redesign, such as introducing a capacity mechanism, is an order of magnitude more complex a task than either of these reforms – it's hard to see it being fully operational within 10 years.

We consider that by focussing on developing a perfect capacity market solution, the reform process will simply take too long, and subsequently that the needed investment in replacement capacity will be 'too late' - and therefore impose material additional costs on consumers.

Similarly, a key challenge to delivering a safe and rapid decarbonisation of the NEM is ensuring there is a stable investment environment. Investors already need to manage a great deal of risk and uncertainty, both in terms of the regulatory, technical, and commercial environment, in order to bring projects to market. The very potential for a slow moving but massive regulatory change like the introduction of a capacity market mechanism can only worsen this investment uncertainty – at precisely the time where the need for new investment is most critical.

The CEC therefore considers that targeted, quick to implement policy mechanisms to incentivise renewable generation and storage should be developed and applied concurrently with separate mechanisms to deliver a rapid but controlled exit of coal.

Targeted measures for rapid and controlled exit of coal generation

Delivering a rapid and controlled exit of thermal coal is critical to an affordable and reliable NEM decarbonisation. Any action to prolong the life of thermal coal generation runs counter to Australia's commitment to reducing emissions by at least 43% by 2030.

However, uncoordinated and uncontrolled exit of these assets could cause problems for consumers, to the extent it leads to volatility and unpredictability in wholesale prices.

Of course, this does not change the fact that carbon intensive coal generation should be rapidly removed from the generation mix. In fact, it's likely that substantial portions of the coal fleet may exit sooner than announced closure dates or may otherwise withdraw permanently due to technical failure.

Governments should therefore explore what targeted measures can be used to ensure coal generation exit can be controlled in a safe and secure manner. The CEC considers that these mechanism should be separate to mechanisms to incentivise new investment in renewables and storage.

There are a multitude of coal exit policy mechanisms that might be utilised. These include reverse auctions for coal unit closure, centralised / regulated mechanisms, state government initiated bilateral contracting, and measures such as a 'coal bond' that requires coal generators to provide bonds that are lost if the unit fails or is otherwise withdrawn from service.

The CEC does not have a preference as to which of these mechanisms, or any other, is preferable. Any such mechanism must be tailored to the specifics of the NEM and must be separate to any mechanisms to incentivise renewables and storage.

However, the following principles should be applied when developing a separate and tailored mechanism to control the exit of thermal coal generation:

- Any such mechanism must be fully transparent, with any and all payments, penalties and obligations made public. This is necessary to ensure consumer value for money.
- Any such mechanisms must have transparent and enforceable dates as to when a coal unit will exit the market. This is necessary to provide certainty to investors in replacement renewable generation and storage capacity.
- Penalties for non-conformance must be materially robust and sufficient to ensure appropriate behaviours. This is necessary to ensure that coal generators undertake requisite maintenance and procure sufficient fuel, so as to be able to supply energy as per agreed terms.
- More generally, these penalties must be symmetrical – that is, equally material penalties must begin to be incurred if a generator exits one day too soon, or one day too late, on either side of the defined exit date
- Mechanisms must be structured in a manner that minimises the risk of wholesale market manipulation and excessive and volatile price outcomes
- Finally, governments must ensure the owners of thermal coal generating assets remain responsible for the full extent of site remediation costs when their units are shut down. This is necessary to ensure that consumers do not face these potentially significant costs once these units are removed from service.

It's also preferable that such mechanisms are standardised, as much as possible, across the NEM. This will help reduce uncertainty. However, its recognised that differences in physical asset characteristics and ownership structures may require some tailoring across regions.

Targeted measures to incentivise renewable and storage investment

The CEC considers there is an urgent need for the development of targeted policy measures to support investment in new renewables and storage capacity. The urgency of this need is such that we cannot afford to go through the lengthy process of a full market redesign, as proposed by the ESB.

The CEC and clean energy sector remain open to the form of targeted policy mechanisms that might be developed. We note the effectiveness of the LRET in driving investment in large scale renewables over the past decade and consider that an expansion / extension to the LRET would be a relatively easy to implement and very effective way to accelerate renewable buildout.

Similarly, a revised NEG, clean energy target or some other form of renewable / storage pricing mechanism could be effective in providing a clear and investable signal for new clean energy resources. We have identified a few such mechanisms, such as a storage target or an advance capacity reserve mechanism, which could be readily implemented and which we consider are fit for purpose.

In addition to these targeted policies to incentivise investment in renewables and storage, there are a number of other incremental policy reforms that have the potential to drive improved supply side outcomes. These include:

- Coordinating announced funding from state and federal governments to accelerate transmission and storage buildout

- Accelerating the key projects announced through AEMO's ISP, including the ISP actionable transmission projects
- Accelerating AEMO's declaration of system strength nodes and expected volumes of renewables to be hosted at those nodes
- Supporting the development of a streamlined connection process through the joint CEC / AEMO Connection reform initiative

The rest of this submission steps through these targeted reforms in more detail

1. Tailored clean energy policies to support efficient investment

There are three key areas of coordinated investment needed to transition to a low cost, high renewables power system. These are renewable generation, the transmission grid, and storage.

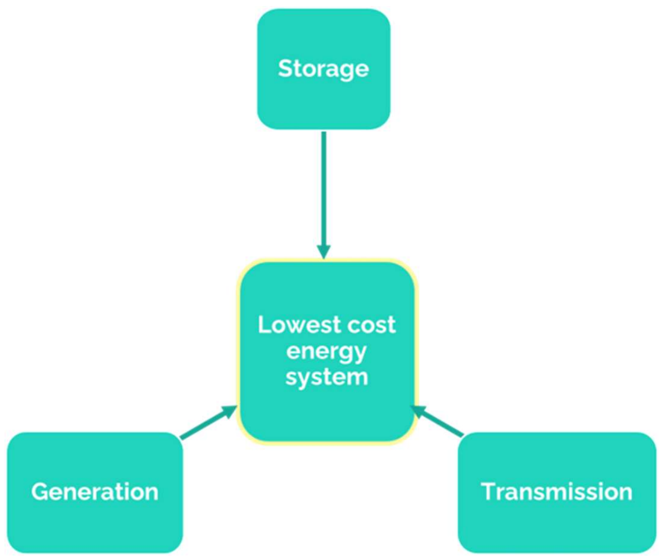

Figure 2: coordination of storage, transmission and renewable generation

Getting the mix of these three components right is central to transitioning the power system at lowest cost.

The CEC considers that targeted policy reforms are needed to accelerate investment in each of these areas. This section explains how targeted storage and generation incentive mechanisms will bring forward renewables and storage, while effective coordination of government funding can enable and bring forward crucial investment in transmission.

Storage target mechanism

Storage will play a key role in maintaining supply reliability for consumers as the transition accelerates. However, its currently difficult to make an investment case for new storage assets. We therefore recommend the development of a storage target mechanism to incentivise better utilisation of existing storage assets, but more importantly to support investment in new storage assets.

Energy storage, including hydropower and batteries, is a natural complement to both renewables and transmission. It can store excess energy produced by renewables, and then feed it back at a later time improving utilisation of the grid. It can also be used to enhance how much power can flow on the transmission grid, by providing a kind of 'shock absorber', as per the SA and Victorian big batteries.

AEMO is projecting the need for massive investment in additional energy storage, with the ISP predicting 46 GW (and 640 GWh) of dispatchable storage capacity will be needed by 2050.[5] This is needed to provide the firming capacity that complements variable renewables and will also likely materially reduce the amount of large scale transmission build that will need to occur. Storage investment is also absolutely critical to the effective build out of Renewable Energy Zones.

While huge volumes of storage investment is needed, it remains challenging to make an investment case for large storage projects. Battery technology in particular is still a new player in the NEM and has faced challenges in the connection and integration process, while the high capital outlays associated with new hydro build are similarly challenging. Other forms of storage are developing rapidly but are less known in Australia and are therefore also difficult to make bankable.

The full range of storage capabilities also aren't yet properly defined and are therefore often not effectively remunerated. There is basically a lot of missing money in the investment case for storage, even when there is a demonstrably huge need for this investment.

The CEC considers a targeted mechanism to incentivise storage can help deliver better outcomes by driving more efficient utilisation of existing storage and supporting the business case for new storage investment.

Various potential designs exist for a storage target scheme. One option is for it to resemble the renewable energy target[6], where eligible storage entities would generate certificates that retailers would then surrender. Another is for a series of auctions, whereby a defined volume of storage (or firmed renewable capability) is procured by AEMO or some other entity in tranches.

The advantages of such a mechanism are that it can be:

- Developed on the basis of existing regulatory frameworks like the renewable energy target (RET), or auction processes like the Reliability and Reserve Trader (RERT) mechanisms
- Implemented relatively quickly, given the pre-existence of these regulatory frameworks
- Adjusted over time to reflect changing external conditions. For example, an auction type mechanism could be rolled out in tranches, or a target mechanism could be shaped over time, with procured volumes changing to reflect changing system needs, or even the development of a broader, more long term market re-design. This reduces the regulatory risk associated with 'locking in' a new regulatory framework, although it does reduce investment certainty.

The CEC considers that if the ESB's proposed capacity mechanism is significantly simplified and streamlined, it could look end up looking a lot like a storage target mechanism. As described above, and noting our general commitment to collaboration, we will work with the ESB to understand whether this is possible.

[5] AEMO, Integrated system plan, June 2022, p.50.

[6] Mountain, B.R., Harris, P.N., Woodley, T., Sheehan, P. (2022). "Electricity storage: the critical electricity policy challenge for our new government". Victoria Energy Policy Centre, Victoria University, Melbourne. DOI: 10.26196/23jk-8f47

Generation reserve capacity mechanisms

Additional investment in renewable generation is needed to complement storage and transmission investment. Greater certainty is needed to de-risk this investment and bring it forward in time, so as to reduce the risks associated with earlier than expected coal closure.

One option to deliver this is simply to expand or extend the existing large scale renewable energy target (LRET). The LRET has been the standout success of the various renewable energy policies introduced over the last two decades and has driven huge volumes of investment in renewable capacity.

A key benefit of an LRET expansion is that it would relatively straightforward, from a regulatory design perspective. As identified above, we consider that it will take 10+ years to introduce a full capacity market mechanism, which is time we cannot afford. In contrast, reform to an existing mechanism such as the LRET could likely be progressed much faster than this and could bring forward much needed investment. Similarly, most investors already have significant experience in and understanding of how the LRET operates and are confident in making investment decisions on the basis of this policy mechanism.

Another option for Ministers to consider is the development of a ‘reserve capacity’ mechanism. CEC members have developed a variety of options of what these mechanisms might look like, but in a general sense they would involve:

- AEMO and state governments working together to identify credible risks that might require reserve capacity above and beyond the baseline forecasts of reliability needs. This could be to meet a specific reliability requirement in a given jurisdiction, such as an N-2 requirement, or a lower USE at risk tolerance (as per the interim reliability standard)
- AEMO would hold tenders to procure the required capacity. This should be focussed around procurement of renewable generation and storage capacity, recognising that these two technologies in combination provide zero carbon dispatchability.
- These procured reserves could be held out of the energy market for a defined time, and brought online as needed
- Procured reserves would receive a fixed payment to cover financing costs. They would also be free to participate in other out of market reserves or services, such as an operating reserve (see below), RERT or other state reserve schemes

Effectively, these reserve mechanisms can bring on capacity ahead of when it is needed, so that if an unforeseen event occurs (like catastrophic failure of a major coal generator, as occurred in Queensland with the Callide failure), reserves are ready to be brought into the market with no delay. This will support reliability and price outcomes for consumers.

Our recommendation is that **Ministers direct the ESB to work with the CEC and industry to determine whether the proposed capacity mechanism can be simplified to more closely resemble a storage target mechanism, and / or the various reserve capacity auction processes**

We also recommend that Ministers **give further consideration as to the expansion or extension of the LRET**. This is a proven policy reform that we consider can bring on additional generation capacity in a rapid and predictable manner.

2. Development of an operating reserve to meet daily demand

As discussed in Part 1 above, new risks to reliability may emerge as a function of rapid daily changes in relative demand and supply availability. This 'duck curve' effect can arise when the power system has large volumes of solar PV generation, which produces power as a function of solar availability. Basically, this can result in large amounts of energy being produced during the day when the sun is up, but which then fall away rapidly when the sun sets in the evening.

This may result in reliability risks, to the extent that there is insufficient flexible capacity available to replace this missing energy, to meet the evening demand peak.

There is a potential solution to this risk that can be progressed immediately. In 2020, Infigen Energy, now Ibedrola, lodged a rule change request with the AEMC to introduce an "operating reserve" market. This new market service would allow AEMO to procure an operational buffer of additional generation capacity, which could be used to address operational shortfalls such as the above scenario.

The AEMC has delayed a decision on this rule change until July 2023. The AEMC stated that this was in part due to allowing for consideration of the ESB's work, particularly development of a capacity mechanism.

The CEC considers that an operating reserve is likely to be much easier to implement that a complex redesign of the energy market, as envisioned through the ESB's capacity mechanism. As such, we consider it ought to be prioritised over the development of a capacity mechanism, as a targeted measure that can be rolled out faster than a capacity mechanism, to address an emerging issue.

> Our recommendation is therefore that Ministers **direct the AEMC immediately recommence work on the Operating reserve market rule change, with a view to moving to a draft determination by the end of 2022**

3. Ministers should consider how to most effectively coordinate funding to accelerate the buildout of critical transmission infrastructure

State and federal governments can play a key role in bringing forward the investment in transmission infrastructure that is crucial to accelerating the transition to a decarbonised NEM. As described in figure 2 above, transmission is the third element of bringing low cost, zero carbon electricity to customers.

State and federal governments have already committed extensive funding to accelerating the buildout of critical transmission investments. This has occurred through the various commitments to REZ buildout and transmission augmentations from the various state governments, as well as the federal government's announced Rewiring the Nation (RTN) funding.

We consider the RTN should be utilised in a manner that complements the funding already committed by the states. For example, this can help bring forward crucial REZ developments, or be used to support relatively incremental augmentations to unlock currently constrained renewable generation. It can also be used to support the rollout of 'virtual transmission', such as storage projects located at key parts of the network that can unlock significant additional network capacity.

The RTN funding could also be used to help de-risk and bring forward investment in major transmission interconnector projects, particularly those identified by AEMO in the Integrated System Plan. As AEMO has identified, these major projects are critical to maintaining reliability, by capturing the benefits of spatial distribution of renewables and storage.

Our recommendation is that Ministers set up a work program to explore how the RTN funding can be most effectively utilised to coordinate with state based funding, to accelerate transmission buildout.

The CEC will shortly be providing more detailed advice on our thinking around this funding coordination and we stand ready to work with state governments to explore these options.

4. Ministers should direct the AEMC Reliability Panel to undertake an urgent and thorough review of the reliability standard.

The reliability standard underpins the regulatory architecture that maintains energy supply for consumers. The AEMC Reliability Panel has recently undertaken work to reassess this standard in light of the physical changes in the power system. However, it has had insufficient time to complete this critical work. Ministers should direct the Panel to undertake a subsequent review, to complete this analysis as soon as possible.

The Reliability Panel's recent review undertook an analysis of how underlying supply reliability risks are changing in the NEM. This analysis identified that as the NEM generating fleet transitions to being predominantly variable renewables based, the nature of reliability high risk periods will change.[7] The Panel then suggested the form of the reliability standard should be adjusted to reflect this changing reliability at risk profile.[8]

The form of the Reliability Standard is a foundation element of the NEM regulatory architecture, determining how wholesale prices are set and how AEMO operates the market. This foundation element must accurately represent changing reliability risks, and therefore should be reassessed more thoroughly. Getting this analysis right, and changing the standard accordingly, means the market will have the right price signals to drive the long term investment needed to manage these changing reliability risks.

Somewhat in contrast to the other measures proposed in this submission, changing the standard is not itself a quick fix. The detailed modelling analysis needed to assess what the standard should look like over the long term, and what kinds of reliability risks will emerge, will take time to complete. Similarly, actually changing the market price settings to reflect the new reliability standard will be a slow process, as will be the subsequent investment in capacity. The Panel must therefore be directed to commence this work as soon as possible, given these time limitations.

We therefore recommend that Ministers request:

- **the Reliability Panel to undertake a review of the form of the reliability standard and give consideration to subsequent changes in the market price caps.**
- **this review should commence in the next 6 months and consider the changing nature of reliability at risk profiles out to 2040.**

The ESB's paper also includes some interesting, though high level, analysis of the changing nature of reliability at risk events,[9] including analysis exploring so called 'renewables droughts', or 'dunkelflaute'

[7] The Panel noted that it "considers the distribution of USE shifts towards longer duration higher impact reliability events in a high VRE power system with storage as a material reliability provider." AEMC Reliability Panel, 2022 RSS review Draft report, 9 June 2022, p.38.
[8] Ibid. p.47. The 'form' of the current reliability standard is in the form of 'expected USE', which as an average value, doesn't effectively take into account the ways in which reliability risk profiles are rapidly changing in the NEM.
[9] ESB, Capacity mechanism High-level Design Paper, June 2022, p.30

events. This is similar to the analysis undertaken by the Reliability and described above. There is likely to be significant value in releasing the underpinning modelling and data analysis that informed this analysis.

> We therefore recommend **that Ministers request the ESB release any modelling and data analysis that informed its considerations in developing the paper**

5. Measures to accelerate REZ buildout

Renewable Energy Zones (REZ) will form the basis of how 'bulk energy' is provided in the future. Bulk energy is just that – effectively it's the source of the majority of electricity supply needed to meet the bulk of consumer demand for energy.

Historically, so called 'baseload' coal generators provided this bulk energy supply, with gas peaking units coming in over the top to meet high demand. As renewable generation like wind and solar have entered the system, they have increasingly displaced coal in this role. As the exit of coal generation accelerates, wind, solar and storage coordinated with transmission investment, will increasingly take over as the source of this bulk energy supply.

A REZ is really just a massively distributed power station, with its individual components being wind, solar, storage (or load) and transmission. As such, they are perfectly placed to be the backbone of how we maintain a reliable supply of bulk energy as the system transitions.

There is a lot that needs to be done to build a REZ. Fortunately, a lot of progress has already been made, especially by those states that have already begun the REZ buildout process. However, we consider that governments can assist in accelerating this process in the following ways:

- **Standardisation of state based regulatory frameworks for REZ development:** Ministers can develop an agreed set of principles, or more detailed procedures, to standardise various elements of REZ design. This could include those elements of REZ design that are more likely to fall to state agencies, such as financial elements including the form of access arrangements and underwriting contracts, and social license elements such as approaches to planning and community engagement.
- **Clear direction to AEMO to develop standardised REZ technical elements:** AEMO has a central role to play in REZ rollout, particularly around the technical elements of design. AEMO is already undertaking important work in this area, particularly as it looks to develop a 'streamlined connection process', or 'batching process', as part of the Connection Reform Initiative program that has been run as a jointly cooperative effort between the CEC and AEMO. We recommend ministers direct AEMO to prioritise resourcing and funding for this work, with a view to having a single, national approach to streamlining the REZ connection process within the next 12 months.
- **Clear direction to AEMO regarding declaration of system strength nodes to assist in REZ development.** System strength is a complex power system characteristic – without going into a detailed explanation of the physics, system strength plays a critical role in maintaining the operability and stability of a REZ. At its core, the more system strength is provided, the more renewable generation and storage can be connected to a REZ.

  AEMO is responsible for determining how much system strength must be provided by network businesses, at specific 'nodes'. A portion of the costs to provide this system strength may be borne by customers. As AEMO uses a degree of discretion as to how much system strength it requires NSPs to provide, it may sometimes hesitate or be overly cautious, in order to avoid being seen to impose excessive costs on consumers – AEMO and NSPs still have a very strong aversion to being seen to be 'gold plating'. Ministers can play a role here by providing clear and unequivocal guidance to AEMO regarding where system strength nodes must be declared, and the volumes of renewables that must be hosted at each node. This will then de-risk the process for AEMO, freeing them up to direct networks to provide the volumes of system strength needed to facilitate the transition.

PART 3: Long term market intervention – Capacity Mechanism

The CEC remains committed to working collaboratively with governments, the market bodies and the ESB to progress the market reform needed to transition the NEM.

On that basis, while we consider that the targeted measures described in Part 2 of this submission represent a practical approach, we will continue to work with the ESB to refine and improve the high level design of the proposed capacity mechanism. We consider that simplifying and streamlining the ESB's high level design could see it more closely resembling some of the targeted mechanisms we have explored above. We consider this is more likely to support the investment needed to maintain reliable and low cost energy for consumers.

This section of the submission therefore sets out our initial response to the ESB's high level design.

Coal exit and renewable storage; eligibility for incumbents and new entrants to participate

The most important element of the transition to a decarbonised NEM is to manage the rapid replacement of fossil fuel generation with zero carbon generation and storage capacity, in tandem with transmission investment. This must occur in advance of fossil fuel retirement and/or failure.

The ESB does not address this core dynamic of the transition in the paper. Instead, section 4 focusses on the 'efficiencies' around of allowing 'new' vs 'existing' capacity to participate in the capacity mechanism.

This differentiation based on 'efficiency' misses the point – namely, that the central and most important inefficiency is created by the artificial externalisation of carbon costs under the NEO. This central flaw of the NEM regulatory architecture means the ESB has been unable to design a capacity mechanism, or other policy reforms, that resolves the issue at hand.

This design flaw must be addressed directly. As described below, the ESB must be provided with explicit direction to take account of the cost of carbon, and associated emission reduction objectives / carbon budgets, in any capacity mechanism design.

However, this also highlights how questions of new entry vs incumbency must be viewed through the lens of the overarching requirement of decarbonisation – that is, how to make use of existing, and incentivise new investment, in **renewables and storage only**.

The issue then becomes about striking the balance between better utilisation of existing renewables and storage assets, and incentivising investment in new renewables and storage. The following comments and suggestions relate to how the ESB's high level design might be adapted to do this.

There is some good discussion on page 39 of the paper, particularly the below:

> "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."

The CEC considers that a sensible way to differentiate between supporting efficient utilisation of existing renewable capacity, and incentivising new investment, is to build this into auction timing and the form /

tenor of any contracts awarded. Auction timing, contract form and tenor should be developed on the basis of system needs but must also consider the needs of investors.

Focussing on new investment, the form of contracts awarded could consider whether it is feasible for an investor to access other revenue sources to help make a business case for a new asset, such as those available from the provision of system services

Similarly, eligibility for contracts should consider the different kinds of augmentations that might be undertaken to provide the ‘new capacity’. This should include investments in existing assets to increase reliability, availability or max capacity. For example, capital intensive investments to refurbish existing hydro capacity.

The varying economies of scale, scope, and ‘speed’ of different assets should also be considered. For example, while a battery asset may be less capital intensive and faster to build, a pumped hydro asset can provide deep storages and will be available for a longer time scale. These different characteristics are particularly relevant to tenor of contracts.

Finally, system need must be considered in terms of what contracts are awarded. For example, as the Reliability Panel and AEMO undertake more detailed analysis of reliability at risk periods in the NEM, it may become apparent that deeper storages are needed to address increased risk of energy shortfall (so called ‘renewable droughts’). This can be reflected in the tenor and form of any contracts awarded, to explicitly enhance this kind of deep storage investment. Similarly, where an urgent need for network support services, system strength or SRAS is identified, the high installation speed and modularity of battery storage could be reflected in the form and pricing of any contract awarded.

These changing system needs, coupled with lead times for investment in different technologies, should also factor into auction timing. As identified above, hydro may provide deep storage capabilities but also has a relatively long construction lead time, while battery storage has a fast build time but provides relatively short duration storage. Auction timings (T-4, T-1 etc) should be set with a view to both what the system requires in what timeframe, as well as the practical lead times to construct the various forms of storage.

Provision of further guidance on treatment of carbon emissions

The CEC considers that any capacity mechanism must be consistent with the federal government’s commitment to achieving a 45% reduction in emissions by 2030. To enable this, Ministers should provide the ESB with clear and unequivocable direction that any capacity mechanism must support and accelerate the decarbonisation of the NEM, with a view to being consistent with achieving or exceeding the national target and remaining within associated carbon budgets.

The CEC commends the ESB for seeking explicit instruction from Energy Ministers as to inclusion of sectoral emissions reduction in its capacity mechanism design, in the context of net zero and the operationalisation of such guidance in the capacity market design.[10]

Ministers can provide this guidance in various ways. At a high level, this could take the form of instructing the ESB to account for a nominated national carbon budget when designing the mechanism. As acknowledged by the ESB itself, the carbon budgets implicit in the ISP could be used as the basis of this carbon budget.

---

[10] ESB, High level design paper, p.39.

The CEC trusts that if this guidance is provided, the ESB will move quickly to redesign its capacity mechanism to focus on renewable generation and storage. While our strong preference is for the mechanism to exclude fossil fuel generation outright, if the ESB proceeds with inclusion of fossil fuel generation, then the detail of the mechanism must be strictly consistent with meeting an overall emissions reduction target.

For example, the allowed carbon budget could be translated into a decreasing average emissions intensity of each tranche of capacity procured through the mechanism. Including a kind of 'ratcheting mechanism' could translate into a steady reduction in the volume of emissions intensive generation that can be procured in each round.

The CEC also considers that an emissions intensity metric should be included in any capacity mechanism design, to determine exactly how much specific assets contribute to this budget. This emissions intensity metric would be applied in a similar manner as the proposed availability de-rating methodology. For example, storage and renewables would receive a 100% (no derating) value, while CCGT might receive a lower value, then OCGT, coal and diesel receiving lower values still - as an indicative order only. These values could be based on standardised assessments of carbon intensity by generation type, or through an actual unit by unit assessment of historic emissions intensity.

The ESB should undertake further work to consider how this concept of an emissions metric can be worked into different elements of the capacity mechanism.

Changes to the Energy only market – MPC and CPT must not be reduced

A key concern for industry is the suggestion made in the ESB's paper that the proposed capacity mechanism may require the existing energy market price caps to be materially reduced. Specifically, the ESB has stated that:

> "The ESB will need to determine if the MPC should be lower than it would be in the absence of a capacity mechanism. In considering this issue, the ESB will focus on issues including incentives for real-time generation through the wholesale market; impacts on resources that are ineligible to participate in the capacity mechanism (or which contribute significant energy but less capacity) and whole system costs. The ESB will carry out a detailed assessment of this issue as part of the detailed design, including quantitative analysis."

The ESB should carefully consider the consequences of this statement. The settings of the energy market underpin how participants set investment, contractual and operational strategies. These strategies are based around the expectation that fundamental design elements of the market frameworks will not be summarily altered. Reducing the market price cap (MPC) represents a major change in the underlying regulatory frameworks and will markedly increase uncertainty for investors.

Even the suggestion of reducing the market price cap will provide a chilling effect on investment in renewable generation and storage. When combined with the likely extended time frame to implement a mechanism as complex as the ESB's proposal, there is a real risk that an already uncertain investment market will be further destabilised, at precisely the time when AEMO is projecting this investment is most critically needed.

The ESB must also recognise that the current price envelope defined by the MPC and the cumulative price threshold (CPT) play a crucial role in sending efficient operational signals. A relatively high MPC allows for sharp changes in wholesale prices, which in turn incentivise responses from generators and storage. For example, a sharp increase in price provides a strong signal for batteries to respond quickly and provide energy when most needed. The move to five minute settlement is designed to enhance the sharpness of these signals; any move to lower the MPC will run completely contrary to this clear direction of NEM redesign, and markedly reduce the efficiency of market operation.

Similarly, the setting of the CPT can send effective price signals to support investment in deep storage, which may become particularly important as the reliability risk profile of the power system changes. In particular, increasing the level of the CPT may be a particularly powerful way to support investment in deeper storages.

Any move to suppress the MPC would also run contrary to the recent work of the Reliability Panel, which clearly identified that a significant and steady increase in the level of the MPC and CPT is needed to maintain reliability of supply.[11] The Panel's recommendation recognised the role of stable price settings in driving efficient new investment.

The ESB must clearly state that any further deliberations on the capacity mechanism will not entertain a reduction in the MPC or CPT. This must be explicit and unequivocable, in order to avoid worsening the already significant investment uncertainty created by the consideration of a move to a capacity market.

Consideration of reliability at risk periods

The ESB's paper contains a very short summary of the changing nature of reliability risks in the NEM. This analysis briefly describes how reliability at risk periods may increasingly shift from occurring at short super peak demand periods, towards more seasonal, or energy constrained type events. This is consistent with the more thorough analysis recently undertaken by the Reliability Panel, which also investigated the changing nature of reliability at risk periods.

The ESB must do more work in terms of understanding the changing nature of reliability risks. As opposed to the questionable logic included in section 3 of the paper, the ESB would be better off focussing on the actual drivers of reliability risk – the fundamental shift in the generation mix towards a storage, renewable and transmission dominated system. While there is some limited discussion of this later in section 5.5.4, significant additional thinking is required.

The ESB also does not give adequate consideration of how this fundamental change will require investment in particular technologies – or rather, delivery of different 'favours' of megawatts - in order to maintain reliability. For example, if reliability at risk periods are shifting towards long, seasonal 'renewables drought' type periods, then it follows that what is needed is delivery of sustained megawatts – that is, the ability to sustain a volume of megawatt hours supply for the days or weeks of elevated demand that may occur over winter peaks. This may require more investment in deeper, long duration storage, or partitioned and distributed shorter duration storage.

If the ESB proceeds with development of a capacity market mechanism, it must undertake significant additional analysis to understand how reliability risks may change in future. This analysis should then inform all of the design choices made by the ESB, particularly issues around tenor and form of contracts, and the specific types of capacity that is needed.

---

[11] AEMC Reliability Panel, *2022 Draft Review of the reliability standard and settings,* p. v

The ESB should also release any detailed modelling it has undertaken to inform its considerations of changing reliability at risk periods.

Approach to derating factors

The ESB must undertake significant additional analysis around derating factors. In particular, the ESB should consider how best to make use of historic and modelled data to provide accurate representations of actual unit reliability. It must also undertake more robust consideration of the appropriate aggregate availability metrics to apply to renewables and storage.

Recognising the potential lack of usable historic data for assessing renewable derating factors, some form of modelling is likely to be most appropriate. The ELCC model described by the ESB may show some promise here, however it would be crucial that any modelling undertaken is fully transparent and easily understood by industry.

Historic performance may be appropriate for some older renewable assets, as well as most fossil fuel assets. However, such historic analysis must not be smeared or averaged over time in any way, as this is likely to disguise the sharply worsening forced outage rates of many of the ageing NEM fossil fuel assets. Such an approach to derating must be based on recent performance only and calibrated carefully with the nominated at risk period that the capacity is being procured to manage.

The approach to different technologies described in section 5.5 also requires significant additional work. This analysis does not account for renewable generation / storage hybrids, which are likely to form an increasing part of the NEM generating mix in years to come. While acknowledging the complexity of assessing the derating of such assets, the ESB must nevertheless take them into account. Recognising that these are effectively firm / dispatchable units, it many follow that an equivalent assumed derating as an OCGT or other fast response asset may be appropriate to be applied (noting that batteries tend to be more reliable, in general, than many of the ageing OCGTs in the NEM generation fleet).

The ESB must also take into account the very different manner in which different types of renewables and storage interact with each other to deliver aggregate availability. Solar and wind generation are obvious complements to each other, often with a degree of negative correlation in terms of periods of output. Similarly, the co-location of storage capacity with renewables can markedly increase the aggregate availability of these assets. The ESB must take a more sophisticated approach to assessing these aggregate availability outcomes when developing derating methodologies for VRE.

Finally, the CEC supports the inclusion of demand response in the development of any future capacity mechanism. Emerging technologies, particularly hydrogen electrolysers, may play a key role here. More detailed consideration should be given not only to derating factors for demand response, but how they may be factored into the many other elements of capacity mechanism design.

Availability and penalty regimes

The CEC considers this entire section of the paper highlights the impracticality of including existing fossil fuel assets in any future capacity mechanism. The nature of the penalties envisioned by the ESB are likely to be ineffective in actually delivering required capacity from thermal coal assets in particular. Given the only ‘penalty’ that appears to be considered is losing a capacity payment, it’s hard to see how the proposed mechanism would actually impose any discipline on ageing thermal assets that are facing other, quite significant cost pressures.

The very complexity of the measures being considered to ensure compliance and delivery of energy when required, simply highlight how the targeted, simplified measures proposed by the CEC as alternatives are likely to be far more effective in actually facilitating a safe and rapid transition.

Accounting for transmission

Again, this entire section simply highlights the incredible amount of complexity that remains to be addressed before the ESB's capacity market mechanism can be considered even halfway to implementation – again reinforcing the need for targeted, simper measures as proposed by the CEC.

However, if the ESB proceeds with this design, it follows that interregional trade in capacity should be enabled, as this will deliver lowest cost solutions to consumers. This should be available to all market participants, including market network service providers.

The problem with this is that facilitating interregional trade in capacity appears to necessitate the design of a new interconnector flow auction process (at least in one design option) to run parallel to the existing SRA framework - which is what appears to be considered in Box 5 on page 64. The fact that one single line is devoted to this is telling – it appears the ESB does not understand the complexity and therefore time it will take, to develop an entirely new parallel SRA process. Similarly, the complexity inherent in option 2b appears not to be fully appreciated.

The paper also does not consider the interactions with treatment of intra-regional transfer, noting that this will be developed in tandem with the ESB's Access reform work. Extreme care will need to be exercised by the ESB, if we assume that some form of 'transfer right' is also to be applied to intra-regional capacity payments. This comes very close to considerations of 'firm transmission rights' for intra-regional flows, a reform that has been thoroughly disproven and rejected by industry.

We appreciate the ESBs consideration of the above, and if you would like to discuss any of the issues raised in this submission further, please contact Morgan Rossiter on mrossiter@cleanenergycouncil.org.au.

Yours sincerely,

Christiaan Zuur
Director Energy Transformation