Your Ref: ERC0295, ERC0307

11 February 2021

Dominic Adams
Australian Energy Market Commission
Submitted online to: www.aemc.gov.au

Dear Dominic

Submission: Directions Paper on Reserve Services in the National Electricity Market

CS Energy welcomes the opportunity to provide a submission to the Australian Energy Market Commission's (**AEMC's**) *Directions Paper - Reserve Services in the National Electricity Market* (**Directions Paper**). CS Energy is strongly supportive of the creation of mechanisms that appropriately procure services that are critical to the effective and efficient delivery of secure and reliable energy into the future.

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 inarguably 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 market and regulatory frameworks that incentivise the provision of system services that are flexible and adaptive.

Whilst specific feedback has been provided in Appendix A to this letter, CS Energy would also like to reiterate the broader feedback and suggestions in relation to the overall process

of reviewing the services required for a secure and reliable energy system that were provided in its earlier submission to the primary frequency response consultation.

CS Energy is concerned that the consultation processes underway by the AEMC on system services will lead to a series of incremental layers over current mechanisms, the complexity of which will risk efficient and effective outcomes for consumers. In CS Energy's view, the AEMC should consider the following:

- Apply a more holistic approach to the development of system service mechanisms that captures the physical outcomes that they are each delivering while challenging the underlying frameworks where appropriate;

- Prioritise the development of operational metrics on which service procurement mechanisms are to be based, whilst ensuring that sufficient stakeholder consultation is conducted;

- Re-evaluate the timing of the processes to allow the appropriate sequencing of work that will properly inform the development of potential options and the consultation process. It is critical to allow for the necessary technical work to be completed and publicised prior to any decisions on mechanisms; and

- Consider ways in which stakeholders can assess the proposed mechanisms holistically rather than through disparate processes. This could be achieved by the AEMC establishing a stakeholder strategic working group or similar that provides umbrella assessment of the mechanisms for system services.

Responses to reserve services

CS Energy considers that the development of any reserve services mechanism needs to be founded on a clear objective which is anchored to an operational metric. The mechanism design should then provide explicit incentives to value the capability required to deliver the system needs. Any procurement should be co-optimised with existing energy and ancillary service markets.

CS Energy is concerned that the Directions Paper, which represents the third stakeholder consultation on reserve services[1], is again, ambiguous on the need yet presents an expectation that a final recommendation will be made in June 2021 by the Energy Security Board (**ESB**). As outlined in its submission to the ESB's NEM Post 2025 market reform consultation[2], CS Energy considers that there is merit in exploring reserve services in terms of a broader review of regulating services. Reserves for contingency events are already captured in the Frequency Control Ancillary Services (**FCAS**) frameworks while the increasing variability in VRE is not currently fully embedded in the Lack of Reserve (**LOR**) frameworks. Any reserve service for normal operations should be targeted at managing the increasing variability or ramping of VRE in a way that is not duplicative of existing regulation and LOR frameworks as are the options proposed in the Directions Paper. It must also consider the anticipated impact of the shift to five-minute settlement (**5MS**) on reserves and system flexibility.

CS Energy considers the existing combination of FCAS and out-of-market reserve frameworks as already capable of, or readily adaptable to, providing the capacity required to return the system to secure operation whether after conventional credible contingencies

[1] Two held by the AEMC and one by the ESB
[2] CS Energy, *Submission to ESB NEM 2025 market reform consultation*, October 2020

or new modes of failure. The AEMC should focus on assessing the need for reserves to manage variability. Developing a reserve services mechanism with competing objectives under normal and contingency operations will only result in inefficiencies.

Rather than establishing potentially arbitrary Operating Reserve Demand Curves (**ORDCs**), the AEMC should focus on establishing an operational metric that encapsulates the level of variability that can be managed economically under normal operating conditions. Only once this metric has been defined can mechanisms be designed.

CS Energy considers it possible to modify the current five-minute regulation FCAS market to include markets in different timescales and proposes that these at least be explored. This has the benefit of allowing the Australian Energy Market Operator (**AEMO**) to modify the requirements as the dynamics of the system change over time and removes the duplication arising from the options proposed in the Directions Paper. Operating reserves are also commonly embedded in regulating services in international markets.

Given that the required technical work to quantify the need for reserves to manage the variability of VRE and the impact of 5MS in incentivising flexible resources has not been performed, CS Energy is concerned that neither the AEMC or ESB will be in a position to recommend the need for a reserve services mechanism to Energy Ministers in June 2021. The AEMC should instead outline a roadmap of work, appropriately sequenced, through which it can inform any recommendation.

Further detail on CS Energy's responses to the specific questions in the Directions Paper are set out in Appendix B.

If you would like to discuss this submission, please contact Alison Demaria (Market Regulatory Manager) on 0407 548 627 or ademaria@csenergy.com.au.

Yours sincerely

Teresa Scott
Market Policy Manager

APPENDIX A

General comments on the system services consultation processes

Efficient market and regulatory frameworks are best developed via a holistic approach that diligently examines both the underlying operational needs as well as the economic outcomes and trade-offs of potential mechanisms. For system services, this strategic pathway was initiated by the AEMC in its 2017 System Security Market Frameworks Review[3] (**SSMFR**) and the subsequent 2018 Frequency Control Frameworks Review[4] (**FCFR**). These reviews sought to understand emerging operational challenges related to system security, the efficacy of current frameworks and potential adaptations to these, as well as mapping out the work required to be undertaken to inform any potential solutions.

Unfortunately, this work has not been sufficiently advanced or coordinated, at least in the public sphere, with the current consultation on system services prompted by rule change requests from industry.

The absence of a holistic approach to determining fit-for-purpose frameworks and the resultant poor outcomes was raised by many stakeholders in response to the ESB's Consultation Paper[5]. CS Energy is cognisant that the ESB has requested the AEMC pursue these rule change requests, however, in this consultation CS Energy considers the AEMC has not applied the required strategic overlay to develop efficient frameworks, in particular, with respect to the following.

(a) Overall process

In its July 2020 consultation, the AEMC acknowledged the breadth of material related to system services and proposed streamlining the consultation by grouping the rule change requests based on their "operational timeframe". This presumably explains why the Fast Frequency Response (**FFR**) rule change request was drawn into the consultation on Primary Frequency Response (**PFR**), while consultation on operating reserves is a separate process.

CS Energy agrees that it is appropriate to consider system services such as system strength independently, but the others should not be unbundled unless there is a clear mapping to their place in the broader context. As stated in its submission in July 2020[6], CS Energy considers that any grouping should be based on the operational outcome that the services are intended to deliver rather than on an arbitrary timescale.

In the absence of a clear strategic framework, the grouping as proposed by the AEMC will likely lead to inefficient outcomes through the development of a potentially complex overlay of incremental changes that overlook intricate interactions. This will likely result in a costlier and less operationally efficient outcome for the market and ultimately consumers.

The structure of this process also denies stakeholders the opportunity to assess the rule changes holistically and will limit the completeness of feedback that is able to be provided. This will likely result in unintentional outcomes or potential opportunities not being identified.

[3] AEMC, *System Services Market Frameworks Review*, June 2017
[4] AEMC, *Frequency Control Frameworks Review*, July 2018
[5] See for example, submissions from AGL, Origin, Aurora, Business Council of Australia, Energy Consumers Australia, Energy Australia, Joint submission by the Australian Council of Social Services and its signatories, Tilt Renewables, The Australia Institute.
[6] CS Energy, Submission to AEMC's *Consultation Paper – System Services Rule Changes*, August 2020

(b) Sequencing of work

The current approach to the consultation, perhaps driven by the timeframe, is, in CS Energy's view, unlikely to lead to an optimised outcome. As highlighted in the advice provided by FTI Consulting to the ESB, developing mechanisms for procuring system services first requires understanding of the need and its quantification via an explicit operational metric.[7] Without this metric, details of potential options such as procurement requirements, risk exposure and cost-recovery cannot be plausibly drafted, let alone any assessment on the efficacy of mechanisms undertaken. This sentiment was also acknowledged in the FCFR which, for example, highlighted the need to develop an understanding of the desired frequency performance within normal operating conditions[8], and set out a joint workplan with AEMO to undertake the required technical work to inform the development of any new mechanisms or changes to existing frameworks. However, AEMO's subsequent Frequency Control Work Plan published in September 2020[9] demonstrates a misalignment with the timetable of this consultation process, and more generally is focussed on the short-term needs rather than broader strategic considerations. In this regard, CS Energy's concerns include:

- AEMO's technical report on PFR advising its incentivisation framework scheduled for June 2021;

- Development of a feasible (operationally and economically) metric for frequency performance within the Normal Operating Frequency Band (**NOFB**) has not, to CS Energy's knowledge been progressed by the Reliability Panel. If it has, there has been no opportunity for industry input to date; and

- There is no work to explicitly consider reserve services and the materiality of the need.[10] The Directions Paper indicates that AEMO will be providing advice on this but there is no transparency on what this is, when it will be provided and how it will inform the options being consulted on.

The experience with the recent Coordination of Generation and Transmission Investment market review should serve as an example of the need to provide the technical detail and modelling and undertake consultation on these details earlier in the process.

Mechanisms cannot be efficiently designed if the procurement need is not understood, and stakeholders cannot comment on the materiality of an operational problem without the relevant technical information.

The sequencing concern is exemplified by the fact that any review of the Frequency Operating Standard (**FOS**) will occur *after* new mechanisms have been decided. CS Energy appreciates that the AEMC's timeframe is restricted and incompatible with the timeframe required for a FOS review, but this shouldn't circumvent due process. The AEMC, with technical advice from AEMO, could commence work on the initial stages of the assessment to establish draft operational metrics, to assist in streamlining the FOS review process when this is commenced by the Reliability Panel. The Reliability Panel can then continue to develop economically efficient metrics, which balance the trade-off between system security and cost, and review the performance of these metrics and how to embed them within the standards' frameworks.

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[7] FTI Consulting, *Essential System Services in the NEM*, August 2020
[8] AEMC, *Op. Cit.*, July 2018, p.42
[9] AEMO, *Frequency Control Workplan*, September 2020
[10] CS Energy considers reserves to be relevant to the frequency control consultations as: reserves address supply-demand imbalances (MW/time); ramping considerations are important; and some of the options proposed include co-optimising reserves with existing frequency control markets.

(c) Scope

Developing mechanisms via disparate rule changes not only has the consequence of potentially not properly capturing interactions, but it also removes the opportunity to adequately question the efficacy of the broader frameworks in which the mechanism(s) under consultation would operate. For example, it is unclear whether the existing FCAS markets are being challenged and potentially adapted. Challenges with scope can be partially addressed by considering the rule changes in terms of the physical outcome delivered.

The need for mechanisms to value system services is rooted in terms of the transformational changes to the power system yet there seems to be an unwillingness to change how one may view the frameworks and their underlying definitions. In its submission to the ESB Consultation Paper, CS Energy touched upon the need to ensure that any options developed are based on definitions, frameworks and outcomes that better reflect the future NEM. For example, understanding the new "normal" operating state given the changing generation mix will help to articulate the operational outcomes required of system services.

Instead, it appears that the default action continues to be proposing additional layers that encapsulate these changing dynamics while leaving the core unchanged. Perhaps this is the most efficient outcome, but in CS Energy's view, that is unlikely, and irrespectively this conclusion cannot be ascertained unless the full gamut of options is assessed alongside the operational need. The absence of this examination will likely serve to undermine the efficacy of any proposed mechanisms over time.

Table 1 below provides CS Energy's high-level view of the system services that need to be considered holistically by the AEMC and briefly outlines how they contribute to the operation of the NEM during normal operating conditions and following credible contingency events. Note, this does not imply that CS Energy considers these mechanisms as necessary or as separate to existing ones but serves to demonstrate a perspective that is useful, particularly to illustrate the linkages in the roles that can be performed by each service.

Service	Broad characteristics	Role in NEM normal operations	Role in NEM credible contingency
Primary Frequency Response	Governor response proportional to small frequency deviations.	Managing small deviations in frequency within the NOFB to maintain frequency as close to 50 Hz contributing to system resilience.	• Frequency is close to or at 50Hz at the time of the contingent event • Initial response to arrest the frequency change immediately following event. • PFR assists in regulating frequency as it is restored following an event during tertiary control
Rate of Change (ROC) capability	Rate of Change reflects the ability of a unit to change its output over time, often referred to as ramp rate.	Currently incorporated in energy dispatch (and dispatch price outcomes) and enables AEMO to match supply and demand. Rate of change (**ROC**) published in pre-dispatch and dispatch instructions. While ROC target applied for the 5min interval it can respond to variability in proceeding intervals providing operational flexibility.	ROC contributes to the restoration of the supply/demand balance with more ROC capability facilitating quicker recovery in the 5 min FCAS. ROC in offers for contingency FCAS
Inertia	Automatic, physical characteristic that is distinct from frequency control. Characteristic of synchronous generation and some load.	Resilience; real time response to minor frequencies	Load relief, instantaneous response to arrest frequency change
FFR	Form of frequency control; sensory response that provides fast and earlier frequency control. Proportional response to frequency. 0-2s	Nil though could potentially provide a fast reserve service if required	Contingency FCAS that arrests frequency and can stabilise also. (Can provide frequency control if capable)
Regulation FCAS	Integral frequency response provided by generators delivered on a 4-sec automatic generation cycle (**AGC**)	Manage frequency as close to 50 Hz as possible with volume procured and enabled over a 5 min period. Raise and lower services.	AGC suspended during large frequency excursions following a contingency event, reinstated after frequency restored.
Contingency FCAS	Frequency control to arrest, stabilise and restore frequency following a contingency event. Contingency capacity reserves to maintain security	Nil	Provides primary, secondary and tertiary frequency control to arrest, stabilise and restore frequency respectively.
Operating reserves	Capacity reserves held to manage operational reserves	Low reserve condition, LOR; headroom to maintain operational reliability Potential to manage variability in short-term.	Nil – these are contingency reserves except where they are utilised to replace capacity and contingency capacity reserves following a contingency event.

Table 1: Role of system services in the NEM

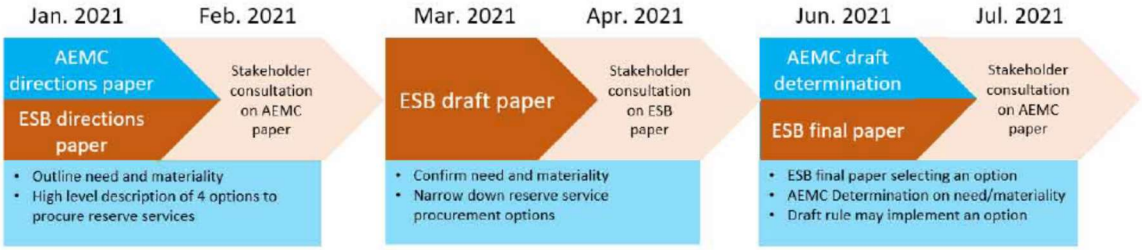
APPENDIX B

1. Reserve Services in the Broader NEM Reform

The Directions Paper on reserve services follows an initial consultation as part of the system services rule change requests in July 2020[11] and the ESB NEM Post 2025 Consultation Paper[12] in September 2020. These processes sought to gauge stakeholder sentiment on the need for reserve services and high-level design features of any potential procurement mechanisms.

The Directions Paper aims to "*further investigate the nature of the variability and uncertainty facing the power system as it transitions and a range of approaches to address it*".[13] Unfortunately, there is no substantive progression of the preceding discussions. Questions of the need and materiality of reserve services are still being posed and the four design options presented in Section 6 are inadequate for meaningful consultation. Firstly, the efficacy of a mechanism cannot be assessed without a clear underlying objective linked to operational metrics and secondly, the design of a mechanism relies on the characteristics of the underlying objective or problem. For example, determining the appropriate cost and risk allocations will depend on whether the mechanism is mitigating a problem arising from particular behaviour which then may suggest a causer-pays type arrangement as the best approach to drive the desired outcome.

It is also unclear from the Directions Paper how diligent consultation can be conducted within the timeframe as illustrated below.[14] Given that the ESB is leading the high-level direction of reform through the 2025 program, it is reliant on this consultation to provide critical input into developing recommendations to Energy Ministers on the required reforms. CS Energy is concerned that the ESB will not be adequately informed in its advice, leading to suboptimal outcomes for the NEM and consumers.



While recommendations can be proposed without understanding all the details, the timeframe and process here is insufficient to perform the necessary assessments and consultation to determine whether new mechanisms should be recommended at all. There is a high risk that a reform direction will be agreed that at best will be inefficient, and at worst, that will have yet to be identified undesirable consequences undermining the credibility of the reform process.

This risk is highlighted by the lack of detail in the Directions Paper and the sequencing of work undertaken. Reference to technical advice by AEMO is limited to a single sentence in the Executive Summary providing no transparency on scope and timing, reducing the utility of this consultation. This input is the foundations of the consultation and the AEMC should

[11] AEMC, *Consultation Paper – System Services Rule Changes*, July 2020
[12] ESB, *Post 2025 Market Design Consultation Paper*, September 2020
[13] AEMC, *Directions Paper - Reserve Services Mechanism for the NEM*, p.1
[14] *Ibid*, p.4

clearly articulate the nature of the technical advice, its expected timing and a commitment that stakeholders will have adequate time to be consulted prior to any development of recommendations even if these are to be at a high-level.

2. The Need for Reserve Services

Discussion on the need for reserve services is categorised in terms of expected and unexpected events. In its Directions Paper, the ESB explicitly stated that "*the proposed principal aim of a possible new reserve product is to address* unexpected *changes in net demand due primarily to the variability of VRE generation over the 5-30 minute time frame*"[15]. Expected events such as evening ramping and peak demand can be forecast, and clear market signals provided to participants already capable of responding to actual or forecast price volatility arising from demand changes.

Unexpected events for which reserves could be procured that are considered in the Directions Paper are:

- Net demand forecast uncertainty; and
- System security, up to the level to prevent a contingency event from resulting in involuntary load-shedding.

The nature of the need for these reserves and how they evolve over time will be different for each.

System security events

The AEMC suggests that a reserves mechanism could be utilised for system security that cannot be addressed through the current FCAS arrangements, positing that these are inflexible to new modes of failure. These shortcomings have not been clearly articulated nor is there a discussion on whether the variability and uncertainty associated with VRE constitutes a security event.

The Directions Paper does raise the potential need to redefine how contingency events are classified to incorporate the increasingly probabilistic nature of the system, however, this is contradicted by the reference to the frameworks being considered in the indistinct events rule change request. The latter focuses on high impact, low probability events and has dismissed the notion of redefining contingency events in favour of an indistinct category of events that leverages the protected events framework. CS Energy's comments specific to this are provided in its submission to that process.[16]

Thus, if ramping events are treated as changes in net demand which CS Energy argues that they should be, and the protected events framework is to cater for the new modes of failure, it is unclear what gap in managing security events this reserves service would actually be addressing.

Net demand forecast uncertainty

CS Energy agrees that the power system needs enough resources to meet net demand forecasts accounting for uncertainty and variability. With the changing generation mix, a level of uncertainty and variability will become the new norm, and the AEMC should be

[15] ESB, *NEM Post 2025 Market Reform Directions Paper*, p.44
[16] CS Energy, *Submission to AEMC Directions Paper – Enhancing Operational Resilience in Response to Indistinct Events*, February 2021

considering what level of uncertainty represents the trade-off between secure operations and economic efficiency, that is, it is not efficient to run an increasingly probabilistic system without tolerating a level of uncertainty.

Understanding this "optimal" level of uncertainty should frame how a reserves mechanism is structured and capability incentivised, as well as providing a clear linkage to other services acting to manage the supply-demand balance during normal operation such as PFR and regulation FCAS.

The Directions Paper discusses the need for reserves in terms of allowing for consideration of ramp rates and energy availability yet does not perform an assessment of the current arrangement of factoring ramp rate into dispatch. The Rate of Change (**ROC**) capability in the NEM is published in AEMO registration records and presently, the level of ROC available across the NEM is high. In fact, there is latent capability currently not being fully utilised. Participants' ROC must not be less than 3 MW/min unless there are legitimate reasons to operate below that value.[17] The participant will trade off increased ROC against incurred maintenance costs and reflect it in its bids and the forecast price. Pricing outcomes already provide this signal by reflecting the mismatch between ROC and changing demand. Greater transparency of participant ROC will result with the shift to 5MS with the potential of the 5-minute pre-dispatch to forecast ROC price outcomes enabling participants to respond to the market signal by re-offering ROC capability. While this ROC capability will change over time, clear market signals on both the need and availability of this capability needs to be considered.

This ramping capability is not necessarily available to meet net demand uncertainty as the signals are not currently complete. The Directions Paper outlines the LOR framework in place, but this does not capture the need for this net demand variability. The existing reserve assessment processes incorporate a measure of uncertainty via the Forecast Uncertainty Measure (**FUM**), but they do not incorporate a measurement of the system ramping requirement or available system flexibility to meet this requirement.[18]

The misalignment of the market signals to the system needs is familiar for system services, and the role of a mechanism to procure these services cannot assume the status quo as the baseline. CS Energy does not argue with the increased need to manage variability and uncertainty as demonstrated in AEMO's Renewable Integration Study (**RIS**) but this work is preliminary in understanding the need. Much more analysis needs to be performed by both AEMO and the AEMC to define the evolving need and how any procurement mechanisms for reserve services may be designed. This includes:

- Understanding how the introduction of both 5MS and the inclusion of system ramping requirements in market information will affect both the availability of and need for reserves; and

- Developing the ability to accurately forecast expected ramps and thus the required level of system flexibility. A key insight from the RIS was that the current deterministic approach to forecasting expected ramps is limited in accuracy. CS Energy acknowledges that improving the forecasts and determining the need for reserves will be an iterative process, but it is important to accurately assess future ramping events to properly assess the need for operational reserves and the design of any procurement mechanism.

[17] AER, Rebidding and Technical Parameters Framework
[18] AEMO, *Renewable Integration Study Appendix C*, p.53

3. Reserve Services Mechanisms

Maintaining secure operation with increasing levels of VRE will rely on "*reducing, quantifying and communicating uncertainty…. with adequate* [system] *flexibility* [achieved] *by predicting when it will be required and ensuring it can be delivered*".[19]

- **Predicting system flexibility**

  CS Energy is supportive of the measures identified by AEMO in the RIS to enhance forecasting tools and operational procedures to both improve the accuracy of net demand forecasts and the quantification of any residual risk that needs to be managed by the market. This quantification of ramping requirements and flexibility assessments is the first step in facilitating the scheduling of flexible resources. These changes need to happen regardless of any reserve mechanism.

- **Ensuring delivery of system flexibility**

  Irrespective of the mechanism, it is important to communicate the forecast uncertainty and variability to the market. This information needs to be sufficiently frequent to be factored into participants' decisions. CS Energy supports AEMO's work in evolving the Short-Term Projected Assessment of System Adequacy (**PASA)** and the view that it will include this information.

  Appropriate market signals (whether information alone or an explicit pricing mechanism) based on the quantified need can then ensure sufficient flexible resources are available. This includes the integration of new flexible resources into the NEM. AEMO's concerns about potential delays in the speed of unit commitment as discussed in the RIS will likely be assuaged by the appropriate signals and compliance frameworks.

The Directions Paper also references adapting system definitions as an option to manage this variability, specifically examining the definition of contingency events. This option is largely inconsistent with the objective to manage ramping behaviour as most events will be within normal operating conditions and so sit outside the credible continency frameworks. Furthermore, the indistinct rule change is focusing on high impact, low probability events that may arise from new modes of failure and so will not address the variability being considered in this Directions Paper. This reinforces the need to first determine a clear metric to reflect the level of variability that is to be managed.

Any potential mechanism for reserve services needs to consider the following:

- **Objective and operational metric of mechanism**

Any mechanism for reserve services first needs to have a clear objective. In this case, a potential reserve services mechanism would be managing the unexpected variability or ramping of net demand, driven largely by increased volumes of VRE.

Current frameworks such as LOR do not capture ramping events and thus LOR levels or the FUM are not appropriate metrics on which to base reserves procurement as they are presently calculated. AEMO and the AEMC should determine whether these can be modified to include ramping events and clearly communicated to the market or whether a separate operational metric is required on which the volume of procured reserves is based. In either case, there will be linkages.

[19] AEMO, *Op. Cit.*, p.61

Importantly, the AEMC should determine what distribution of ramping events be managed under normal operating frameworks. The RIS presented ramping events to 2025 both in terms of the 99th percentile and in terms of the number of ramps with magnitude greater than 10%, 20% and 30% of installed VRE capacity. A cost-benefit assessment should be undertaken to determine what this level should be, and it should be structured to be flexible over time to adapt to the changing system while still providing transparency to the market. This metric would also underpin any ramping classification tool that AEMO may develop.

A transparent and robust metric that clearly links to the mechanism's system security objective is critical and would need to have oversight from the Reliability Panel. This metric would define any so-called ORDC regardless of the specific mechanism. In all instances, the ORDC would reflect the dynamic need for reserves based the level required for secure operations.

The RIS identified infrequent days that may be more challenging for ramping events. These could be managed under the protected events framework based on an appropriate assessment such as the forecasting ramping margin falling below the largest credible risk in each region.[20]

- **Potential interactions with other regulatory frameworks**

Additional to the energy market, a reserve mechanism is likely to interact with existing frameworks as well as potential new ones and this needs to be considered in any design:

- Interaction with other system services mechanisms – the interaction of proposed mechanism with the FCAS markets is crucial. The distinction between these reserves and contingency FCAS needs to be explicit and have clear rules on when each is activated to maintain competitiveness and whether there is potential to arbitrage between mechanisms.

  The congruence of a system reserves mechanism should be considered against existing mechanisms to procure reserves such as the Reliability and Security Ancillary Services (**RSAS**) that endow AEMO with the ability to procure capacity reserves within 30 minutes for reliability or restoration of the power system to a secure operating state. Understanding of the technical need and subsequent economic analysis will provide insight into whether a reserve mechanism represents a more efficient solution in the long-term and thus the subsequent need for RSAS.

  Depending on how the reserves are defined, there are likely to be interactions with other essential system services that are activated to manage the supply-demand balance as per Table 1. The RIS also highlighted the need for these to be "*considered in the context of other essential services (including system strength and inertia), so that an enduring framework can be established to value the power system requirements that work together to maintain a secure system*".[21]

- Interaction with other mechanisms – the AEMC should consider how any mechanism interacts with the Reliability Emergency Reserve Trader (**RERT)**, the Wholesale Demand Response Mechanism (**WDRM**) and the Retailer Reliability Obligation (**RRO**) particularly as there is anticipated to be a large proportion of demand side participation in the reserves market; and

[20] AEMO, *Op Cit.,* p.54
[21] Ibid, p.63

- Potential drivers of variability – the RIS modelling focused on 2025 and thus does not capture all the potential drivers of variability that a reserves mechanism is intended to manage. Geographical diversity of VRE provides a natural dampening of the associated variability, the level of which varies between different technology types. Several jurisdictions have since announced policies to develop and invest in Renewable Energy Zones (**REZs**) with individual capacities of up to 8 GW. REZs will have an impact on the system flexibility requirements and there may need to be a trade-off between the topology of REZs and the cost to the market of potential increases in the magnitude of ramping events.

3.1. Explicit Pricing of Reserves

3.1.1. General Comments

CS Energy is supportive of a mechanism to price reserves to manage the variability of VRE once the technical need has been sufficiently quantified and considers any mechanism should be co-optimised with the energy market.

The Directions Paper outlines four potential options for explicitly pricing reserves in the NEM:

- Option 1 – Co-optimised Operating Reserve Market;
- Option 2 – Co-optimised Availability Market;
- Option 3 - Callable Operating Reserve Market; and
- Option 4 – Ramping Commitment Market.

The information provided on each mechanism precludes thorough consideration and as such, CS Energy is unable to provide an informed opinion at this stage as to whether any of the four options reflect an efficient mechanism. Identification of the high-level challenge specifies what operational outcomes are to be delivered by the mechanism. While there is general agreement on the potential need for a reserves mechanism, its precise function is ambiguous as evident in the discussion of the four proposed options and the Directions Paper more generally.

It is unsurprising that more detail cannot be provided at this stage as, in CS Energy's view, the work required to inform the development of any mechanism has only been partially completed. The RIS identifed a high-level increase in the frequency and magnitude of ramping events due to VRE but further quantification is needed.

CS Energy suggests that the AEMC undertake the necessary work before progressing any option for a reserve mechanism as per the following process:

Step	Description	Outcomes
Problem Identification	Completed at a high-level through: • Infigen Rule Change request • AEMO's RIS • ESB 2025 program **Supported by consultation**	Reserves may be required to manage unexpected ramping due to VRE
Quantification of Need	AEMO to expand RIS to further quantify the need for reserves and required characteristics to manage ramping from VRE	Understanding of the operational need for system security and system capability to deliver

Define Operational Metric	Economic assessment of the level of ramping that should be managed under a reserve mechanism **Supported by consultation**	Determination of operational metric that reflects economic trade-off of managing ramping
Mechanism Options	High-level exploration of options to procure reserves to satisfy needs, including interactions **Supported by consultation**	Outline of proposed mechanisms exploring different design features for assessment
Detailed Assessment	Appropriate cost-benefit and other technical modelling **Supported by consultation**	Detailed assessment of efficacy, trade-offs, etc. of mechanisms

As outlined earlier, CS Energy's view is that the gap in current market frameworks relevant to a reserve services mechanism is to address an economically-efficient distribution of unexpected ramping events due to VRE.

Below, CS Energy outlines some broad considerations that are relevant across all potential mechanisms before providing comment specific to each. Considerations for mechanism design include:

- **In-market versus out-of market reserves**

The proposed options consider both the in-market and out-of-market procurement of reserves but do not explore the relative merits of each. If reserves are intended to be enabled relatively frequently, then CS Energy considers in-market procurement as more efficient. Out-of-market reserves tend to only provide net benefit when their utilisation is low as evident through the RERT.

A mechanism that procures reserves in-market is advantageous as it draws more reserves into the market and reduces the risk of delays in the speed of unit commitment once activated. The introduction of 5MS is likely to incentivise more reserves into the market and so an out-of-market mechanism may be counter-intuitive.

Furthermore, as the operating conditions that reserves are proposed to manage are intrically related to the energy and FCAS markets, it doesn't make sense to separate them. As discussed in Infigen's rule change request, co-optimisation with the energy and FCAS markets is more benefical to market participants as it reduces the risk of adversely impacting the spot market, the forward contract market and their associated activities and commitments.[22]

If the mechanism was out-of-market, there is a risk that it may incentivise participation in the operating reserves market alone, negating any reliability benefits and increasing system costs. Participating in both the energy and reserves markets requires an assessment of the opportunity cost of reserving headroom against the potential forward system reserves price. Conversely, if one were able to only participate in the operating reserves market then there would be no energy opportunity cost, but availability payments would still be received even if the service was not activated. Thus, participants in the reserves market only can access a capacity payment which, depending on the exact design, may imply a higher price cap than the Market Price Cap (**MPC**) to which the energy market is bound. This will likely have the perverse outcome of incentivising "stop gap" resources.

[22] Infigen, *Operating Reserves Rule Change Request*, March 2020

Ultimately, whether a reserves service should be co-optimised with the energy and FCAS markets or not, depends on the quantification of the need and the operational metric and thus objective of the mechanism.

- **Nature of procurement**

The timeframes over which reserves are proposed to be procured have been determined based on the existing market timeframes rather than on operational need. Locking in an arbitrary timeframe may introduce a level of inflexibility to the mechanism and may not cater for the evolving system. For example, technical analysis from AEMO may highlight the need for reserves at different call times. The AEMC should not set design parameters until the appropraite preliminary work is performed.

Given the RIS identified the challenge of both ramping up and down events, the AEMC may wish to consider a more symmetrical mechanism.

- **Compliance**

The current "bidding in good faith arrangements" would need to apply and would be measurable with the existing compliance frameworks. Performance would need to be monitored for all enabled reserves whether activated or not.

- **Pricing arrangements**

It is unclear how pricing arrangements and cost recovery can be developed based on the current proposals given some of the options have dual objectives or duplication with existing arrangements. Again, pricing frameworks cannot be developed until clear operational metrics are determined.

- **Implementation costs**

The Directions Paper discusses implementation costs only in terms of the system implementation costs for AEMO. The addition of new markets adds exponentially more complexity to participant trading systems both in terms of implementation and ongoing portfolio management. These would also need to be costed. An in-market mechanism is likely to be less costly to implement for participants.

3.1.2. Specific comments on proposed mechanisms

Option 1: Co-optimised Operating Reserve Market

Option 1 intends to incentivise in-market five-minute reserves with the primary objective being to *"procure sufficient reserve capacity available to address increases in net demand for the next dispatch interval, accounting for uncertainty. This amount comprises both the expected changes in net demand and an amount able to meet unexpected changes in net demand arising from forecast uncertainty".*[23] It is unclear whether forecast uncertainty here refers to general forecasting errors as encapsulated in the FUM or is intended to reflect ramping events.

The Directions Paper proposes that the volume procured will be based on an ORDC that reflects the consumer value to avoid the probability of lost load. How this metric interacts

[23] AEMC, Op. Cit. p.41

with the existing LOR framework and energy price needs careful consideration particularly with respect to 5MS.

Depending on how the ORDC is calculated, there is also a risk that the five-minute procurement window may not facilitate the replenishment of reserves during some periods.

The operation of Option 1 appears to be a dynamic version of the current raise regulation FCAS market so could be achieved through a simple modification of the existing framework. The Market Ancillary Services Specification (**MASS**) could be amended to update the response times required from enabled technologies and would represent a more efficient integration of reserves in the market as discussed above.

The Directions Paper also states that the secondary objective of this mechanism is to "*on a rolling basis… address … specific credible contingency necessary to maintain system reliability and security over a 30-minute time horizon".*[24] This objective is confusing and duplicative of the existing contingency FCAS, power system guidelines and protected events frameworks. Furthermore, the procurement needs as reflected in the ORDC would be inflated based on this assessment leading to over-procurement and an inefficient mechanism. This would also have flow on effects on the contingency FCAS markets if operating reserves were to be activated for credible contingencies.

Option 2: Co-optimised Availability Market

Option 2 is similar to Option 1 except for the reserves being procured 30 minutes ahead of dispatch. Procuring 30 minutes ahead may provide more operational certainty for AEMO but may risk greater uncertainty in the volume procured as forecasts of variability increase in accuracy closer to real-time but it is unclear whether this difference would be material.

Similarly, with the objective to address expected and unexpected changes in net demand, this overlaps with the role of regulation FCAS and the energy price with FUM already integrated.

This mechanism may also act as a "price kicker" for the energy market.

Option 3: Callable Availability Mechanism

Option 3 extends upon the previous option by explicitly withdrawing the reserve capacity from the market with the stated objective to "*call on if there is insufficient supply in the dispatch interval 30 minutes ahead of time*".

This mechanism may be appropriate if reserves are enabled infrequently with in-market mechanisms generally more efficient for more frequent procurement. This option risks evolving into a reliability mechanism alone that could be viewed as a more frequently activated RERT scheme. Without understanding the operational metric on which this mechanism has been considered, it is difficult to provide assessment.

As per the other options, the volume procured to manage net uncertainty will be interrelated with the energy and regulation FCAS markets.

An out-of-market mechanism may also attract certain technologies over others which may undermine the diversity of responses that are required in managing system security and reliability.

[24] *Ibid,* p.iv

The Directions Paper has also proposed a variation to this option to cater for co-optimisation which is also a variant on Option 2. Reserves are procured 30 minutes ahead on a rolling basis but, unlike Option 2, only have to be callable for the dispatch interval 30 minutes ahead. Without further detail on both options, it is difficult to provide meaningful comment.

Option 4: Ramping Commitment Market

As per its submission in July 2020, CS Energy is not supportive of Delta's proposed ramping commitment market for several reasons. The Directions Paper considers the need for reserve services to meet unexpected events. The demand profile which the rule change request is addressing is considered the new normal in terms of daily load profile. It is expected, it is forecast, and clear market signals are provided to participants with participants already capable of responding to actual or forecast price volatility arising from demand changes.

The mechanism as described has a dual objective of providing regulating and contingency services which would be problematic in setting efficient procurement volumes let alone accounting for the interactions with the energy and FCAS markets.

The premise of this option thus conflicts with that of the Directions Paper, the high-level direction from the ESB with regards to reserve services and the majority of the stakeholder feedback to this proposal in July 2020.[25] Furthermore, as stated in the Paper, there is no evidence that system reserves will not be adequate to meet expected ramping. This option should not be pursued further.

[25] See for example submissions from Aluminium Council, AEMO, AGL, Clean Energy Council, Energy Australia, Engie, Energy Queensland, Enel, GE, Infigen, Meridian Energy, Reposit, Tesla, Tilt available at https://www.aemc.gov.au/rule-changes/synchronous-services-markets