26 July 2022

Anna Collyer
Chair
Energy Security Board
Submitted via email to: info@esb.org.au

Dear Ms Collyer

Submission: Capacity mechanism high-level design paper

CS Energy welcomes the opportunity to provide a submission to the Energy Security Board's (**ESB's**) consultation on its *Capacity mechanism high-level design paper* (**Design Paper**).

About CS Energy

CS Energy is a Queensland energy company that generates and sells electricity in the National Electricity Market (**NEM**). CS Energy owns and operates the Kogan Creek and Callide B coal-fired power stations and has a 50% share in the Callide C station (which it also operates). CS Energy sells electricity into the NEM from these power stations, as well as electricity generated by other power stations that CS Energy holds the trading rights to.

CS Energy also operates a retail business, offering retail contracts to large commercial and industrial users in Queensland, and is part of the South-East Queensland retail market through our joint venture with Alinta Energy.

CS Energy is 100 percent owned by the Queensland government.

Key recommendations

The NEM is changing and will continue to do so as it transitions to a market with more Variable Renewable Energy (**VRE**) and an overall lower carbon footprint. The ability to effectively and efficiently manage power system security and reliability against this evolving landscape is paramount, and CS Energy supports the need to develop flexible and adaptive market and regulatory frameworks that facilitate this outcome.

CS Energy is concerned that the proposal presented in the Design Paper in its current form will not be an efficient or effective design and will not deliver benefits to consumers. The design work undertaken by the ESB in an attempt to address competing objectives has manifested in little progression since the December 2021 Initiation Paper and a blueprint that is piecemeal and overly complex. In attempting to address numerous challenges, the design ultimately does not deliver what is required.

A fresh approach is required, and the overall design process needs to be much improved and genuinely collaborative with stakeholders. This includes clear acknowledgement that the current energy crisis relates to energy, not capacity and does not provide justification for the development of a capacity mechanism. It would be beneficial for the ESB to refocus attention on clearly articulating the objective that the potential mechanism aims to achieve, accepting that different measures may be required for different objectives.

CS Energy proposes that the capacity mechanism could be significantly simplified and better aligned to the overarching objectives (as CS Energy understand them) and therefore, consumer needs.

A fresh approach

Clarify the problem definition

A new approach and process is required to develop a design that delivers market efficiency and benefits to consumers. Taking a step back from the discussions to date, if one drills down to the core issues on which they are based (whether explicitly or implicitly), there are two dominant challenges that are driving the uncertainty of reliable supply. The first relates to concern about coal retirements and the second, renewable droughts.

Objective 1 – managed replacement of coal

Concern about coal retirements is relevant in the short-term and longer-term based on current closure dates. The concerns are varied and relate to:

- The lumpiness of the capacity withdrawal;
- The current proportion of supply that is provided by coal;
- Potential price shocks that may result when sizable capacity exits the market;
- Whether the 42-month notice of closure provides enough confidence to the market; and
- The level of Essential System Services (**ESS**) and stability that coal plant provides both locally and on a system level. In particular, given the topology of the NEM, these stability services are quite fundamental to network operations.

Thus, **Objective 1** relates to the managed replacement of coal. That is, certainty that replacement capacity *and* capability will be where required when needed, and any price impacts of the exit are minimised.

Any mechanism design needs to facilitate a smooth transition between the retiring asset and the required portfolio of capability that will replace it. In essence, the efficient outcome would be to incentivise a ‘like for like’ replacement that would consider locational impacts on energy flows and stability, integrate with broader system security needs and leverage existing transmission infrastructure. Importantly, the design should not incentivise coal or prolong the life of coal.

Objective 2 – Strengthen investment signals for firming capacity

The other overwhelming challenge is ensuring that a power system with more VRE is supported by sufficient levels of firming capacity. This firming capacity needs to be flexible to respond to energy ramping requirements as well as provide a suitable mix of long-duration storage for potential periods of renewable drought.

Any mechanism needs to be targeted to incentivise investment in this capability but should not distort energy market signals. Incentivisation of the flexibility that will be required in the operational timescale will also be reliant on energy market price settings, and thus, **Objective 2** is to explicitly strengthen investment signals for firming capacity.

Understanding energy storage and firming capacity needs over the long-term is critical to setting clear targets in MW/MWh that need to be delivered. This will highlight the scale and pace of investment that is required. The timing of new firming capacity will have a symbiotic relationship with the managed replacement of coal assets. Understanding this dynamic is critical to identifying any potential gaps that a mechanism may need to address.

<u>Designing an effective mechanism</u>

Operationalise the objectives

Each objective has different needs from a design perspective which must be catered for. Objective 2 in some ways is simpler as the operational metric only has one dimension, MW/MWh installed. What does need to be explicitly acknowledged however, is the varying costs of technologies. While any mechanism should be underpinned by a technology neutral approach, it may not be feasible (physically or economically) to design a mechanism that will provide sufficient incentives for all. This certainly was the international experience.

CS Energy considers pumped hydro storage as a key technology in the future energy mix but recognises that it will not be incentivised by a capacity market mechanism alone. The cost of new pumped hydro and the associated social licence requirements is likely to prohibit bankable projects in the absence of directed policy support. However, a market mechanism that incentivises firming capacity will complement this direct support.

In CS Energy's opinion the managed replacement of coal is more multi-dimensional with operational and market expectations. The operational expectations aren't limited to the Australian Energy Market Operator (**AEMO**) but impact network operation also as any withdrawal affects its capability. The Design Paper doesn't address this despite existing generation being eligible to participate. Awarding one-year contracts at T-1 or T-4 auctions to coal plants will not address the concerns of above. Furthermore, the proposed one-year capacity contract would not be viable for coal plant to plan and undertake any required maintenance (capex and opex) from an economic perspective and likely from a physical availability perspective also.

The mechanism design to address Objective 1 needs to apply a more holistic lens and consider how to facilitate a smooth transition that manages reliability and security of supply while minimising potential market impacts.

Given the locational factors, a mechanism that may be efficient is one that is targeted to each coal region and operationalises the objective to capture both energy and system security needs and network capability. This would serve to incentivise a like for like approach. For example, the managed replacement of 500 MWh[1] of secure and reliable supply from a coal plant with a portfolio of new assets that deliver 500 MWh of reliable supply with a similar level of system security locally and globally.

Refined mechanisms for consideration

CS Energy considers the capacity mechanism can be refined to better align with each objective:

- <u>Objective 1 – managed replacement of coal</u>

  Consider the generator of above that provides 500 MWh of reliable supply. This generator also provides ESS such as inertia, system strength, reactive power, and voltage control as well as emergency services such as supporting system restart and re-energisation of the regional transmission network.

  Assume this generator has a closure date of 2030. Rather than hoping the broad capacity mechanism outlined in the Design Paper can incentivise the timely investment in the *right mix* of generation and storage in the *right location*, a more targeted auction could be conducted.

  As this auction would be designed for the managed replacement of a specific plant, it would be held once only. AEMO would remain responsible for holding the auction given it best understands the reliability and security needs of this transition.

  The auction could be approached in two ways: AEMO could specify the broad operational and locational requirements and request tenders for a party to deliver the entire portfolio; or AEMO determines the portfolio need and auctions contracts for the individual components. CS Energy considers the former more efficient and pragmatic.

  For illustrative purposes, assume the successful tender(s) will develop a portfolio of generation, storage and system security support across an energy hub within the same region as the retiring plant. The contract places an obligation on the successful tender to deliver 500 MWh of secure and reliable supply from say 2027 to 2032. This would require coordination with the coal plant (potentially via a contract that is considered in the bid or via a co-tender) which will contribute to the 500 MWh while the new investments are being built, particularly if construction delays are experienced. As the new portfolio comes online, the coal plant can more effectively manage its retirement. Importantly, this approach doesn't prolong the life of the coal asset.

  The contracted obligation places no technology restrictions on the portfolio; the successful bid determines the efficient means to meet the operational requirements (both in terms of MW and MWh) that will facilitate the managed replacement. This could also comprise a mix of direct investment and procurement of appropriate new resources. If desired, jurisdictions could apply an emissions overlay on the auction requirements.

  In some ways, utilising the auction process to establish energy hubs is akin to the process of establishing Renewable Energy Zones (**REZs**), the difference being the

[1] Sizing used for illustrative purposes only

technology neutrality and broader requirement to manage the impact of the exiting capacity.

This targeted approach facilitates the transition of the power system efficiently. The new investment is market driven and actively manages the replacement of the retiring capacity such that market impacts are minimised. The energy price will continue to provide the broader investment signals and there will be no price shocks as the process should ensure that no net capacity will be withdrawn overnight. This provides both the market and government with the desired certainty regarding reliability.

Additionally, AEMO will be provided with operational confidence that the auction incentivises the right mix of capability to ensure system stability is maintained beyond the coal life, and importantly ensures local requirements are met which is particularly vital in key corridors.

Operational benefits will accrue to Transmission Network Service Providers (**TNSPs**) also as the network capability will remain relatively unchanged and thus so will network operation. Without this managed replacement, TNSPs would need to fundamentally re-design the network to reflect the changed capability at great expense to consumers.

Implementation requirements of this mechanism would be minimal as the auction/contracting process would utilise existing platforms and not require changes to market or operational systems.

- Objective 2 – Strengthen investment signals for firming capacity

  CS Energy supports exploring the feasibility of a mechanism that sets an explicit target for firming capacity. For example, as proposed by the Clean Energy Council (**CEC**), a certificate mechanism could be explored or a reserve investment mechanism. CS Energy would support a certificate mechanism provided gas-fired generation was eligible as a firming technology.

  This mechanism would interface efficiently with the energy market, which has the existing platforms and experience with certificate mechanisms. The certificate value would reflect the need and would cater for all types of "events", a criterion expressed in the Design Paper. Existing and new providers could also participate.

Assessment of proposed mechanisms

The combined outcomes of the two mechanisms above should be assessed against the backdrop of existing and proposed frameworks both to determine net benefits and to identify any potential gaps.

Jurisdictional schemes are already providing investment signals and any mechanism needs to integrate with these schemes. The suite of REZ arrangements and financial instruments that are either in place or being developed under these policies will drive new capacity. These investment signals will be strengthened by the Federal *Rewiring the Nation* policy.

The managed replacement of coal and a firming capacity target complement these schemes and should optimise investment in energy, storage and transmission as the NEM transitions to net zero.

Given concerns about the scale and pace of change, the ESB could analyse the above mechanisms to identify and quantify any gaps over the longer-term and redirect its focus. One clear gap that exists is the lack of progress in establishing market signals for ESS. The current AEMC processes underway do not provide a holistic framework of required work and are inadequate. The market has little transparency of future power system needs and the work to understand the technical requirements and develop appropriate standards has not been done.[2] Establishing effective investment signals for ESS will be critical to the success of any reliability mechanisms.

Shortfalls of the proposed design

CS Energy's preferred approach as outlined above proposes that the capacity mechanism be simplified to consider auctions for the managed replacement of retiring coal plant and be complemented by a targeted mechanism such as a certificate scheme that incentivises the required volume of firming capacity.

This approach could take stock of the ESB's work to date through an examination of the shortfalls of the current high-level design against the stated objectives above and learnings from the experience in other jurisdictions. Concomitant to the clear objectives, this will facilitate a more efficient design process.

In order to ensure that CS Energy's position on the design proposed is documented, CS Energy briefly covers its concerns with the proposed design below and directs the ESB to its submission to the Initiation Paper which remains highly relevant.[3]

- <u>Lack of clear and consistent objective</u>

  CS Energy appreciates that the ESB was provided with design principles from Energy Ministers. Individually these principles are sound but satisfying them simultaneously with a singular mechanism is not possible.

- <u>Integration with the energy market</u>

  As a result of the lack of a clear objective, the capacity mechanism and how it is intended to integrate with other market and regulatory frameworks is confused and contradictory. On the one hand, it is intended to complement the energy market by ensuring that potential gaps in capacity are met and reliability maintained. Yet the Design Paper makes a point of not defining capacity or at-risk periods, and as such denies the ability to articulate the gap(s) to be met by the capacity mechanism, rather expecting it to be "always on". This is reinforced by the stated intention to examine lowering the Market Price Cap (**MPC**). Lowering the MPC implies that the capacity mechanism is not intended to be solely a safety net and thus not complementary to the energy market but acting as an add on further distorting the drivers of the mechanism.

  CS Energy considers that lowering the MPC is a matter for the Reliability Panel, following a modelling exercise that demonstrates the balance of the two mechanisms. While the design of any capacity mechanism does need to consider how to avoid double-dipping, lowering the MPC may have perverse outcomes particularly as not all Participants will be able to access payments under the capacity mechanism.

[2] CS Energy, *Submission to AEMC-AEMO Joint Paper on Essential System Services and Inertia*, 21 July 2022
[3] CS Energy, *Submission to ESB Capacity Mechanism Initiation Paper*, 10 February 2022

Furthermore, lowering the MPC will create a disconnect with operational delivery, undermining the performance of the mechanism. This will be hindered further by the proposed lack of punitive action for non-performance under the capacity mechanism which CS Energy does not support. If, for example, capacity providers do not deliver when required and the Reliability and Emergency Reserve Trader (**RERT**) is deployed, why should consumers foot the bill while the only "penalty" for non-delivery is foregoing a payment?

Any capacity mechanism needs to be practical and provide additionality rather than create market distortions.

- <u>Lack of consideration of system security requirements</u>

  The Design Paper assumes that future system security needs will be facilitated by the ESS reforms currently underway. Given the infancy of these processes, it is unclear what investment signals will be provided for the required capability. Any capacity mechanism design at the very least needs to consider a scenario in which broader capability is equally as important as capacity and flexibility.

  CS Energy is also concerned that locational impacts are not adequately considered. The ESB does consider regional reliability targets but this doesn't capture the strategic location of many generation and network assets that deliver system stability. Nor does the consideration of network capacity alongside generation adequacy. The NEM has locational attributes that need to be integrated into any design. CS Energy's proposal set out above seeks to address some of these issues.

- <u>Lack of justification</u>

  The Design Paper is disappointing in its due diligence as to why the proposed design represents the most effective and efficient solution. The ESB offered two main reasons for its preferred design:

  - *RERT deployment*

    The first was the level of RERT activation over the last few years. At the time of publication, there were 15 RERT events in the last five years, which has increased to 16 events with the 5 July 2022 event. CS Energy has concerns with the use of RERT providing justification for a capacity mechanism when these events haven't been appropriately contextualised. Citing the frequency of events alone is not adequate.

    In the event of a forecast or actual Lack of Reserve 3 (**LOR3**), utilisation of the RERT under appropriate circumstances and conditions to avoid or minimise involuntary load shedding is supported.

    However, a review of these 16 events highlights activation/enablement for forecast LOR2 conditions, some of which were declared as actual LOR2 conditions. Notwithstanding the challenge for managing fast and slow response RERT contracts, post event analysis indicates that AEMO appears to utilise the forecast demand in its supply/demand calculations to declare actual LOR2 conditions. On this basis, the majority of the RERT activation/enablement was not required when actual supply and demand was reconciled with required reserve thresholds. The key insight arising from this observation is that arguably the incurred RERT costs should not have occurred.

- *International examples*

  The ESB also exalts the capacity mechanisms in international systems and the Western Energy Market (**WEM**) but fails to contextualise them. For example, many of the cited jurisdictions operate under day-ahead markets where the influence of scarcity price signals is more muted than in the NEM. More concerningly, the Design Paper does not appear to have drawn upon the lessons from these jurisdictions on the development, implementation and performance of capacity mechanisms to feed into the design process or highlight their cost. Many findings of the European Commission's inquiry into capacity mechanisms may provide useful direction.[4]

  CS Energy's prior comments on the learnings from other capacity mechanism including the WEM are included in Attachment A.

The ESB also needs to be wary of conflating the current energy crisis with the design of a capacity mechanism, and it certainly cannot be used as a justification. The current market challenges relate to energy not capacity and the broader issues of fuel security. It may be useful for the ESB to examine why the Retailer Reliability Obligation (**RRO**) didn't perform as expected and capture these learnings as part of its development of a capacity mechanism.

Next Steps

CS Energy encourages the ESB to re-evaluate its approach and consider how to better target its mechanism to meet the required objectives. CS Energy considers the capacity mechanism as presented in the Design Paper can be simplified to effectively manage the replacement of coal plant. This would integrate efficiently with the energy market and jurisdictional schemes. A certificate mechanism to strengthen the investment signals for firming capacity should be developed in parallel.

The high-level design presented in the Design Paper is overly complex and undermined by the ESB's efforts to cater for too many broad objectives. As a result, its objective is confused, and ultimately the mechanism is designed to fail.

Given the magnitude of the proposed reform and the potential impact on consumers, CS Energy implores the ESB to take on board stakeholder feedback and focus on identifying the true need.

Any further design considerations must include rigorous cost-benefit analysis and genuine stakeholder engagement. The consultation process to date has been suboptimal at best to the detriment of the Design Paper. CS Energy has been disappointed and concerned with the process to date, including how the Technical Working Group (**TWG**) has been utilised. For example, the Design Paper was prepared in apparent isolation by the ESB and its consultants, with the most recent engagement with the TWG prior to the release of the paper on 20 June 2022 occurring on 19 April 2022.

Key stakeholders such as industry and consumers will bear the impact of poorly designed market reform and their knowledge and expertise must be respected.

[4] European Commission, *Final report of the Sector Inquiry on Capacity Mechanisms*, 2016

If you would like to discuss this submission, please contact me on 0407 548 627 or ademaria@csenergy.com.au.

Yours sincerely

Dr Alison Demaria
Head of Policy and Regulation (Acting)

ATTACHMENT A

Lessons from other jurisdictions which have implement capacity mechanisms

The below is an excerpt from CS Energy's submission to the ESB's capacity mechanism initiation paper. It is included as the learnings remain highly relevant to the considerations of the Design Paper.

International examples

The design choices of international schemes cannot be assessed without the appropriate contextualisation. This includes understanding the objectives of these mechanisms, the process by which certain design choices were developed as well as the broader energy market landscape. For example, all five cited jurisdictions operate under Day Ahead Markets (**DAMs**) where the influence of scarcity price signals is more muted than in the NEM. The PJM and CAISO DAMs apply centralised decision-making while the European DAMs have decentralised decision-making. These and other factors affect the design specifics of the capacity mechanisms.

Although the design features cannot be properly assessed, lessons can be drawn from the development, implementation and performance of these capacity mechanisms that can aid the ESB.

The common element to all five examples is that they are designed to be complementary to the underlying wholesale markets and represent last resort actions to manage periods of high system stress, with varying focus on the retention of existing resources and the development of new resources. The French, I-SEM and UK mechanisms were all developed in alignment with the European Commission guidelines and approval process. In its inquiry into capacity mechanisms[5], the EU Commission concluded that:

- Resource adequacy concerns should be addressed through market reforms first. Suggested reforms include explicitly engaging in demand-side response, making hedging products available to generators to reduce revenue risk and thereby encourage investment;

- Market-wide capacity mechanisms are likely to be the most appropriate form of intervention where there is a long-term risk that there will be insufficient investment in capacity. Strategic reserves are likely to be the most efficient transitionary solution; and

- Capacity mechanisms in EU member states must satisfy the following stipulations:
    - They are last resort mechanisms to deal with adequacy concerns and are thus are approved only for a maximum of 10 years;
    - Should not distort actual or forecast electricity market prices;
    - Careful design supported and informed by robust resource adequacy assessments;

[5] European Commission, *Final report of the Sector Inquiry on Capacity Mechanisms*, 2016

- Pan-EU harmonised approach to the assessment of reliability risk based on Value of Lost Load (VoLL) and expressed as a function of Loss of Load Expectation (LoLE) or expected USE;
- Maximise competitive price-setting as much as possible;
- Appropriate and robust penalties to incentivise delivery on contracted capacity; and
- Facilitate cross-border participation.

The ESB may benefit from further understanding the design choices of international jurisdictions prior to any assessment of their suitability to the NEM. In particular, CS Energy considers there to be many learnings from the I-SEM, given the DS3 Programme of market reform echoes the intent of the Post-2025 NEM Reform project in which the capacity mechanism was one component of a complex, integrated market reform process. Some of the learnings specific to capacity mechanisms include:

(a) <u>Need for a clear, consistent objective</u>

As discussed above, for any mechanism to be effective and efficient, there needs to be a clear objective that is transparent and consistent. For all capacity mechanisms to date, the high-level objective is a clear policy intent to be complementary to existing markets for times of high system stress.

This then needs to be reinforced with a clear metric on which procurement is based. The cited centralised, market-wide capacity mechanisms are volume-based, with the regulator setting the required quantity and a market clearing process setting the price. These generally take the form of a call option based on a strike price, thereby both tying suppliers to the capacity they sell to the market and providing a hedge against high electricity prices. In this way, they incentivise the provision of capacity at times of system stress.

The required quantity is based on a metric that reflects the desired reliability outcome:

- PJM utilises a variable resource requirement curve that sets the amount of capacity required (based on forecast peak demand and a reserve margin) and is the basis for the price formation;
- The I-SEM transitioned from a price-based mechanism to a volume-based mechanism in 2018 acknowledging the need for more specific targeting towards periods with higher load and loss of load probability. Procurement is now based on LoLE of eight hours; and
- The UK had a further objective to incentivise investment in combined cycle gas turbines (**CCGTs**).

Once the overarching objective has been operationalised into a metric, then considerations such as eligibility of participation can be determined.

For decentralised mechanisms, a clear objective is just as critical as it determines the obligations imposed on market participants:

- The French capacity mechanism is not intended to provide a reliability price signal or incentivise new investment but rather to mobilise in-market resources to manage high peak demand days. France has a highly sensitive heating load which led to the winter peak increasing by over 30% in ten years; and

- The CAISO obligation[6] has two objectives: to ensure reliability in real-time and to incentivise the siting and development of new resources for long-term reliability. This is reflected in the Resource Adequacy (**RA**) obligation which allocates a capacity requirement tiered into system, local and flexible components.

(b) Importance of integrated design

The design of any mechanism needs to be cognisant of its symbiotic relationship with all aspects of the market in which it is to be integrated. This includes the underlying market structure and revenue streams, system security, network capacity and interaction with incentive schemes.

- **Underlying market structure** - A capacity mechanism will only be effective and efficient if its interaction with the energy market is understood and minimises distortions. In the I-SEM "*coherent alignment between all revenue streams (energy, capacity, system services and others such as RESS auctions in Ireland), for market participants/service providers and this aspect needs to be carefully considered in the design of future arrangements*".[7] Furthermore, it was determined that the Market Reference Price (**MRP**) of the Reliability Option (**RO**) would be settled based on volumes sold in the DAM at the DAM reference price, volumes sold in intra-day markets at the intra-day MRP and any remaining capacity of the RO volume at the balancing market reference price. For those also providing system services, this is also considered in the settled price.

  The CAISO RA is considered against the backdrop of a capacity mechanism and reliability must run contracts.

  As power systems become more dynamic with the changing generation mix, power systems with DAMs are increasingly reliant on intra-day markets and the balancing market to manage real-time security and reliability as forecast demand accuracy increases closer to real-time. Energy-only markets such as the NEM do not have this challenge, with scarcity pricing reflecting the changing dynamics. Capacity mechanisms cannot replace the role of scarcity pricing, rather the reliance can increase depending on the exact design. Reliability options (such as those in the jurisdictions referenced) incentivise delivery by providing a hedge against high prices during system stress events and penalties for non-delivery. That is, instances of high wholesale prices are still necessary to incentivise resource adequacy, and depending on the design, establish the revenue stream from which capacity payments are made.

- **Complementarity with system service provision** – the emerging challenge of the energy transformation is the need to ensure the correct investment signals are in place to incentivise the required mix of capability to efficiently deliver system security as well as reliability. Investment signals for the provision of essential system services will be the predominant driver of this capability but "in order to ensure efficiency and delivery of the necessary flexibility, it is important that the capacity and system services market investment signals work synergistically and do not counteract one another in any way".[8]

  The design of capacity mechanisms needs to accommodate the reality that not all

[6] Note, to avoid confusion with the formal capacity mechanism in CAISO, the decentralised resource adequacy requirement is referred to as an obligation here.
[7] EirGrid and SONI, *Shaping Our Electricity Future – Technical Report*, February 2021, page.142
[8] *Ibid*, p.136

MWs are necessarily equal in this regard and needs to evolve around the incentives founded in current and future system services markets and mechanisms in order to be effective. The ESB cannot consider a potential capacity mechanism for the NEM without explicit consideration of the package of system security reforms required going forwards.

- **Power system dynamics** – the ability to deliver capacity on the necessary timescales relies not only on the supplier but is also contingent on real-time operational and transmission constraints. The capacity mechanism needs to consider real-time limitations to capacity delivery so as to avoid paying for capacity that physically cannot be delivered and thus increasing costs to consumers.

- **The role of networks** – supply is only one dimension of resource adequacy. As outlined in AEMO's *Power System Requirements*, network transport capability is also a critical component.[9] This is recognised in overseas capacity mechanisms with the EU models incentivising increased interconnection through its eligibility to participate, and PJM includes transmission upgrades as eligible suppliers.

  The ESB will need to consider network capability, the eligibility of network participation in the capacity mechanism as well as the interaction with the broader transmission investment and planning frameworks.

- **Interaction with non-market incentive schemes** – each jurisdiction has a range of policies and incentive schemes supporting investment in renewable energy, storage and demand side technologies. Eligibility for the capacity mechanism requires these incentives to be surrendered.

(c) Compliance frameworks

Some learnings may also be derived from the compliance frameworks of international jurisdictions:

- I-SEM has an opt-out framework for suppliers to suspend their obligations when undertaking a planned outage longer than three months or for unit mothballing;

- Exposure to penalties based on non-delivery at times of system stress needs to be clear and within the control of the asset (that is, default is not due to operational or network constraints);

- Non-compliance penalties for renewable resources is difficult to ascertain given the need to determine the reliable capacity of renewables from the system perspective;

- To provide assurance, I-SEM requires new providers that are successful under the auction to post a performance security and meet completion milestones ahead of the delivery year. If the new provider defaults on their delivery obligations, they are liable for termination fees;

- Performance of demand side participation needs careful consideration; and

- The compliance schemes of decentralised mechanisms can be onerous and costly. The layers of obligations in CAISO for example requires participants to submit monthly and annual forecasts and undergo regular auditing processes.

[9] Australian Energy Market Operator, *Power System Requirements*, July 2020

The compliance burden is additional to the overall effort of the implementation and administration of a second market. This includes measures addressing and monitoring performance of both supply and demand side participants as well as an assessment of network capacity and the contribution of each to reliability which is not a trivial exercise. Given the role of resource adequacy assessments, appropriate accountability and governance frameworks also need to be established.

(d) Modelling

The successful design and operation of a capacity mechanism requires robust and rigorous resource adequacy assessments. The EU investigation found a tendency for system operators to over forecast lost load especially in relation to VRE, leading to larger capacity auctions than the system required.[10]

EirGrid and SONI perform comprehensive resource adequacy assessments to determine capacity requirements including subtracting capacity procured external to the capacity market (including previous auctions). The experience in I-SEM has indicated many learnings with its modelling underpinning the capacity market:[11]

- The modelling conducted did not appropriately capture evidence from operational experience including:
  - Reliance on historical data for wind and demand and the consideration of average values didn't project accurate assessments of reserve margins;
  - Scheduled outages were optimised to occur over the summer when system demand is low when in reality this is not always the case;
  - Assumptions that interconnectors were importing or exporting simultaneously at a fixed rated capacity; and
  - Modelled system constraints and other assumptions represented a gross simplification of actual operation.

  They are looking at implementing changes to the modelling process to a forward casting approach that takes into account all technology types and different operational models such as hybrids. They are also seeking to ensure that any modelling during the qualification process for auction eligibility will also clarify the reliability needs in terms of both availability and the ability to meet dispatch instructions.
- Transparency in the scenario building process and simulations is critical as is public consultation with stakeholders;
- Demand forecast uncertainty is minimised via a stochastic approach applying a 'least worst regret costs' principle.

While not a direct issue for the NEM, resource adequacy modelling is complicated by the disparity between DAM outcomes and the physical dispatch needs. For the I-SEM, it has been found that DAM outcomes result in a scheduling of interconnections and critical plant that is inadequate for system security needs, and often leads to tight reserve margins. This

[10] European Commission, *Final report on capacity mechanisms sector inquiry*, 2016
[11] SEM Committee, *Capacity Remuneration Mechanism Detailed Design Decision Papers*, 2015-2016

is compacted by the increased inaccuracy in day-ahead wind forecasts.

(e) Performance of capacity mechanisms

Capacity mechanisms are often criticised for their tendency to over-procure and result in increased cost to consumers. The experience in Western Australia's (**WA**) Western Electricity Market (**WEM**) is testament to this. CS Energy provides the following comments specific to learnings from the performance to date of the jurisdictions identified in the Initiation Paper.

- **Trade-off between volume and price** – both the I-SEM and UK mechanisms have not incentivised the level and type of new investment that was anticipated. Under the price regulated approach, the I-SEM distributed a fixed pool of money across all capacity providers based on the calculated capacity requirement to meet the reliability standard. The shift to competitively auctioned ROs decreased the overall cost of the scheme, but the reduced prices resulted in contracts being awarded mostly to existing generators rather than new entrants. I-SEM has since identified that the rate of new capacity delivery may not be sufficient to deliver long-term resource adequacy.

  In the UK, the competitive price-discovery of the volume-based mechanism was insufficient to incentivise investment in the new entrant gas that the mechanism was intended to achieve. Successful recipients were largely small, distribution connection generation, storage and trials of demand-side response.

  Depending on the objective of the capacity mechanism, a volume-based approach based on competitive price discovery may not incentivise the desired mix of capability, particularly large-scale. The trade-off of this mix however is a higher cost of the scheme.

- **Non-delivery during stress periods** – in the four years of operation the UK mechanism has had delivery issues, with the system experiencing periods over winter with high demand and low wind generation. Concerns with its efficacy also lead to a standstill period from November 2018 to October 2019.[12]

  In the I-SEM, analysis suggests that the structure of the ROs and the intended incentive may not be as effective as anticipated.[13] One option being pursued is strengthening the scarcity pricing signal. Currently, there is expected to be a shortfall in procured capacity for the 2024/25 delivery year.

- **Delivery incentives for new assets** – new providers awarded contracts in the I-SEM had requirements of a security bond and delivery milestones. The need for a stronger incentive has been identified to ensure effective delivery. Under the original framework, projects had a long stop date for delivery which manifested in new plant potentially being absent for the first 18 months of its contracted capacity tenure.

- **Mechanisms need to be designed for the future system** – EirGrid and SONI have identified potential shortfalls in the I-SEM capacity market arising from its design being centred on the current power system and generation mix. While it may deliver resource adequacy in the short-term, it is likely that the design will need to change to facilitate resource adequacy of the future I-SEM. It has been identified that the capacity market inadvertently favours certain generation as the changing generation mix has not been

[12] Ofgem, *Report on the Operation of the Capacity Market in 2018/19*, March 2020, p.13-14
[13] Eirgrid and SONI, *Op. Cit.*, p.132

adequately defined. Work is currently underway to better align the market to the future vision.

- **Technology neutrality is caveated** – while technology neutrality is, and should be, a tenet of market design, capacity mechanisms need to acknowledge that not all MWs are equivalent in a future system that is more dynamic and needs to actively procure system security services. This is also evident in discussions about long-duration storage. Capacity mechanisms need to achieve the required balance between neutrality and incentivising the right mix of capability.

- **Transparency of costs** – given the tendency of capacity mechanisms to over-procure, it needs to be clear from the onset how "over-delivery" will be identified and reported as well as the framework to appropriately allocate the costs of this over-procurement. A poorly designed capacity mechanism has the potential to adversely impact consumer affordability.

(f) Market power considerations

Market power considerations were integrated into the I-SEM design capacity market via a principle of mandatory bidding for existing dispatchable plant. This was strengthened by the consideration of a single zone for assessing capacity needs in alignment with the single zone energy market. These actions were undertaken to encourage greater competition.

Interestingly, the EU investigations found that capacity mechanisms in member states impacted adversely on competition in the EU internal electricity market given differences in their design features and government underwriting in some instances.

Furthermore, the pan-EU trading has experienced distortions and complications with the presence of different types of capacity mechanisms (or their absence in some jurisdictions) particularly given the eligibility of interconnectors to participate. This impacted market power across the jurisdictions.

While the NEM is not interconnected with other power systems, the design principle that facilitates jurisdictions to opt-out of the mechanism may facilitate similar outcomes with respect to market power and the treatment of interconnectors.

(g) The WEM capacity mechanism

The Initiation Paper omits reference to the capacity mechanism in Western Australia's WEM from which key insights can be derived. The capacity market is volume-based and was established based on capacity requirements to meet 10 POE plus a reserve margin. Capacity was awarded two years in advance, and with contracts capped at the Long-Run Marginal Cost (**LRMC**) of a new gas turbine.

Figure 1 below shows the cumulative new entrant capacity for the years since the mechanism's implementation.[14] The average capacity utilisation of this capacity was approximately 35% at a cost to consumers of over $1 billion.

[14] Public Utilities Office, Department of Finance, *Electricity Market Review*, July 2014, p.24

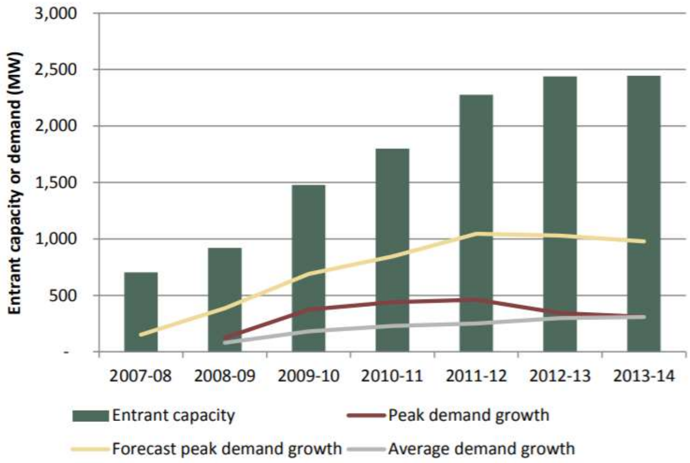

Figure 1 Cumulative new entrant capacity, demand growth and forecast demand growth

The oversupply was driven in part by the disparate treatment of generation and demand response under the scheme as well as capacity prices being unresponsive to excess capacity. The chronic oversupply forced the WA government to intervene in the scheme to reduce the capacity imbalance and reduce the costs of excess capacity borne by consumers.

The mechanism is also unlikely to facilitate the transformation of the energy sector, as contrary to the scheme's objective, the pricing structure creates price risk for investors meaning the outlook for merchant investment in flexible generation or storage is poor.