AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Voluntarily Scheduled Resource Guidelines

Part of the Integrating price-responsive resources (IPRR) rule

Draft Report – Standard consultation for the National Electricity Market

Published: 03 June 2025

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New South Wales | Queensland | South Australia | Victoria | Australian Capital Territory | Tasmania | Western Australia

Australian Energy Market Operator Ltd ABN 94 072 010 327

Explanatory statement and consultation notice

The publication of this draft report commences the second stage of the standard consultation procedure conducted by AEMO to develop the Voluntarily Scheduled Resource (VSR) Guidelines (the VSR Guidelines or the Guidelines) under the National Electricity Rules (NER). The Guidelines will be developed via the standard rules consultation procedure described in National Electricity Rules (NER) 8.9.2. AEMO is developing the Guidelines as part of the implementation of the Integrating price-responsive resources (IPRR) into the National Electricity Market (NEM) reform project.

On 19 December 2024, the Australian Energy Market Commission (AEMC) made a final rule (National Electricity Amendment (Integrating price-responsive resources into the NEM) Rule 2024) to allow aggregated consumer energy resources (CER) to be scheduled and dispatchable in the NEM. The operation of the new "IPRR dispatch mode" will commence on 23 May 2027.

NER 11.180.3(a)(2) stipulates that the Guidelines must be developed and published by 31 December 2025. However, to enable the necessary AEMO and participant system development and testing, the Final Guidelines will be published by 4 September 2025.

The contents of the Guidelines are specified in NER 3.10A.3 (provided in section 4 of this draft determination).

This draft report sets out AEMO's considerations and positions in respect of the requirements and processes specified in NER 3.10A.3, for stakeholder consultation. AEMO has provided a draft of the Guidelines at this draft report stage of this consultation.

Consultation notice

AEMO invites written submissions from interested persons on the Draft Guidelines and issues identified in this Draft Determination to NEMReform@aemo.com.au by 5:00 pm (Melbourne time) on **9 July 2025**.

Submissions may make alternative or additional proposals you consider may better meet the objectives of this consultation and the national electricity objective in section 7 of the National Electricity Law. Please include supporting reasons.

Before making a submission, please read and take note of AEMO's consultation submission Guidelines, which can be found at https://aemo.com.au/consultations. Subject to those Guidelines, submissions will be published on AEMO's website.

Please identify any parts of your submission that you wish to remain confidential, and explain why. AEMO may still publish that information if it does not consider it to be confidential, but will consult with you before doing so. Material identified as confidential may be given less weight in the decision-making process than material that is published.

Submissions received after the closing date and time will not be valid, and AEMO is not obliged to consider them. Any late submissions should explain the reason for lateness and the detriment to you if AEMO does not consider your submission.

Interested persons can request a meeting with AEMO to discuss any particularly complex, sensitive or confidential matters relating to the proposal. Please refer to NER 8.9.1(k). Meeting requests must be received by the end of the submission period and include reasons for the request. AEMO will try to accommodate reasonable meeting requests but, where appropriate, we may hold joint meetings with other stakeholders or

convene a meeting with a broader industry group. Subject to confidentiality restrictions, AEMO will publish a summary of matters discussed at stakeholder meetings.

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1. Stakeholder consultation process

As required by NER 3.10A.3, AEMO is consulting on the development of the Voluntarily Scheduled Resources (VSR) Guidelines. The Guidelines will be developed via the standard rules consultation procedure in specified NER 8.9.2.

Please note that this document uses terms defined in the NER, which are intended to have the same meanings. There is a glossary of additional terms and abbreviations in Appendix A.

AEMO's indicative process and timeline for this consultation are outlined below. Future dates may be adjusted and additional steps may be included if necessary, as the consultation progresses.

Table 1 Consultation process and timeline

Consultation steps	Dates
Consultation paper published	Thursday 20 February 2025
Public forum	Friday 28 February 2025
Submissions due on consultation paper	Thursday 20 March 2025
Draft report published, including draft Guidelines	Tuesday 3 June 2025
Submissions due on draft report	Wednesday 9 July 2025
Final report and Guidelines published	Thursday 4 September 2025

AEMO's consultation webpage for the proposal is at https://aemo.com.au/consultations/current-and-closed-consultations/voluntarily-scheduled-resources-Guidelines-consultation containing all previous published papers and reports, written submissions, and other consultation documents or reference material (other than material identified as confidential).

In response to its consultation paper on the proposal, AEMO received 12 written submissions including three late submissions and four fully or partly confidential submissions. A detailed account of all public submissions have been provided in Appendix B.

AEMO also held a stakeholder workshop with network service providers on 1 May 2025 and had three one-to-one conversations with other stakeholders about their submissions.

AEMO thanks all stakeholders for their feedback on the proposal to date, which has been considered in preparing this draft report, and looks forward to further constructive engagement.

2. Background

2.1. Integrating price-responsive resources into the NEM

On 19 December 2024, the AEMC made a final determination and rule in the National Electricity Amendment (Integrating price-responsive resources into the NEM) rule change, which will allow aggregated consumer energy resources (CER), distributed energy resources (DER) and price-responsive loads to be scheduled and dispatchable in the National Electricity Market (NEM). Currently, unscheduled price-responsive resources are not able to participate in dispatch, meaning they are not effectively integrated into the NEM's planning and operation functions and are not visible to AEMO or the electricity market. Inability to participate in dispatch and energy markets, therefore, restricts these currently unscheduled price-responsive resources from contributing to the real-time matching of supply and demand and from potential value streams accessible in the market that could enhance benefits to consumers who own CER, such as regulation frequency control ancillary services (FCAS).

The AEMC's final rule is the last stage of the rule change process that was initiated by AEMO's January 2023 rule change proposal for the "Scheduled Lite Mechanism." This rule change request was developed in accordance with the final recommendations made by the Energy Security Board (ESB) to Energy Ministers as part of its Post 2025 Market Design work.

The AEMC's final rule establishes a framework, called "dispatch mode," which allows for aggregated resources, such as virtual power plants (VPPs), small stand-alone generators or energy storage systems, community batteries, flexible loads and other price-responsive resources to participate in NEM dispatch. This includes the ability to bid into the market, set spot prices, receive and follow dispatch instructions, and participate in energy markets.

The IPRR dispatch mode commences in May 2027. Alongside the dispatch mode framework, the AEMC's final rule includes an incentive framework to encourage participation in the IPRR mechanism. In addition, the AEMC has mandated a monitoring and reporting framework, to allow AEMO (and other stakeholders) to understand and manage the impact of unscheduled price-responsive energy resources on demand forecasting processes and market outcomes. AEMO will be consulting separately on both the incentive framework and monitoring and reporting framework, with information on how to engage on these consultations accessible on AEMO's Integrating price-responsive resources web page.

2.2. NER requirements

This section provides the requirements placed on AEMO by the AEMC's final IPRR rule in relation to the VSR Guidelines.

NER 3.10A.3 states that:

a. *AEMO* must develop and publish, and may amend, the *voluntarily scheduled resource Guidelines* in accordance with the *Rules consultation procedures*.

b. The *voluntarily scheduled resource Guidelines* must specify:

   1. requirements for nominating one or more *qualifying resources* as a *voluntarily scheduled resource* in accordance with clause 3.10A.1;

   2. the requirements and process for aggregation of *voluntarily scheduled resources* in accordance with clause 3.8.3, including the circumstances in which *AEMO* may request *Voluntarily Scheduled*

Resource Providers that have aggregated *voluntarily scheduled resources* to declare individual *qualifying resource* availability and operating status to *AEMO* pursuant to clause 3.8.3(f1) or to disaggregate pursuant to clause 3.8.3(b6);

3. a requirement that the *Voluntarily Scheduled Resource Provider* is *the financially responsible Market Participant* in respect of a *market connection point* nominated as a *voluntarily scheduled resource*;

4. a framework for testing the capabilities of *qualifying resources* prior to their request for nomination as a *voluntarily scheduled resource*;

5. operational requirements for a *voluntarily scheduled resource* including:

   (i) the types of data to be provided by a *Voluntarily Scheduled Resource Provider* to *AEMO* and by *AEMO* to a *Voluntarily Scheduled Resource Provider*;

   (ii) information about the requirements for telemetry and communications equipment;

   (iii) the minimum threshold for nameplate rating, or combined nameplate rating, of a *voluntarily scheduled resource*;

   (iv) the dispatch conformance criteria; and

   (v) the acceptable types of *metering installation* for participating *market connection points*;

6. the processes for:

   (i) *Voluntarily Scheduled Resource Providers* to share data with *Distribution Network Service Providers* or (where relevant) *Transmission Network Service Providers*; and

   (ii) the disclosure of data collected by *AEMO* from *Voluntarily Scheduled Resource Providers* to *Distribution Network Service Providers* and *Transmission Network Service Providers* (as applicable), including obligations of confidentiality that will apply to any such disclosures.

7. the matters required by clause 3.10A.2; and

8. any other information that AEMO considers reasonably necessary.

c. The *voluntarily scheduled resource Guidelines* must also specify zonal aggregation requirements including:

   1. a methodology for determining zones in which *voluntarily scheduled resources* participate in *central dispatch* as well as the *loss factor* that is to apply in each zone for the purpose of clause 3.8.6(h);

   2. requirements and conditions on *Voluntarily Scheduled Resource Providers* for aggregating *qualifying resources* as *voluntarily scheduled resources* in accordance with clause 3.8.3 (including that all *qualifying resources* that form part of an aggregated *voluntarily scheduled resource* must be within the same zone);

   3. guidance for *Voluntarily Scheduled Resource Providers* on processes for the aggregation of *voluntarily scheduled resources* into the zones determined under subparagraph (1);

   4. validation processes for *AEMO*; and

   5. where *AEMO* proposes to implement a change to any zone in which *voluntarily scheduled resources* participate in central dispatch (including implementing a new zone), guidance for *Voluntarily*

Scheduled Resource Providers on the processes and timing for the implementation of such change in zones, including the minimum lead time before the change would take effect.

d. In developing the *voluntarily scheduled resource Guidelines*, *AEMO*:

1. must balance costs of participation for voluntarily scheduled resources in central dispatch with AEMO's costs for facilitating participation by voluntarily scheduled resources in central dispatch;
2. must facilitate ease of participation in central dispatch for voluntarily scheduled resources;
3. may apply restrictions on voluntarily scheduled resources in central dispatch only to the extent reasonably necessary for AEMO to manage power system security and reliability; and
4. may have regard to any other matter determined by AEMO, acting reasonably, and which AEMO must specify in the voluntarily scheduled resource Guidelines.

e. *AEMO* may from time to time review the *voluntarily scheduled resource Guidelines* and, if at the conclusion of that review, *AEMO* considers that changes are necessary or desirable, *AEMO* must amend the *voluntarily scheduled resource Guidelines* in accordance with the *Rules consultation procedures*.

2.3. The national electricity objective

Within the specific requirements of the NER applicable to this proposal, AEMO will seek to make a determination that is consistent with the national electricity objective (NEO) and, where considering options, to select the one best aligned with the NEO.

The NEO is expressed in section 7 of the National Electricity Law as:

> to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system; and
>
> (c) the achievement of targets set by a participating jurisdiction
>
> (i) for reducing Australia's greenhouse gas emissions; or
>
> (ii) that are likely to contribute to reducing Australia's greenhouse gas emissions.

3. List of material issues

The key material issues arising from the proposal or raised in submissions or consultation meetings are listed in the following table:

Table 2 List of material issues

No.	Issue	Raised by
1.	AEMO's overall balancing of participation with system security and costs	EEC Incite Energy Jemena Red and Lumo SA Water SwitchDin
2.	VSR zones 1. Zone setting methodology 2. Option to use congestion-based VSR zones 3. Impact of a change in zones after three years 4. Interactions between VSR zones and distribution and transmission network boundaries, including network constraints 5. Impact of zone selection on existing aggregations or unscheduled qualifying resources in the NEM, including interactions with minimum size threshold for a VSR 6. Allocation of a loss factor of one for all VSRs, regardless of zone 7. Requirements, conditions and processes for VSRPs forming VSR aggregations within the proposed zones 8. Minimum lead time for a change in zones set to 6 months	AGL (items 2, 3, 4, 5, 6) EEC (items 3, 4, 7) EnergyAustralia (items 2, 3, 4, 5) Enel X (items 1, 3, 4, 5, 6, 8) Ergon & Energex (items 1, 2, 3, 4) Incite Energy (item 4) Jemena (items 2, 3, 4) Powerlink (item 4) Red and Lumo (items 2, 3, 5, 6) SAPN (items 2, 3, 4) SA Water (items 2, 3, 4, 5, 6) SwitchDin (items 2, 3, 6)
3.	Nomination of a VSR 1. Support for a larger threshold 2. Support for a lower threshold 3. Other aspects related to nomination	AGL (item 1) EnergyAustralia (item 2) EEC (items 1, 3) Enel X (items 2, 3) Ergon & Energex (item 1) Incite Energy (item 2) Red and Lumo (item 1) SAPN (item 2) SA Water (items 2, 3) SwitchDin (items 2, 3)
4.	Portfolio management 1. Circumstances where AEMO may request Voluntary Scheduled Resource Providers (VSRPs) that have aggregated qualifying resources to declare individual qualifying resource availability and operating status 2. Processes for managing NMI churn that result in VSR dropping below minimum size or above 30 MW 3. NMI churn that occurs without customer permission by a financially responsible market participant (FRMP) not responsible for the NMI, or accidentally by a customer and may impact operation of a VSR 4. Systems and processes available to VSRPs for portfolio management	AGL (item 4) EEC (item 4) Enel X (items 1, 2) EnergyAustralia (items 1, 2, 3) Incite Energy (item 2) SA Water (items 2, 3, 4) SwitchDin (item 1)
5.	Capability assessment (including telemetry and communications equipment) 1. Frequency of aggregated telemetry data required, and considerations for impact on VSRs of different technology types 2. Cyber security considerations with aggregated telemetry requirements	AGL (item 1) Enel X (item 1) EnergyAustralia (item 1) Incite Energy (item 1) Red and Lumo (item 1)

No.	Issue	Raised by
		SA Water (items 1, 2) SwitchDin (item 1)
6.	Deactivation and temporary hibernation 1. Notice periods for mode switching 2. Intra-day mode switching for VSRs	Enel X (items 1, 2) EnergyAustralia (item 1) Incite Energy (item 1) Jemena (item 2) Red and Lumo (items 1, 2) SA Water (items 1, 2) SwitchDin (item 1)
7.	Bidding 1. Simplicity of the bidding framework	Incite Energy (item 1) SA Water (item 1)
8.	NEMDE processes 1. Interactions between constraints and VSRs 2. Guidelines inclusions	Incite Energy (item 1) SA Water (item 2) SwitchDin (item 2)
9.	Dispatch 1. Near real time visibility for Distribution Network Service Providers (DNSPs) 2. Battery state of charge information	Jemena (item 1) SA Water (item 2)
10.	Conformance 1. Selection of the Error Trigger threshold and how it will apply to VSRs 2. Consideration of aggregations with mixed or particular technologies that may struggle to linearly ramp and dispatch at exact bid increments 3. Alignment between VSR dispatch conformance and retailer settlement processes 4. Interaction between conformance and impact of reasonably unforeseeable network limits	AGL (item 4) Enel X (item 2) Incite Energy (item 3) Red and Lumo (item 1) SA Water (item 2)
11.	Metering 1. Metering requirements for qualifying resources within a VSR 2. Interaction between metering and aggregated telemetry data requirements	EEC (item 1) Enel X (item 1) SA Water (item 2) SwitchDin (item 2)
12.	Data and information sharing 1. Granularity and scope of data required by DNSPs to manage VSRs 2. Near real-time changes to the VSR/VSRP/zone level 3. Confidentiality and consent associated with data sharing between VSRPs, AEMO and Network Service Providers (NSPs) 4. Data retention periods 5. Inclusion of embedded network managers in data sharing processes	AGL (item 1) EEC (item 1) Enel X (item 3) EnergyAustralia (item 1) Ergon & Energex (items 1, 2) Incite Energy (item 1) Jemena (item 2) Red and Lumo (items 1, 2) SAPN (items 1, 3) SA Water (item 5) SwitchDin (items, 3, 4)

A detailed table of issues raised by stakeholders in written submissions to the consultation paper, together with AEMO's responses, is contained in Appendix B.

Each of the material issues in Table 2 is discussed in Section 4.

4. Discussion of material issues

4.1. AEMO's overall balancing of participation with system security and costs

4.1.1. Issue summary and submissions

Under NER 3.10A.3(d), in developing the VSR Guidelines, AEMO must balance costs of participation with AEMO's costs for facilitating participation, and facilitate ease of participation with restrictions on VSRs that AEMO consider reasonably necessary for AEMO to manage power system security and reliability.

SA Water in their submission questioned whether AEMO has accurately articulated the level of risk VSRs pose to NEM system security and reliability. Explanation behind this questioning provided included a note that VSR expected on day one of IPRR are already operating in the market without visibility by AEMO.

Incite Energy stated AEMO is failing to ensure that the VSR framework supports broad participation without imposing undue complexity or barriers.

SwitchDin argued some key aspects of the proposed guidelines are driven by limitations in existing systems, and that these limitations perpetuate biases that favour larger established market participants, and present barriers to entry for new participants with novel models.

The EEC considered that the technical specifications are required to determine whether this balance has been met.

Red and Lumo was of the view that AEMO's proposal did not strike the right balance in its consultation paper. To correct this balance, they have suggested changes to the non-conformance process which are discussed in section 4.10 of this draft determination.

Jemena also noted that, while the rules explain the overall process of VSR and VSRP engagement with respect to grid reliability, as a DNSP they would like to know detailed information about the control aspect of CER/VSR and Guidelines around the same between the VSRP and DNSP. They also noted it would be helpful to have included in the Guidelines clear roles and responsibilities between DNSP, Distribution System Operator (DSO) and VSRP.

4.1.2. AEMO's assessment

AEMO appreciates the feedback it has received from stakeholders on this matter, and is strongly supportive with the intent of NER 3.10A.3(d) to ensure that the VSR Guidelines appropriately balance participation with system security and costs.

In relation to these submissions, AEMO acknowledges the need to clearly articulate and explain to stakeholders its concerns and reasoning behind requirements included in the VSR Guidelines.

In response to Jemena's comments, and submissions from stakeholders that will be presented throughout, AEMO has provided the following information on NEM reforms as they relate to the integration and management of DER/CER in the NEM. Further, for clarity to stakeholders, AEMO considers that the dispatch instructions and target that a VSR will receive from AEMO is of a lower priority than the individual qualifying resource network limits that are under the relevant distribution or transmission connection agreement. In cases where a dispatch target from AEMO may breach individual network limits at the distribution or transmission level, re-bidding by VSRPs will be required to ensure that the network limits are not breached.

Interactions between IPRR and the National CER Roadmap

AEMO notes that for CER/DER to be managed on networks by NSPs and integrated into the NEM by AEMO, many elements need to come together, as articulated in the interjurisdictional National CER Roadmap.

Under the National CER Roadmap, AEMO considers the following two workstreams will be important in facilitating IPRR and addressing concerns that have been raised regarding the selection of VSR zones, data sharing between VSRPs and DNSPs and amongst other factors:

- Future roles & responsibilities workstream (DSMO M3/P5), which includes:
  - Defining the roles and responsibilities for improving visibility and predictability of CER, including the need for centralised, real-time data, monitoring of power flows on low voltage (LV) network and forecasting.
  - Control hierarchy, and guidance for customer agents (in this case, VSRPs) on the hierarchy for commands received from DNSPs, and targets received from AEMO.
- CER data sharing workstream (M2):
  - Defines what data needs to be shared and how it will be exchanged for different use cases (e.g. for sharing of network limits).
  - The workstream considers IPRR design when identifying data sharing capabilities for different use cases.
- Establish secure communication systems for CER devices (T3) (led by National Energy Public Key Infrastructure (NEPKI)):
  - Includes establishing a not-for-profit entity to manage Public Key Infrastructure (PKI) to operate and manage authentication of communications with CER.

For the first two workstreams, public consultation will occur in July 2025, with a final report and recommendations to be taken to the Energy and Climate Change Ministerial Council (ECMC) for consideration and next steps in Q4 2025.

4.1.3. AEMO's conclusion

Options to support and reduce barriers to participation are analysed and discussed in the following sections.

These matters include:

- The minimum size threshold for VSRs which has been reduced to enable faster growth, as described in section 4.3.2.
- VSR dispatch conformance, which has been adjusted to be less onerous for small VSRs but more appropriate for larger VSRs, as explained in section 4.10.2.

AEMO seeks to ensure it is appropriately articulating the risks that VSR operations pose over time and to ensure it is transparently reporting any concerns where they exist.

AEMO has also provided more detail in this report around the cost considerations for changes in the guidelines that may require fundamental system changes and consequently could outweigh benefits.

4.2. VSR zones

4.2.1. Issue summary and submissions

All twelve submissions provided responses regarding the selection and application of VSR zones. VSR zones are the network boundaries, within the network, where qualifying resources aggregated within a VSR must be connected. VSR zones are a key factor in enabling participation in IPRR, and AEMO and stakeholders have highlighted the need for VSR zones to strike the right balance between supporting participation and AEMO's needs to manage power system security and reliability. Submissions identified several key factors relating to VSR zones and these are set out below.

Zone setting methodology

Jemena stated other key factors to consider when setting VSR zones now and in the future include the growth rate of VSR/VSRP, and the security of data and access to the data with the right level of roles.

Ergon & Energex noted that inconsistency between zonal classifications for VSRs and Wholesale Demand Response Units (WDRUs) may cause confusion among proponents which may impact consumer outcomes when engaging with service providers.

Enel X did not identify any material issues arising from an inconsistent approach in zonal classifications between VSRs and WDRUs, as they expect there will be little overlap between the pools of resources suited to the IPRR dispatch mode versus the Wholesale Demand Response Mechanism (WDRM).

Option to use congestion-based VSR zones

Ergon & Energex and EnergyAustralia supported the use of congestion-based VSR zones.

Ergon & Energex were supportive of congestion-based VSR zones in striking the right balance between size and the ability to manage transmission level constraints.

EnergyAustralia supported the creation of VSR zones based on congestion zones and noted that it strikes the right balance between allowing for small enough zones to support market forecasting and operation, and maintaining a sufficiently large area to support participants being able to meet the minimum capacity threshold across a single dispatchable unit identifier (DUID). They have added that this model is also aligned with WA's use of a transmission node identifier (TNI) as a basis for integrating VPPs into the market.

Meanwhile, Red and Lumo, SwitchDin, SA Water, Enel X and SAPN did not agree with the use of congestion-based VSR zones and rather favoured use of NEM regions.

Red and Lumo suggested that the large regional zones that are currently in place in the NEM will result in the aggregation of more NMIs compared to other smaller zones supporting the development of VSRs.

SwitchDin stated that starting with NEM regions is a good approach to support VSR formation in the early phase when participation is expected to be limited.

Enel X suggested that provided the size of VSRs remains small relative to other dispatchable resources, and there is an insignificant influence on transmission network congestion and power system security assessment there is little benefit in VSR zones smaller than NEM regions.

SAPN did not support the current proposal to use congestion modelling zones as the bounds for VSR zones, arguing the use of congestion modelling zones is likely to restrict early VSR uptake, particularly when coupled with AEMO's proposed capacity threshold of 5MW for VSR registration. SAPN also noted how the setting of VSR zones and VSR minimum size and their impact on participation are inherently coupled.

SA Water did not support the proposed use of congestion modelling zones based on the information currently provided, and support interim use of NEM regions. They noted however that a target state for NEM zones should be establishing a common approach to zoning in the NEM used by all participants, especially AEMO, Transmission Network Service Providers (TNSPs) and DNSPs.

Red and Lumo proposed that NEM regions would be best suited to be adopted as VSR zones and not congestion zones. They were of the view that large regional zones that are currently in place in the NEM will result in the aggregation of more NMIs compared to other smaller zones supporting the development of VSRs.

Impact of a change in zones after three years

AGL, EnergyAustralia, Ergon & Energex, Red and Lumo, and SwitchDin all raised concerns on the impact that a change in zone would have in response to AEMO's proposal of the option to commence with NEM regions and switch to congestion-based VSR zones after three years.

AGL, EnergyAustralia, Ergon & Energex, and Red and Lumo all raised concerns about the disruption that a change in zones would cause, particularly to the formation of VSRs and the potential VSRP investment being stranded, if their VSRs would no longer meet the minimum threshold requirement due to re-zoning.

Enel X supported the use of NEM regions as VSR regions in the early years of IPRR implementation with a transition to zones based on congestion only where necessary, noting the impacts a change in zones may have by requiring the disaggregation of VSRs and how a 1 MW minimum size could mitigate this concern.

SAPN and SA Water supported the option to commence with NEM regions, with SAPN supporting a transition to congestion modelling zones over time as the volume of VSRs increase.

Interactions between VSR zones and distribution and transmission network boundaries, including network constraints

The EEC, EnergyAustralia, Enel X, Ergon & Energex, Jemena, Powerlink, and SA Water all commented on the interactions between VSR zones and the distribution and transmission network boundaries.

The EEC noted that larger zones that cross distribution network areas may pose challenges associated with multiple network providers, however, acknowledged that accounting for individual site constraints is technically possible with the appropriate systems and technology and that this could present the most effective use of demand-side resources.

Ergon & Energex highlighted that sufficient VSR data will be needed to manage VSR impacts at more granular levels, and that the issue of data sharing and management of the DNSP versus customer versus VSRP relationship will present an issue regardless of how the zones are split.

Ergon & Energex and Jemena both commented on additional complexity for VSRPs associated with having to manage portfolios across different distribution networks. Jemena commented on the need for a common format across DNSPs when providing Dynamic Operating Envelopes (DOEs) and therefore their preference for the distribution network boundaries over congestion zones to set VSR zones.

SAPN noted that they did not see a need to align VSR zones with DNSP network boundaries and would suggest that doing so would unnecessarily restrict VSR uptake, referencing the significant effort currently underway to

ensure that the rollout of DOEs and emergency backstop functions by DNSPs is done in a nationally consistent fashion.

AGL identified the complexity that will be associated with misalignment between retail offers, that are coupled with distribution network areas, and the use of congestion-based VSR zones. AGL also noted that, if the VSR zone cuts across two DNSP zones, qualifying resources will be subject to different DOEs (and approaches of dealing with network constraints) from different DNSPs.

SwitchDin noted that the VSR zones largely ignore distribution network topology despite the constituent CER being connected to the distribution network, and Incite Energy said substation level zones are needed as VSR may offer non-network solutions under the Regulatory Investment Test.

Powerlink recommended that AEMO systems consider the relationship between NMI, TNI and VSR zones to enhance operational flexibility of VSRs, such as the opportunity to contract with VSRs to resolve local transmission level concerns resulting from planned outages or contingency management if the capability can be summated to a TNI.

Powerlink noted that greater power system opportunities for VSR may be visible if able to understand the capability at a TNI level.

Impact of zone selection on existing aggregations or unscheduled qualifying resources in the NEM, including interactions with the minimum size threshold for a VSR

AGL in their submission stated that they currently have a VPP portfolio that operates across NSW, SA, Victoria and Queensland, which as of FY24 consisted of 1.25 GW of decentralised assets under orchestration.

EnergyAustralia noted they have community batteries in the Endeavour and Essential distribution networks that would not qualify unless the zone is large enough to be aggregated across Ausgrid also.

Enel X shared that their VPP operates across NEM regions, and that selection of zones smaller than NEM regions would impact the feasibility of establishing VSRs in Enel X's VPP, but that the VPP is capable of coordination at a network area/feeder level if required. SAPN commented that many VPPs today are in a nascent state, with few being likely to have sufficient resources aggregated within a single congestion modelling zone to participate as a VSR.

Finally, SA Water argued that the choice of zones would affect aggregation options within their portfolio, which may result in some possible VSRs they are considering being unable to be offered.

Allocation of a loss factor of one in dispatch for all VSRs, regardless of zone

AGL, Enel X, and Ergon & Energex agreed with a loss factor of one in dispatch. Ergon & Energex noted that retail customers already have a loss factor applied in settlements as required under the NER, so it is appropriate losses are not "double counted." Enel X added that it supported AEMO's view that the complexity of implementing loss factors in dispatch for VSRs outweighs any market scheduling efficiency benefits that may arise from applying a notional loss factor to a zone.

Red and Lumo did not agree with loss factor of one in dispatch, arguing it is inconsistent with arrangements for scheduled and semi-scheduled generators, who are subject to marginal loss factors meaning that allocating a loss factor of one would unfairly privilege VSRs over other types of generation.

SA Water did not oppose the proposal for a loss factor of one in dispatch, but also wanted an approach that maintains consistency of treatment between VSRs and other registered participation units through alignment

between the zone and loss calculations. SA Water suggested if VSR zones were NEM regions that the MLF be at the RRN, but if smaller zones are selected to try link the loss factor to the Transmission Connection Point (TCP).

SwitchDin commented that one possible issue with using a loss factor of one in dispatch is that it ignores any constraints between the distribution and transmission networks, or within the distribution network where CER are actually connected.

Requirements, conditions and processes for VSRPs forming VSR aggregations within the proposed zones

The EEC noted that the requirements include that the VSRP will be responsible for ensuring resources within each VSR comply with their individual distribution connection agreements, but at the same time, the VSRP will have no visibility of this distribution agreement and related network limits so further consideration should be given to this requirement.

Minimum lead time for a change in zones set to 6 months

Enel X recommended in their submission that AEMO's minimum lead time for a change in zones is set at 12 months, as a 12 month transition period is better aligned with common end user flexible demand resource contracting terms and tenures.

4.2.2. AEMO's assessment

Zone setting methodology

As a first step in identifying the suitability of the appropriate zone classification, AEMO identified details of the existing zone classifications. These details are captured in Table 3 below.

Table 3 Existing zone classification that could be used for IPRR

Type of zone	Number of zones	Features
NEM regions	5	Spot price set for each NEM region corresponding to the NEM states and territories. NEM region zones no longer to be used in NEMDE, and only used in a very small number of constraint equations.
Load Forecasting Areas	8	Used in the development of pre-dispatch and short-term load forecasts Used in the implementation of the *wholesale demand response* mechanism.
ISP sub-regions	12	Used to improve the granularity of optimisations previously assessed across the five NEM regions.
Distribution network areas	13	Areas serviced by *Distribution Network Service Providers (DNSPs)* to supply electricity to end-users.
Congestion modelling zones	17	Also called sub-regional zones, are currently used in vast majority of the constraint equations used for *central dispatch*. Also used to perform congestion modelling and analysis.
Renewable Energy Zones (REZs)	43	Used to cluster large-scale renewable energy projects and supporting network infrastructure.

AEMO then identified the key factors that it considered to be important to the assess the suitability of existing zone classifications. These factors are included in this report, but also form part of the Draft Guidelines.

Table 4 Factors to assess the suitability of existing zone classifications

Factor	Explanation
Size and ease of participation	Larger zones will, generally, contain more *qualifying resources* and therefore be more likely to support the development and growth of *voluntarily scheduled resources*.
Transmission system security	Zones must be set in a way that supports *AEMO*'s effective management of *power system security* at the transmission level.
Load forecasting	Zones must be set in a way that allows *voluntarily scheduled resources* to be effectively integrated into the load forecasting process.
Balance voluntarily scheduled resource risk to system security over time	Consider size of impact, including the expected *voluntarily scheduled resource* growth rate, and therefore risk that *voluntarily scheduled resources* will have on *power system security*.
Stability	Changes to VSR zone boundaries will be potentially highly disruptive to *voluntarily scheduled resource* operations and development, and therefore should be minimised.
Be consistent with future backstop arrangements and related activities	Ensure VSR zones are compatible and support backstop arrangements.

In response to Jemena's comment, AEMO believes that the growth rate of VSRs/VSRPs is considered in AEMO's approach to balancing VSR risk to system security over time. It has referenced the expected VSR growth rate in this factor.

In relation to Jemena's other comment regarding the security of data and access to the data with the right level of roles, AEMO does not consider that this is a factor influencing zone selection. Rather, that data security and access is relevant across IPRR, and is captured in Data and Information sharing (section 4.12).

Selection of VSR zones, including interactions with distribution networks and the option for a change in zones after three years

AEMO hosted a follow-up workshop with DNSPs and TNSPs to discuss key matters within the VSR Guidelines that matter the most to them based off feedback received in submissions. The first of these topics was the selection of VSR zones. During the workshop, there was general agreement that distribution network areas would not be suitable for use as VSR zones, given that the varying size of the distribution networks would result in unfair zones across the NEM, with distribution network areas in Victoria for example being significantly smaller than the other distribution networks.

During the workshop, AEMO also presented further reasoning behind its proposal to use congestion-based VSR zones, and on the option to commence with NEM regions initially before transitioning to congestion-based VSR zones. AEMO highlighted how the existing 17 transmission congestion zones are used in constraint equations within AEMO's NEM Dispatch Engine (NEMDE) to manage transmission congestion in a particular area. The congestion zones allow for zone demand forecast, which is available in the Demand Forecasting System (DFS), and are widely used in AEMO and externally by NSPs. This is in comparison to the NEM regions that do not accurately reflect the correct limitation in the network for the areas where congestion presents.

Considering these factors, AEMO believes that the use of congestion-based VSR zones would mean that transmission congestion could be managed correctly and accurately using constraint equations. The use of these zones could also avoid time consuming and resource-intensive changes to AEMO's systems that would be required to incorporate VSRs into transmission-level constraint equations and modelling. In the option to

commence with NEM regions and then transition, the congestion-based VSR zones would still require an initial update of every constraint equation and model used within AEMO's systems.

Overall, the identified existing zone classifications in the previous sub-section were assessed against AEMO's suitability factors to determine the most appropriate zone classification that could be used for VSR zones, as shown in Table 5. The ISP sub-regions and Renewable Energy Zones were excluded from the assessment given their lack of suitability:

- The ISP sub-regions were developed for forecasting purposes only, and are not used for operational purposes.
- The Renewable Energy Zones do not have sufficient geographic coverage of the NEM.

Table 5 Assessment of existing zone classifications against suitability factors

Type of zone	Size and ease of participation	Transmission system security	Load forecasting	Balance voluntarily scheduled resource risk to system security over time	Stability	Be consistent with future backstop arrangements and related activities
NEM regions	High	Low	Low	High	High	High
Load Forecasting Areas	Medium	Low	High	Medium	High	Low
Distribution network areas	Low	Medium	Medium	Medium	High	High
Congestion modelling zones	Medium	High	High	Medium	High	Medium

Following the above assessment in Table 5, transmission congestion modelling zones were determined to be the most appropriate basis for VSR zones.

To further clarify AEMO's methodology that's been applied to determining the suitability of congestion zones, Figure 1 below illustrates the process of making this decision.

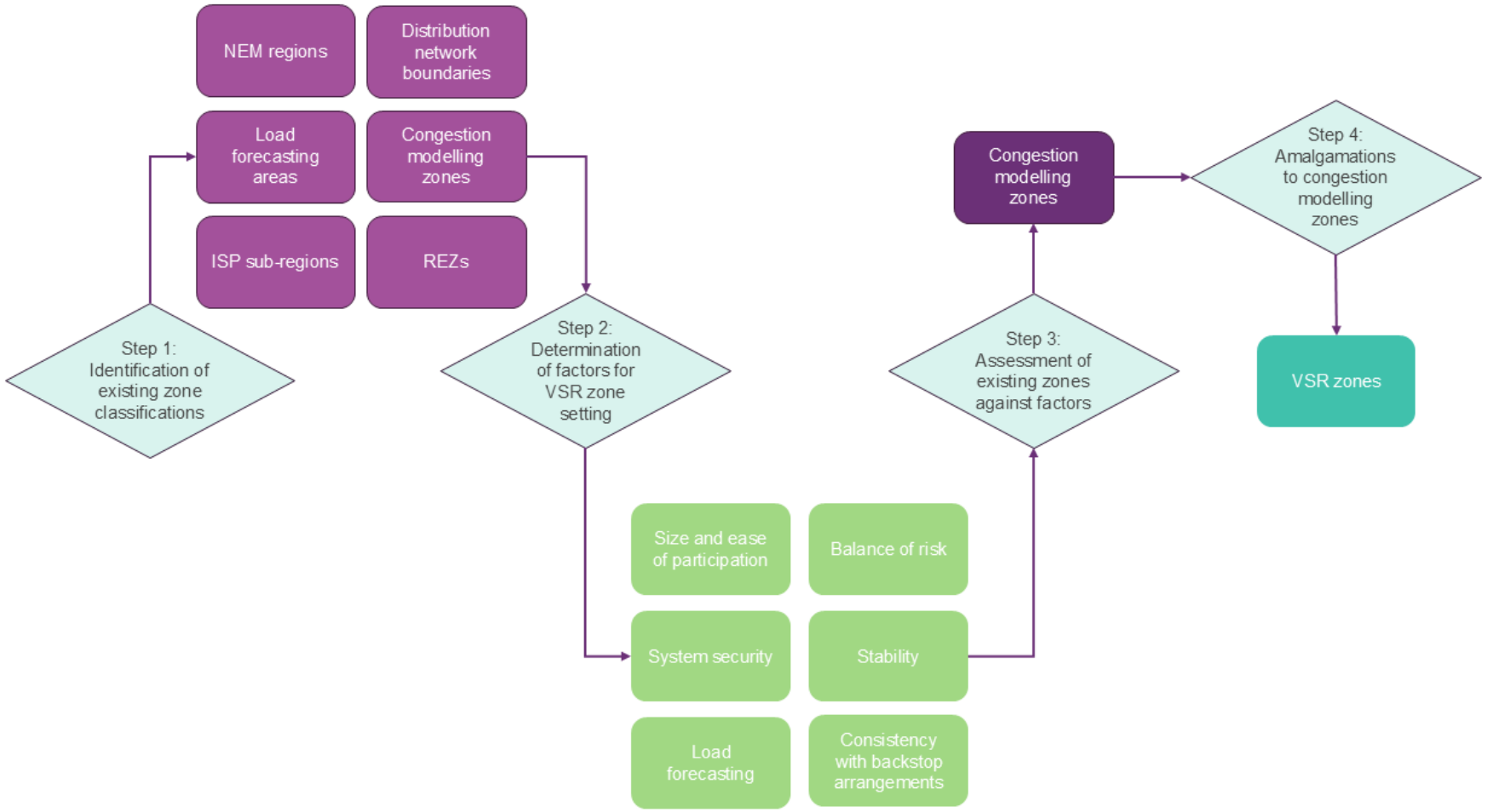

Figure 1 AEMO's methodology for determining zones

To extend the above reasoning behind AEMO's proposal to use congestion-based VSR zones, AEMO also would like to provide the following general scenario to assist stakeholders' understanding, considering the NSW region, in which there are four VSR zones as shown in Figure 3.

For a scenario where AEMO is trying to manage the imports into NSW from Victoria, transmission congestion during this instance often presents in the Southern Sydney zone and in the Canberra area of the NSW Southwest + Canberra zone. If NEM regions were selected as the VSR zones, a node for the aggregated VSR would have to be placed in the Sydney area, which could worsen the congestion situation in AEMO's modelling, opposed to placing the VSR on a node in the Southern Sydney VSR zone. This is because the aggregated VSR could have completely opposite factors in the constraint equation managing this congestion by placing the VSR on a node in the Southern Sydney zone versus on a node in the Sydney area.

Table 6 Proposed VSR zones and constituent transmission-level congestion modelling zones

	Proposed VSR zone	Constituent congestion modelling zones
Queensland		
1	Q_CENTRAL	CENTRAL_QUEENSLAND_EXCIND
2	Q_NTH + Q_FARNORTH	NORTHERN_QUEENSLAND_EXCFNQ FAR_NORTHERN_QUEENSLAND
3	Q_SOUTHWEST + Q_SOUTHEAST	SOUTH_WESTERN_QUEENSLAND SOUTH_EASTERN_QUEENSLAND
New South Wales (NSW) and Australian Capital Territory (ACT)		
4	N_NORTH	NORTHERN_NSW
5	N_SWNSW + N_CANBERRA	South West NSW CANBERRA_NSW
6	N_SYDNEY	SYDNEY_NSW
7	N_CENWEST	CENTRAL_WESTERN_NSW
Victoria		
8	V_MELBOURNE	MELBOURNE_VIC
9	V_STATEGRID	220kV network outside Mel (Stategrid)
Tasmania		
10	TAS	TAS REGION NORTHERN_TASMANIA_EXCWT NORTH_WESTERN_TASMANIA WESTCOAST_TASMANIA

South Australia (SA)		
11	S_ADELAIDE + S_NORTH + S_RIVERLAND	ADELAIDE_SA NORTHERN_SA RIVERLAND_SA
12	S_SOUTHEAST	SOUTH_EASTERN_SA

AEMO has also further considered the 13 proposed VSR zones from the consultation paper. AEMO now considers that it can amalgamate two of the South Australia zones to result in a total of 12 VSR zones as outlined in Table 6 above. Figures 2-6 below provide visual representations of the VSR zones against the representative distribution network areas.

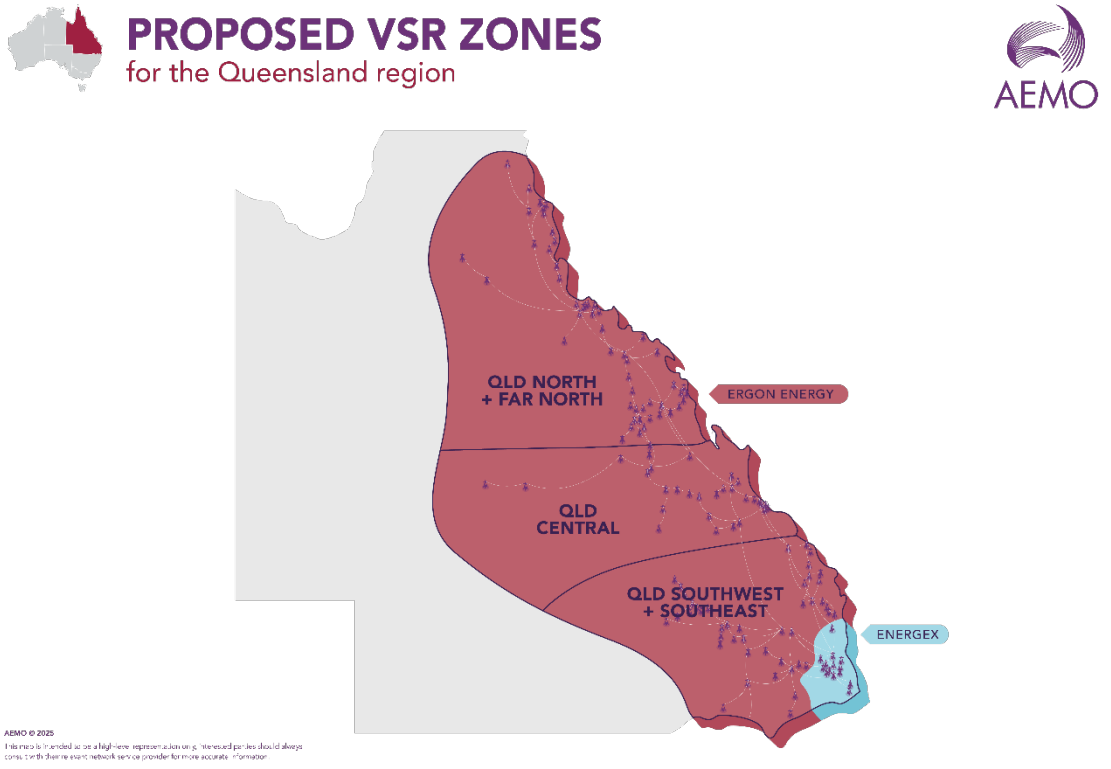

Figure 2 Queensland region proposed VSR zones

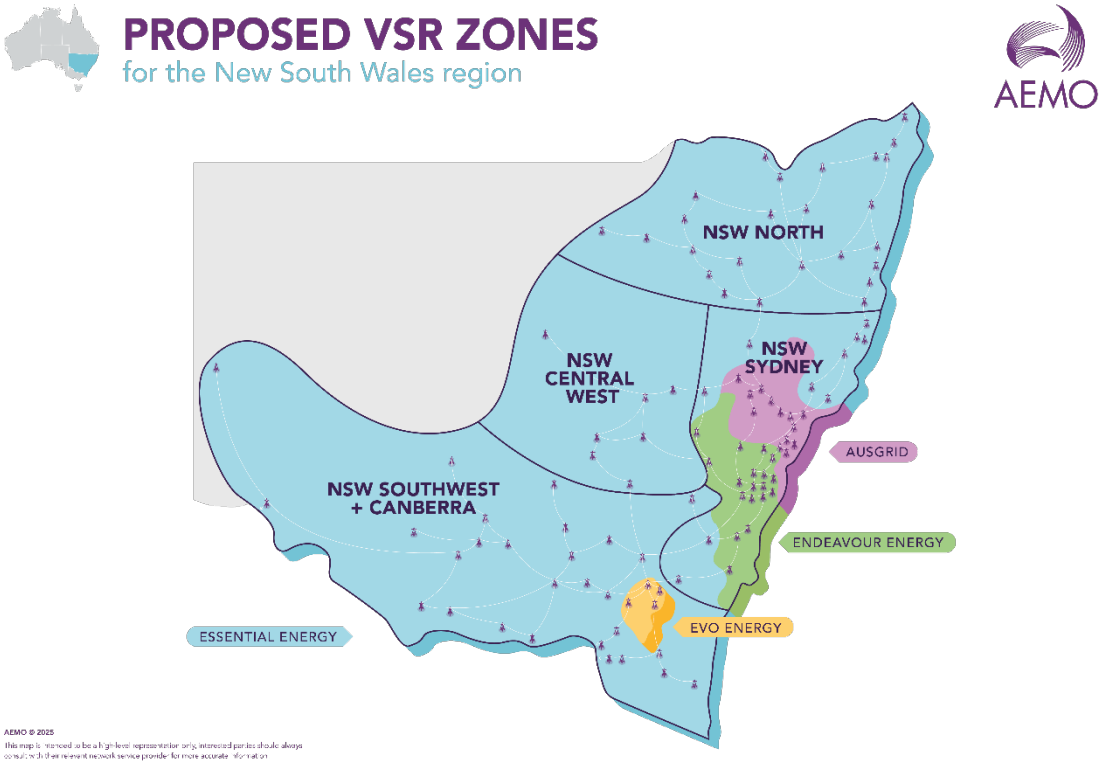

Figure 3 New South Wales region proposed VSR zones

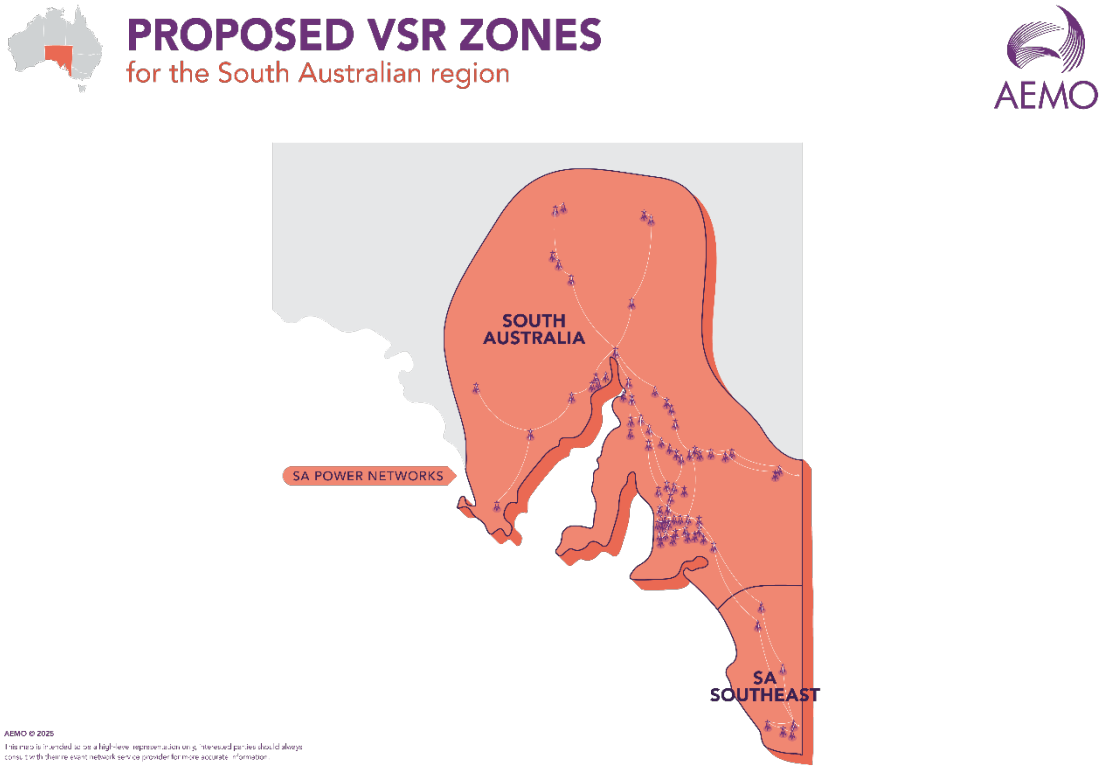

Figure 4 South Australia region proposed VSR zones

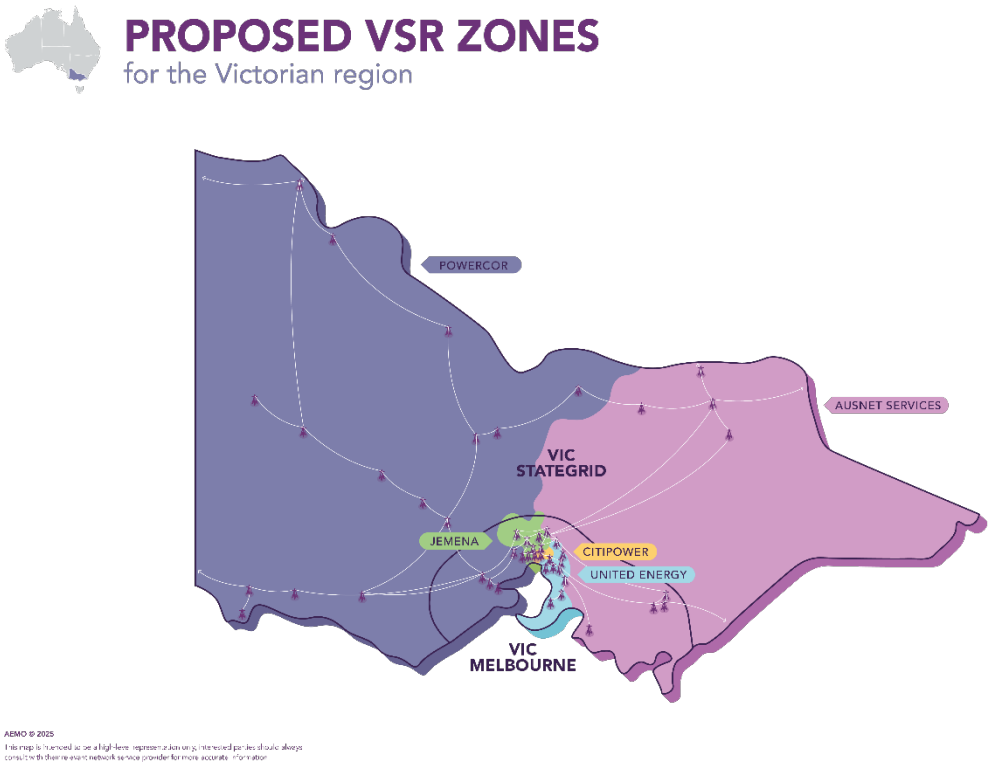

Figure 5 Victoria region proposed VSR zones

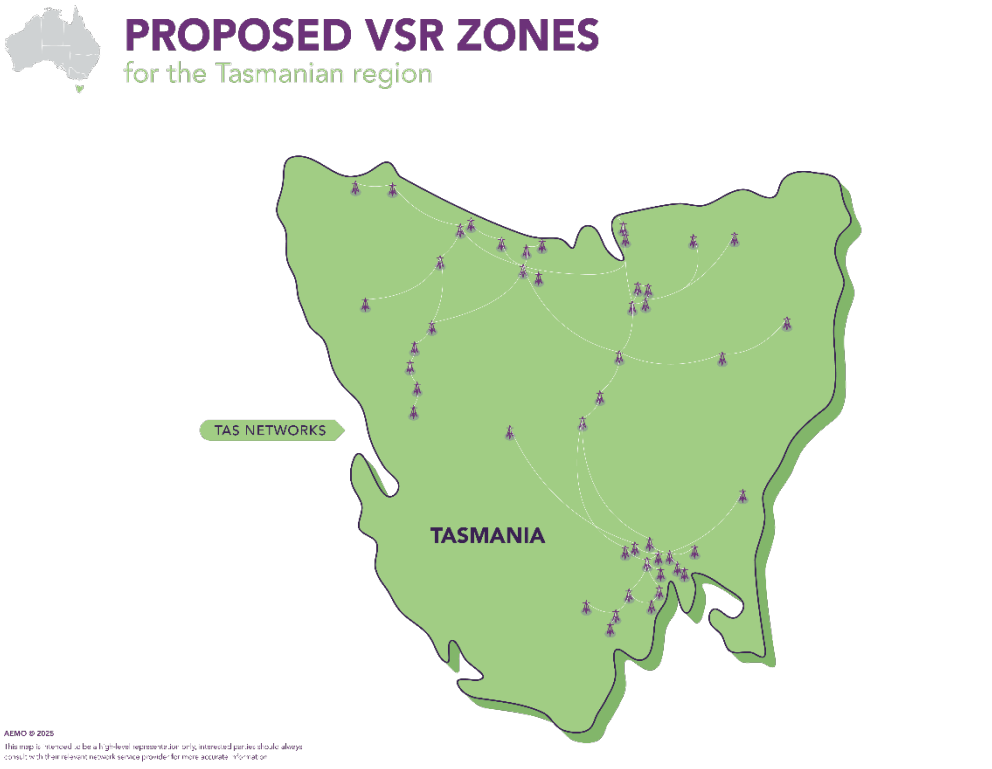

Figure 6 Tasmania region proposed VSR zones

Transmission versus distribution constraint management using VSR zones

The IPRR framework is about facilitating direct access to the wholesale market, including bidding, dispatch, and scheduling, and as such does not provide a framework for DER/CER to provide local network services to DNSPs. Rather, AEMO considers that DER/CER will be able to do so via separate agreements with DNSPs.

VSR zones therefore must be set to manage transmission-level congestion, with the selection of VSR zones appropriate at a transmission-level given that limits advices are developed on a regional basis (whereas in distribution networks, limits advices are developed around a service franchise area). AEMO does not expect to receive or to manage DOEs, and distribution-level limits are not intended to be incorporated or managed by NEMDE.

AEMO considers that VSRPs will be required to consult with DNSPs so that they can capture DOEs in the VSR bidding profile. This will require appropriate data sharing processes between DNSPs and VSRPs. Consideration for these data sharing arrangements will be facilitated through AEMO's CER Data Exchange. The implementation for the CER Data Exchange will commence from July 2026, which means that by the commencement of IPRR in May 2027, there may be some form/mechanism to allow the sharing of common DOE formats between DNSPs and VSRPs.

Considering transmission versus distribution level constraints

For either the use of NEM regions or congestion-based VSR zones, VSRPs will also need to establish processes to manage NMIs within a VSR that are across distribution network areas. In relation to Jemena's comment on the need for a common format for DOEs across distribution network areas, AEMO would like to highlight the work currently underway on the CER Data Exchange, as highlighted in the box above.

The above also addresses the EEC's comment about VSRPs needing distribution network connection agreement- and network limits information for qualifying resources in their VSR, which has been further considered in section 4.12.

Implementation requirements for congestion-based VSR zones

During the NSPs workshop, AEMO also presented its understanding of the systems and processes, as well as data and information sharing, that would be needed by industry to make congestion-based VSR zones workable. This includes addressing the need for:

- VSRPs/FRMPs to know which NMIs are in which zones so that they can nominate and operate VSRs
- DNSPs to know which NMIs are in which zone to understand and monitor the active qualifying resources within any VSRs on their network.

AEMO acknowledges and agrees with stakeholders on the importance of accommodating and supporting the use of transmission congestion-based VSR zones in AEMO's systems. AEMO will implement the necessary changes to ensure that this can occur, and will seek industry's support and feedback in facilitating this work.

The main requirement will be that each NMI can be mapped to the relevant VSR zone. To do so, AEMO perceives that its systems will need to:

- Map between NMIs and TNIs, as is currently supported via AEMO's retail systems.

- Map TNIs to the relevant congestion zone or VSR Zone, which AEMO cannot currently perform for all TNIs. This is because approximately 10% of AEMO's TNIs are not mapped to the zone substation, which is what defines the transmission congestion zones and VSR zone boundaries.

Interaction with the minimum size threshold

AEMO is also cognisant of feedback it has received regarding the balance between the selection of VSR zones and the minimum size threshold for a VSR. As has been outlined in section 4.3.2 on the VSR minimum size, AEMO has sought to reduce the minimum size threshold for a VSR to support participation within the sub-regional congestion-based VSR zones.

Determination of loss factor(s)

In relation to comments received on AEMO's proposal for all VSRs regardless of zone to receive a loss factor of one, AEMO considers that this is still the most appropriate option. AEMO does not consider that the allocation of a loss factor of one will unfairly support VSRs compared to existing scheduled participants in the NEM. This is because AEMO is not considering any changes to VSR settlement calculations to what is currently done as part of AEMO's energy retail settlements process. This includes that:

- An aggregated meter read for the VSRP/FRMP for each TNI and class will be performed.
  - These aggregate meter reads are already adjusted for distribution loss factors (DLF) in the metering system prior to being sent to Settlements.
  - Aggregated gross generation and consumption energy values are produced as inputs for the non-energy cost recovery calculations.
- The energy calculation that is then performed is energy amount ($) = energy MWh x RRP x TLF (Transmission Loss Factor), where the TLF is for the TNI and sourced from the registrations system stored data.

This settlements method means that the VSR DUID can be comprised of a combination of NMIs with different TNIs and therefore TLFs. As the NMIs in the VSR can change over time through NMI churn, NMIs that are within a VSR will continue to be aggregated with any other NMIs that the VSRP/FRMP owns on each TNI and delivered in the same way as is done now for energy settlements.

AEMO notes that with this method, a VSR can be paid if their generation exceeds consumption within their portfolio. This is no different from what can happen today, such as if a small retailer had a large portfolio of rooftop solar PV and residential batteries.

Minimum lead time

AEMO considers it appropriate to extend the minimum lead time for a change in zones to 12 months rather than the six months that was proposed in the consultation paper.

4.2.3. AEMO's conclusion

For the reasons set out above, AEMO has selected transmission congestion zones as the basis for VSR zones in the Draft VSR Guidelines.

AEMO proposed 13 congestion-based VSR zones in its consultation paper. AEMO now considers that it can amalgamate two of the South Australia zones, as shown in Figure 3 and established in the Draft Guidelines.

AEMO will commence work with industry on the implementation requirements to support and enable the use of congestion-based VSR zones, specifically around ensuring visibility (where appropriate) of which NMIs are within which VSR zones.

AEMO has maintained its proposal for all VSRs regardless of zone to receive a loss factor of one.

AEMO has extended its minimum lead time for a change in zones to 12 months.

4.3. Nomination of a VSR

4.3.1. Issue summary and submissions

The nomination of a VSR represents one of the most important aspects of implementing the IPRR rule. This is because this process determines the key features that will dictate how VSRs will first enter and then operate in the NEM.

Within the nomination process, the minimum size and minimum bid size of VSRs are of critical importance, but the application process itself and notice times around nominations are also fundamental pieces of implementing the IPRR rule.

Ten stakeholders commented on AEMO's approach of nomination of VSRs in their submissions. Two stakeholders submitted confidential submissions.

Most of the submissions were centred around minimum aggregation and bid size requirements.

Submissions supporting a larger threshold

Ergon & Energex supported AEMO's proposal of a minimum combined nameplate rating of 5MW for dispatch to manage the challenges associated with handling a larger number of smaller VSRs by AEMO's control room, and its alignment with the existing standing exemption from registration of 5 MW.

Red and Lumo did not support implementing an initial lower VSR rating threshold and then increasing it as dispatch mode capability grows. They noted that VSRs will become a significant source of generation in the future and as such, larger VSR nameplate rating requirement that is proportional to the forecast size of this generation would be warranted. Red and Lumo, while acknowledging that the smaller the VSR nameplate rating the easier it is to form a VSR, pointed to potentially significant administrative problems that AEMO would face including handling small units in AEMO's control room. They also supported a 1 MW bidding threshold.

AGL supported the 5 MW threshold, but noted that it would need to review the technical specifications to comment further. In their view for residential NMIs in order to determine nameplate rating contribution, there must be either a static or dynamic baseline referenced, at the assets or the point of connection.

Submissions supporting a lower threshold

Incite Energy stated that even a 1 MW threshold would be a barrier to entry and there should be no lower limit, as it would reduce competition and be in direct conflict with the market objectives. They also added that the definition of qualifying resource is static and is anticipated to be problematic in a dynamic environment, questioning whether it is needed, and whether simply the metering installation is sufficient (without AEMO involvement or consideration of behind-the-meter assets).

Incite Energy strongly opposed AEMO's minimum nameplate or combined nameplate rating of 5 MW, adding that there was no good reason for this limit other than AEMO seeking to protect incumbent players from new

entrants. In their view, during the introductory period, participants should be limited to an upper limit of 5MW, thereby ensuring all VSR participants are treated equally during the introductory period.

EnergyAustralia supported adopting a low minimum threshold for VSRs for participation and bidding, stressing that the threshold should not create a barrier to use of the VSR mechanism. They also noted that AEMO should be cognisant of how a 5MW threshold would translate into smaller scale assets which are starting from a very small capacity threshold.

EnergyAustralia cited the example of average home battery system size being 10KW, which, with 88% asset availability would make it impractical to create a 5 MW sized VSR. EnergyAustralia have included examples of their community battery sizes that were, in most cases lower than the 5 MW threshold. They questioned the 5 MW threshold on the basis of many batteries and loads currently sized between 4 and 5 MW, which, in their view, the AEMC rule change was intending to incentivise to participate on a singular basis.

EnergyAustralia disagreed with increasing the capacity threshold over time, as this could strand existing investments made by participants in becoming a VSRP.

SwitchDin supported setting the threshold as low as possible to encourage participation, noting that the current value of 5MW is way too high for this and AEMO should consider a lower value, even if only initially. They also supported lowering the initial nameplate rating, but suggested that it be maintained or even reduced over time to allow for broader participation. SwitchDin suggested that AEMO should be actively working to remove barriers to entry for players with portfolios of large numbers of small capacity VSRs. Finally they believed the minimum bid threshold should also be reduced to 100 kW.

The EEC suggested that in order to encourage a larger number of participants, that a lower threshold should be set to 1 or 2 MW to encourage a wider diversity of participants and technology.

SAPN noted that the VSR registration threshold of 5MW would require a VSRP to aggregate multiple sub-5MW batteries together in order to participate as a VSR. In their experience, an increasing number of proponents are seeking to install sub-5MW battery systems, with many parties only operating a single battery. SAPN was of the view that it was unlikely that a VSRP would be able to aggregate assets of such size and different ownership into a single VSR, which would thus significantly reduce the ability of these resources to participate as VSRs in general. SAPN also noted that for distributed CER VPPs, they expect many of these would not have 5 MW of aggregated resources available within the state and therefore would be restricted from registering as a VSR.

Enel X submitted, that based on their experience as an aggregator the 5 MW threshold would be a material barrier to entry, particularly for aggregations utilising resources smaller than 0.5MW per site. This concern was further elaborated the time it would take to build a portfolio of 5MW, the impact on achieving commercial operation and meeting conditions for incentive payments. They have noted that the proposed 5MW threshold is unintendedly biased toward supporting aggregations of larger resources.

Enel X supported an initial lower VSR nameplate rating threshold that adapts as dispatch mode capability and capacity grows and recommended a 1 MW minimum threshold for nameplate rating or combined nameplate rating. They have questioned the relevance of AEMO's proposed alignment with the standing exemption from registration of 5MW and requested AEMO state the benefits of such an alignment.

Enel X agreed with the 1 MW bidding threshold, suggesting that together with the 1 MW aggregation threshold it presents the most technology/participant agnostic building block option.

SA Water submitted that if the 1 MW bid size is not lowered, a 1 MW minimum VSR size would also be of limited value and the minimum bid size should drive the minimum aggregation size. In their view both conformance (also affected by NMI churn) and bidding becomes difficult for VSR portfolios that have relatively large loads with

non-integer capacities, if bidding is only available in 1 MW blocks. They added that registration can be delayed if the composition of available NMIs for registration an aggregated VSR is not an integer multiple of 1MW. In SA Water's view a 1 MW nameplate unit will not be capable of being dispatched for energy and a 1 MW minimum bid size coupled with a 1 MW nameplate rating requirement will not allow units to participate in both FCAS and energy markets. SA Water has also supported increasing minimum nameplate rating requirements over time, provided its evidence based and in line with the IPRR rule.

Submissions on other aspects of nomination

Five stakeholders commented on AEMO's approach on the VSR nomination process – other than minimum thresholds. One stakeholder provided a confidential submission.

Enel X appreciated the proposal to add an API as an alternative to a manual CSV upload as is currently required. They added that the availability of both a system-to-system API and a manual CSV upload facilitates aggregators with varying maturity and technology platforms.

SA Water did not support an API based nominations system if it was the only way to submit nominations. In their view it could potentially increase the cost of participating in a VSR. The also noted that the requirement for VSRP should reflect the requirement for FRMP as these supersede some of the VSRP requirements and potentially these categories could be combined.

SwitchDin, however, supported an application programming interface (API) based nomination system as in their view it provides an opportunity for automation and reducing management overheads.

SA Water believed that registration for FCAS should be a separate process to VSR nomination and capability assessment. If this was not the case, VSRs registered for FCAS could be exempted from some VSR capability assessment components due to an equal or higher standard being applied through holding a FCAS registration.

SA Water also suggested that some of the issues with the responsiveness of the current proposal could be addressed if AEMO were better able to separate VSR creation and NMI nomination to a VSR, noting rule requirements that some criteria must be demonstrated as part of forming a VSR. SA Water's proposition for this was for AEMO to require pre-qualification of each NMI as being suitable to participate in a VSR prior to VSR nomination.

The ECC expressed concerns that the requirement of a VSRP having to be the FRMP could limit participation in some cases, including the preclusion to participate in WDRM or other market services. In their view, these relationships should be flagged to the customer and to the market through MSATS. The EEC also considered that the requirement that the VSRP is also the FRMP may also pose a barrier to the participation of smaller aggregators, unless they partner with a FRMP, and recommend that the requirements, conditions and processes for VSRPs are designed in a way which allows broad participation, which may mean establishing specific Guidelines specifying how smaller aggregators can participate without being a FRMP.

4.3.2. AEMO's assessment

Minimum threshold for nameplate rating, or combined nameplate rating, of a VSR

The minimum size for a VSR is a key parameter for dispatch mode participation. The smaller the minimum threshold for the VSR nameplate rating, the easier it is to form a VSR and participate in dispatch mode.

The term nameplate rating is set in the NER, and means the maximum continuous output or consumption in MW of an item of equipment as specified by the manufacturer, or as subsequently modified. In relation to qualifying resources and VSR, nameplate and combined nameplate rating will be treated the same as for bidirectional

units, whereby the nameplate and combined nameplate rating is measured separately for output and consumption.

In the consultation paper AEMO listed the following key factors to consider when setting a minimum VSR threshold:

- AEMO expressed a preference for a minimum threshold for VSR nameplate or combined nameplate rating to be 5 MW. This was to manage the challenges associated with handling a larger number of smaller VSRs by AEMO's control room, and its alignment with the existing standing exemption from registration of 5 MW.
- The minimum bid size of 1 MW for bidding which is consistent with the current NEM system minimum.
- Consistency with:
  - WDRUs where the "maximum responsive component" needs to be a minimum of 1 MW, aligned with 1 MW bid threshold.
  - Small resource units (SRUs) providing contingency FCAS need to be a minimum capacity of 1 MW, also aligned with the 1 MW bid threshold.

Stakeholders were divided on the issue of setting the minimum VSR size. Because of the large number of submissions AEMO did not address each stakeholder's submission individually; instead the key arguments are presented and responded to below.

Supporters of AEMO's originally proposed 5 MW threshold brought attention to the:

- Difficulty of handling a large number of VSRs by AEMO's control room.
- Opportunity to align with the existing standing exemption from registration of 5 MW.
- Trade-off between VSR zone and threshold sizes, in which having a higher threshold is more preferable.
- The possibility of adjusting thresholds in subsequent Guidelines consultations depending on the growth velocity of VSR portfolios.

A large number of stakeholders, however, argued against a 5 MW threshold, due to the:

- Impracticability of having to aggregate multiple resources that have a nameplate rating over 4 MW.
- Apparent contradiction with the AEMC's rule that was intending to incentivise batteries and other resources under 5 MW to participate on a singular basis.
- Long period of time it might take to build portfolios of such size.
- Possible exclusion of currently operating VPPs below this threshold.
- Unintended bias toward supporting aggregations of larger resources and existing participants with such larger resources in their portfolio.
- The limitation it would place on the diversity of participants and technology.

AEMO identified two key (and competing) priorities in determining a minimum threshold for VSRs, which are:

- Fostering growth, inviting new, innovative players to the market; and
- The operational challenges AEMO will have to solve with the number of increased data points and participants.

Operational challenges include readjusting current tools control rooms are using to manage the power system, ensure higher impact information is not crowded out by a range of relatively small impact units. This is because during lack of reserve or minimum system load conditions, critical information must be made available as soon as possible and any delay can have dire consequences for the power system.

Increased number of small units can also negatively affect critical market systems and create delays in processing times.

A higher number of participants, including ones that are relatively new to the market, may also lead to increased number of non-urgent, lower value phone calls to control rooms, which, depending on the state of the power system may lead to distracting staff from solving urgent operational problems.

AEMO, however, is of the view, that these operational challenges, can be mitigated by appropriate uplifts in AEMO's systems, and updating internal and external communications processes and expectations.

AEMO understands that in the process of building viable VSR portfolios, lower thresholds provide better opportunities for both existing participants and potential newcomers, looking to become VSRPs. A lower threshold will support the entry of both relatively large (already covered by the current small bidirectional unit category type, or just below the current 5 MW registration threshold) and relatively small resources (such as residential, commercial or community batteries).

Because of the reasons set out above, in its draft Guidelines, AEMO has altered its original position and has set the minimum nameplate or combined nameplate rating for VSRs to be 1 MW.

Interactions between minimum nameplate rating to determine minimum size and the minimum bid threshold

Stakeholders were divided on the issue of setting the minimum bid threshold for VSRs.

Supporters of AEMO's originally proposed 1 MW threshold brought attention to the:

- Importance of having a technology and participant agnostic solution.
- Fact that WDRUs and FCAS aggregators managed to overcome the challenges of a 1 MW minimum bid size.

Supporters of lowering the threshold pointed to the issues with:

- Conformance, if units could only bid in integers (i.e. multiples of 1 MW blocks).
- NMI churn that could result in a decrease of available capacity for bidding, bringing it below the 1 MW threshold.
- Nameplate ratings being always higher than units could deliver and therefore, bid for.
- FCAS and energy co-optimisation.

AEMO has found that the key (and competing) priorities in determining a minimum bid threshold for VSRs are:

- fostering growth and inviting new, innovative players to the market; and
- the cost and complexity of enabling bidding rules different from current ones.

In its final determination of the IPRR rule, the AEMC, while acknowledging that the 1 MW bid limit may limit some participation, reiterated its position that the integer MW bidding increment should be maintained[1].

[1] See: https://www.aemc.gov.au/sites/default/files/2024-12/Final%20determination.pdf

AEMO's current systems accept bids in integers, however, dispatch instructions are not limited to integers only and can include kW precision. It is understood that the minimum 1 MW bid size has been widely accepted by the industry and relatively new entrants such as WDR providers and FCAS aggregators were able to incorporate this limitation into their business models and processes.

AEMO recognises that conformance of sufficiently large units that have non-integer dispatchable capacities and are unable to modulate their load or generation could pose challenges. However, if non-integer bids were allowed, the same issue could still persist, as there is no guarantee that NEMDE would dispatch the whole of capacity that was offered into the market. In which case, participants would still face the same issue with conformance. It must also be noted, that with the change to AEMO's original position about conformance (see section 4.10 on conformance) VSRs below 30 MW will be less affected by conformance issues in general.

The draft Guidelines ensure appropriate processes are put in place to manage the consequences of NMI churn and this is further explained in section 4.4.2 of this draft report. It must also be noted that if a VSR's capacity reduces below the 1 MW bidding threshold, but it continues to bid in integer values, the conformance process will still record this discrepancy and participants will be able to identify it.

AEMO recognises that nameplate rating will, in most cases, be higher than what VSRs can submit bids for. The consequence of this for a VSR with a 1 MW nameplate rating is that in practice it won't be able to submit valid bids, if its dispatchable capacity is only 0.8 or 0.9 MW. Because of this, in the draft Guidelines and as part of the nomination process, AEMO is requiring VSRs not only to comply with the 1 MW nameplate rating threshold, but also to be able to demonstrate that they're capable of submitting valid bids. This includes the ability of submitting a bid of at least 1 MW of size.

With regards to the submission of FCAS and energy bids, AEMO's systems would not preclude submitting bids of equal sizes for both, depending on the service, as long as the bid complies with the FCAS trapezium set for the unit. As previously mentioned, NEMDE can dispatch non-integer values. Because of that a 1 MW bid submitted for energy and for FCAS could be both satisfied by being dispatched for decimal values.

VSR participation in Regulation FCAS

Since the consultation paper, AEMO has identified further matters regarding the requirements for a VSR to provide Regulation FCAS. AEMO notes that regulation FCAS is a very important service in the market as it is the process that continuously manages frequency variability within the NEM's five-minute trading intervals. AEMO is supportive of aggregations providing regulation FCAS to current quality standards, reflecting the significant contribution of regulation FCAS to system security. AEMO expects energy resources such as standalone or aggregations of community batteries would be well placed to provide this service.

The market ancillary services specification (MASS) contains:

- A detailed description of each kind of market ancillary service.
- The performance parameters and requirements which must be satisfied for a service to qualify as the relevant market ancillary service, and also when a market participant provides the relevant kind of market ancillary service.
- Verification procedures for market ancillary services.

Currently in the MASS, aggregated ancillary service units providing regulation FCAS are required to have Automatic Generation Control (AGC) or equivalent functionality to ensure the resource is able to meet the dispatch target requested by AEMO to supply regulation FCAS.

However, AEMO considers this requirement may not be sufficient to capture all requirements relevant to aggregated units or loads participating in regulation FCAS to ensure the response from the aggregation has a meaningful impact on system frequency. This is because understanding the aggregate coordination and contribution of several, geographically dispersed, small, potentially sub 1 MW resources to stabilising system frequency would require further analysis.

As such, AEMO may need to commence rules consultation to update the MASS to consider technical requirements of VSR aggregations providing regulation FCAS.

AEMO will draw learnings from ongoing pilot projects to aid the formulation of appropriate requirements to support the participation of VPPs in contingency FCAS.

Requirement for the VSRP to be the FRMP

In response to the EEC's comments on the requirement for the VSRP to also be the FRMP, and its impact on small aggregators, AEMO notes the following:

- The requirement for the VSRP to be the FRMP was included in the IPRR framework by the AEMC. Dispatch mode requires a party that pays spot prices, that is the FRMP, to facilitate the participation of qualifying resources aggregated into a VSR in central dispatch.
- AEMO expects to see new retail models introduced, including hybrid arrangements between retailers and aggregators or vendors to manage a VSR, as noted by the EEC on the requirements for small aggregators to participate with retailers. AEMO also notes the option for small aggregators to obtain their own retail license and participate in central dispatch and be spot price exposed.
- IPRR, alongside the Flexible Trading Arrangements[2] reform, can support the participation of demand responsive loads, including those with multiple connection points or secondary settlement points (SSPs) which are not eligible to participate in the WDRM.

AEMO has not considered any changes to MSATS as part of its IPRR implementation. AEMO notes however that the gap of information sharing on off-market services that a customer is providing has arisen in the National CER Roadmap Data Sharing Project, as detailed in section 4.2.2.

Other aspects of nomination

AEMO agrees with SA Water that registration to provide FCAS should go under an appropriate evaluation that does not create inconsistencies among the requirements between VSRs and other resources with respect to providing FCAS.

In response to SwitchDin, Enel X and SA Water's submissions on using an API for the nomination process, it is AEMO's intention to allow the use of API as one, but not the only method.

In response to SA Water's proposition of including a pre-qualification for qualifying resources before the nomination process where they are aggregated into a VSR, AEMO notes that this was an element of the draft rule developed by the AEMC. In the final rule however, the AEMC refined the Rule regarding VSR nomination to clarify that each individual resource is not required to go through the nomination process before being aggregated. As such, the final rule allows AEMO to undertake the nomination approval under clause 3.10A.1 and the aggregation approval under clause 3.8.3 concurrently, which allows for a more streamlined nomination

[2] See: https://aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/flexible-trading-arrangements

process. AEMO does not perceive significant value will be added by separating this process, noting AEMO's implementation of the VSR nomination process has included an automated pre-screening to check that individual resources are qualifying resources.

While not mentioned by stakeholders in their submissions, AEMO would like to reiterate that for VSRPs, no new participant registration category will be created. Market participant registration will occur through AEMO's existing registration form for new Market Participants on AEMO's website[3].

Data and information requirements for VSR nominations

Since the consultation paper, AEMO has developed its considerations of what would be an appropriate approach regarding data and information that AEMO will require during the nomination of qualifying resources as a VSR. This includes what AEMO would collect both at the NMI-level, for the qualifying resource, or at the aggregate level, for the VSR. In considering potential data and information requirements, AEMO considers the need to balance:

- Unnecessary duplication of collection, specifically with what data and information AEMO already collects in the DER Register.
- Ensuring data and information requirements do not increase the barrier to entry for participation in IPRR.
- Supporting and improving the accuracy of AEMO's forecasts under IPRR. Specifically, AEMO will be required to include VSRs across the different participation modes in its operational forecasts. To do so, AEMO will need to remove solar PV located at sites that are part of a VSR from its solar forecasting system, as this solar PV will be accounted for in VSR bids on the supply side.

AEMO is interested in hearing views from stakeholders on this matter to inform any such requirements AEMO may consider including in the final Guidelines. This includes stakeholder views on the following considerations:

- AEMO considers that DER/CER installations that have been done in accordance with the distribution connection agreement (as required by the IPRR rule) should be in the DER Register. In such cases, requesting this data also during the nomination of a VSR could be unnecessarily burdensome and duplicative.
- There are however sites for which AEMO has no information in the DER Register, and in these cases, AEMO considers it may be appropriate for AEMO to collect new data on DER/CER installations at these sites during VSR nomination.
- The impacts, including the level of difficulty and any additional burden, that collecting NMI-level information in such circumstances would introduce.
- The impact of any data and information requirements differs between those that are at the NMI-level (for the qualifying resource) and those that are at the DUID-level (for the VSR).

Based on the above considerations AEMO proposes that the following information about each qualifying resource in a VSR would be collected upon nomination:

- Individual NMI capacities (Maximum Production/Consumption Capacity)
- If multiple DER on site, individual capacity of each DER
- Individual NMI resource types (i.e. solar, battery, etc.)

[3] See: https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/registration

- Maximum storage capacity values

4.3.3. AEMO's conclusion

Based on feedback presented in submissions, AEMO has altered its original position and has set the minimum nameplate or combined nameplate rating for VSRs to be 1 MW for production or consumption. In the draft Guidelines, AEMO has included that the minimum nameplate or combined nameplate rating must also be that which allows for a VSR to meet the minimum 1 MW bid size.

AEMO has included in the draft Guidelines additional information about the requirements for participation in regulation FCAS, which will be also dependent on the finalisation of any necessary changes to technical requirements contained in the MASS in order to accommodate VSRs.

AEMO will offer both an API-based and CSV-based application process for nomination of a VSR.

4.4. Portfolio management

4.4.1. Issue summary and submissions

AEMO is required to specify the requirements and process for aggregation of voluntarily scheduled resources in accordance with clause 3.8.3, including the circumstances in which AEMO may request Voluntarily Scheduled Resource Providers that have aggregated voluntarily scheduled resources to declare individual qualifying resource availability and operating status to AEMO or to disaggregate. AEMO also considers VSRPs require guidance on how to manage and maintain their VSR portfolio, including the management of NMI churn.

The EEC considered that the process for dealing with NMI churn should be as simple and automatic as possible.

Enel X requested that individual qualifying resource availability and operating status is only collected when AEMO determines that it must represent the VSR within the aggregation as two or more dispatchable units in constraints used in central dispatch to maintain power system security. Enel X recommended such a request is accompanied with an explanation setting out the underlying system security concern and relevant constraints.

Enel X noted that if the threshold is set at the 1MW minimum bid increment then immediately switching the VSR to inactive mode is important for the integrity of the market. However, if a 5MW threshold is utilised and the market is continuing to build experience, Enel X suggested there is room for some tolerance provided the VSR Guidelines set out expectations for returning above the minimum threshold (potentially 3-months) and the shortfall tolerance (15% seems reasonable).

EnergyAustralia considered that any AEMO directions on NMI changes must be transient only, and not lead to permanent changes to the NMI being part of the DUID. They also questioned how much lead time will be provided to participants. EnergyAustralia supports an approach where the NMI is made inactive in cases of customer churn to a different FRMP.

Incite Energy noted that they do not believe its within scope for AEMO to consider individual CER assets, and would therefore limit the AEMO's ability to request availability and operating status to the NMI level. They considered it logical that a materiality test applies to any such request. Incite Energy added that if there was no minimum threshold, NMI churn would no longer be an issue for the VSR design.

SA Water is concerned that an unrelated FRMP could accidentally disrupt the operation of an otherwise valid VSR by erroneously initiating a churn for a NMI for which they do not have customer permission, potentially resulting in the inactivation of an entire VSR if below the threshold.

SA Water also highlighted that, if AEMO's proposed requirements for VSRs greater than 30MW are adopted, AEMO would also either need a similar process or would need to prevent the nomination of additional nameplate capacity exceeding the 30 MW threshold if at any time a NMI within a VSR does not meet the technical criteria to participate in a VSR of that size.

SwitchDin noted that AEMO should hold the VSRP accountable for managing their portfolio within appropriate bounds, and to have any remedies managed at the portfolio level and for AEMO to not try to manage individual resources at the NMI level. In cases where a VSRPs portfolio needs to be disaggregated, SwitchDin considered this should be done in consultation with the VSRP, and the VSRP should not unreasonably refuse to negotiate on such a request. SwitchDin also noted that centrally managing the VSR resources at an individual NMI level is burdensome and discourages participation from potential VSRPs with a larger number of smaller-capacity NMIs.

AGL considered that if the process for removing NMIs from a VSR aggregation and notifying AEMO is not entirely automatic, it will make it operationally impossible for VSRPs to nominate and manage large fleets of aggregated assets as a nominated resource. AGL therefore welcomed AEMO's approach to considering changes to the Portfolio management system (PMS) to streamline VSRPs' applications.

4.4.2. AEMO's assessment

Circumstances where AEMO may request VSRPs that have aggregated qualifying resources to declare individual qualifying resource availability and operating status or for a VSR to be disaggregated to two or more DUIDs in central dispatch

AEMO agrees with Enel X's request regarding the case and reasoning to be provided by AEMO where it requests a VSRP to represent a VSR as two or more dispatchable units.

EnergyAustralia considers that any AEMO directions on NMI changes must be transient only, and not lead to permanent changes to the NMI being part of the DUID. They also question how much lead time will be provided to participants. AEMO has assessed this issue prior to the consultation paper and decided that there was no need for a structured approach, including provision of a lead time, to be included in the Guidelines. However, in such circumstances where AEMO considers it may require the disaggregation of a VSR to two or more DUIDs in central dispatch to maintain power system security, that it will work with the VSRP and the VSRP will be responsible for any NMI-level changes.

In response to SwitchDin's comments, AEMO agrees that any situations where a VSR portfolio may need to be disaggregated should be discussed with the VSRP. AEMO confirms that it is not seeking to manage individual resources at the NMI level, and rather that the focus would be on the DUID-level and AEMO's needs to include and model VSRs within constraints and NEMDE (when in active mode).

Processes for managing NMI churn that result in a VSR dropping below the minimum size or exceeding the 30 MW threshold for 4s aggregated telemetry data

As discussed in section 4.3.2, AEMO has elected to lower the minimum size threshold for a VSR to 1 MW for production or consumption. As such, NMI churn that would result in a VSR dropping below this minimum size threshold would result in the VSR being incapable of meeting the 1 MW bid threshold, which would preclude the participation of that VSR in active or inactive mode. AEMO therefore recommends that, in cases where a VSR drops below the minimum size, the VSR is switched to hibernation mode until it can reach the minimum size that allows it to submit a 1 MW dispatch bid.

In response to Incite Energy's comment, AEMO considers that NMI churn considerations will be required even if there was no minimum threshold, given the requirement to ensure NMIs added into a VSR are qualifying resources and to allow data and information sharing regarding updated VSR standing data.

Hibernation would either occur through forced hibernation by AEMO, upon detecting that a VSR is unable to meet the dispatch bid threshold, or by a hibernation notice given by the VSRP. Under these circumstances and given the seven-day notice period for a hibernation notice, the VSR must bid 0 MW from the time it drops below the 1 MW threshold until it has successfully hibernated.

AEMO agrees with SA Water that a process is needed to also reflect when a VSR exceeds the 30 MW threshold for 4s frequency of aggregated telemetry data as a result of NMI churn, and has included this in the draft Guidelines. This includes highlighting the requirement for compliance with the Power System Data Communications standard and that this compliance should be ensured before or at the time of application to nominate additional qualifying resources into a VSR that would see it exceed the threshold.

NMI churn that occurs without customer permission by a non-FRMP or accidentally by a customer and may impact operation of a VSR

In response to EnergyAustralia's recommendation that a NMI be made inactive in cases of customer churn to a different FRMP, AEMO notes that inactive mode must apply to the whole VSR, or DUID, and cannot be applied to individual NMIs within the VSR. In cases of customer churn to a different FRMP, AEMO considers that it may become aware via its retail systems that the VSRP is no longer the FRMP for a qualifying resource part of its VSR, and will notify the VSRP of such a situation.

In response to SA Water's comment about accidental churn due to a non-FRMP accidentally initiating churn on a NMI, AEMO considers that such a situation cannot occur. This is because, one of the first validations AEMO performs on an application for NMI churn is to check the eligibility of that applicant to nominate that NMI. If the applicant is not the FRMP for the NMI, it will not be eligible to nominate that NMI. If a NMI is already classified by a FRMP, then a non-FRMP would receive a "VSR NMI" error message. Where a FRMP change is submitted to MSATS for a NMI related to VSRP, the MSATS request will be rejected with a "VSR NMI" error.

AEMO has also heard similar concerns from a retailer regarding accidental churn associated with one member of a household applying for another retailer without advising another member of the household who has previously applied with a different retailer. A recommendation as such was made to introduce a "cooling off" period, where a NMI cannot be renominated by a different retailer within a minimum number of business days. In this situation, AEMO notes that where a FRMP change is submitted to MSATS for a NMI related to a VSRP, the MSATS request would be rejected with a "VSR NMI" error. AEMO therefore does not consider that this accidental NMI churn circumstance could occur and so no cooling off period would be required.

Systems and processes available to VSRPs for portfolio management

Across stakeholders, AEMO has heard the importance of implementation solutions that support participant's use of the Portfolio Management System (PMS) as much as possible, including:

- Offering automation where possible and streamlining applications for VSRPs.
- Considering existing issues with AEMO's PMS when implementing solution for VSR portfolio management.

AEMO is currently addressing the above concerns through a PMS uplift process.

As part of this PMS uplift process, AEMO would like to hear stakeholders' views on the option for AEMO to automatically revoke the nomination of qualifying resources (NMIs) from a VSR in cases where the VSRP is no longer the FRMP for a qualifying resource. AEMO notes that, as FRMP changes are processed in MSATS, it is

expected that AEMO will know immediately where a FRMP change for a qualifying resource in a VSR has occurred. In AEMO's interpretation of NER 3.10A.1(m)(i), AEMO considers that rather than requiring VSRPs to notify AEMO immediately of such a change, AEMO could rather revoke the nomination of the relevant qualifying resource as a VSR in the event of a FRMP change, with the option for this implementation to consider automatic revoking of the nomination.

AEMO also considers that, given the timeframe under NER 3.10A.1(m)(ii) is as soon as reasonably practicable with a 10 business day deadline, there may also be the opportunity for AEMO to automatically revoke the nomination of a qualifying resource that ceases to be a qualifying resource after the 10 business day deadline. AEMO however would also like to hear from industry regarding the merit in AEMO exploring the option to revoke the nomination of a qualifying resource as a VSR upon AEMO realising a resource ceases to be a qualifying resource, rather than after 10 business days.

4.4.3. AEMO's conclusion

AEMO has included a brief outline in the draft Guidelines on the process it will undertake to deal with cases where a VSR may need to be disaggregated to two or more DUIDs or where it may request individual resource availability or operating status, including working with the VSRP and expectations from the VSRP. AEMO does not consider that a more structured approach further to that outlined is required.

AEMO has included in the draft Guidelines a forced hibernation process to deal with cases of NMI churn resulting in a VSR dropping below the minimum size threshold.

AEMO has added a process into the draft Guidelines to identify where NMI churn results in a VSR exceeding the 30 MW limit and requiring provision of 4s aggregated telemetry data.

4.5. Capability assessment (including telemetry and communications equipment)

4.5.1. Issue summary and submissions

AEMO is required to provide a framework for testing the capabilities of qualifying resources prior to their request for nomination as a VSR, and to provide information about the requirements for telemetry and communications equipment as part of the operational requirements for a VSR.

AGL, Enel X, EnergyAustralia, Red and Lumo, Incite Energy, SwitchDin and SA Water all commented on AEMO's proposed telemetry requirements in their submissions.

Red and Lumo supported AEMO's approach on initial and period capability assessments and operational requirements for telemetry and communications equipment for VSR.

AGL stated that prescribing metering and telemetry at a device level could limit the participation of flexible loads, and recommended AEMO also consider presenting telemetry requirements for different potential VSR technology types in a diagram with several examples. SwitchDin expressed a similar view if 4s telemetry was required on an individual resource level. SwitchDin also added that many candidates for qualifying resources will be reporting telemetry at a much slower rate, typically in the order of every 30-60s.

Enel X was generally comfortable with AEMO's approach, however, raised concerns regarding the latency of aggregated telemetry data, noting that no system can process and communicate data instantaneously.

EnergyAustralia also commented on latency concerns that would make a 4-second interval for communication requirements not feasible for VSRs due to the time lapse that will occur via communication from the asset to the

VPP operator, and then to AEMO. They supported a 60 second timeframe across the board for all services, including for Regulation FCAS, and energy trading, and any future services. In EnergyAustralia's view, periodic capability assessments were not necessary and supported them being done in cases where there was material change to the VSR portfolio or if there was repeated non-conformance by a VSRP.

Incite Energy suggested that rather than mandating high-cost telemetry solutions upfront, AEMO could introduce incentives or staged implementation options for participants willing to enhance telemetry capabilities over time. They also stated that excessive granularity for all VSR and in non-trading periods may not be necessary and could impose unnecessary costs, and that the telemetry approach should integrate smoothly with existing CER aggregation models, ensuring that additional layers of telemetry requirements do not create unnecessary redundancy. Incite Energy also argued that telemetry requirements should be technology neutral and not be limited to the operational characteristics of known/common VSR types today. They noted that telemetry systems comply with best practices for cybersecurity and data privacy to protect sensitive market and operational data from unauthorized access and suggested a review of telemetry requirements in other jurisdictions.

SA Water stated how a VSRP would need additional SCADA endpoints to gather data from each site, collate the data in a single location including aggregation calculations and then forward the data to AEMO via the SCADA lite system. They suggest a daily aggregated telemetry delivery at 5s/60s frequency, as applicable, may be more appropriate, or as an alternative, to establish a new higher performance grid metering requirement for VSRs and do away with any requirement for telemetry. With regard to the periodic capability assessment, SA water suggested that limited (e.g. annual) capability assessment would be appropriate for VSRs that demonstrate conformance. However, in case of detected non-conformances, capability assessments should be more detailed and event triggered.

SA Water also raised concerns regarding cybersecurity risks by more heavily integrating the AEMO SCADA system with participant control and data systems.

4.5.2. AEMO's assessment

Clarification on AEMO's expectations for aggregated telemetry data

Overall, AEMO considers that the submissions received regarding aggregated telemetry requirements for VSRs highlighted the need for AEMO to provide further clarification and explanation on its proposed requirements due to a common misunderstanding.

AEMO is not proposing to mandate telemetry requirements for each qualifying resource within a VSR, but rather is seeking a fair and accurate representation of the aggregation at the DUID level. VSRPs therefore would have the responsibility for determining how they could appropriately calculate and deliver aggregated telemetry data.

AEMO considers that there are a number of ways that VSRPs may be able to calculate aggregated telemetry for each VSR in their portfolio. These include:

- **Sampling**: where VSRPs are collecting telemetry data from a representative sample of their portfolio that is then used to approximate the aggregated response of their portfolio.
- **Automated outputs**: for example, if the price was to reach a particular number, the portfolio would automatically respond in a particular manner.
- **Forecasts**: noting that this could be associated with higher risk in terms of accuracy, VSRPs could use forecasts for the expected performance of their portfolio to calculate aggregated telemetry expectations.

When submitting aggregated telemetry data to AEMO, VSRPs may be able to use SCADA Lite, a new solution enabling secure real-time data exchange between smaller-scale participants and AEMO.

AEMO appreciates AGL's proposal regarding diagrams to illustrate some of the potential aggregated telemetry options for different VSR technology types. AEMO is happy to work with industry to prepare such diagrams, if further clarification is needed beyond that provided above.

Given the reasoning above, AEMO does not consider that latency concerns will be a barrier to VSRPs meeting the aggregated telemetry data requirements.

However, since the VSR Guidelines consultation paper, AEMO has furthered its thinking on its requirements for aggregated telemetry data. This is to ensure that the requirements appropriately align with the use case. AEMO revised its aggregated telemetry requirement to the require two data snapshots for each five-minute trading interval (TI), noting that these times indicate the effective gate closure, before which telemetry must be collected from the qualifying resources within a VSR and received by AEMO:

- One in the middle, T-150s (2 minutes and 30 seconds into the TI)
- One at the end, T-5s (5 seconds before the end of the TI)

In making this adjustment, AEMO considers that it reduces the number of data snapshots required per TI for VSRPs, and aligns more effectively with AEMO's conformance processes by allowing AEMO to monitor the behaviour of a VSR during and at the end of the TI. AEMO is seeking stakeholder feedback on the ease of implementation of this approach from a VSRP point of view. AEMO would like to understand whether the two data snapshots approach per TI would reduce barriers to entry for small VSRS, or providing telemetry every 60 seconds would be the industry's preferred option.

In parallel with the reduced telemetry requirement for smaller VSRs that are below the threshold AEMO has re-considered its requirement for VSRs above 30 MW to provide 4 second aggregated telemetry data. To appropriately balance ease of participation against power system security, AEMO has brought down the frequency of aggregated telemetry threshold from 30MW to 5 MW.

AEMO's understanding is that it is likely that providing telemetry for smaller resources will be typically more onerous than for larger ones. It is also expected that building a portfolio that is larger than 5 MW from such small resources will be more difficult. Therefore, it is also likely that small portfolios consisting of smaller resources will benefit from the reduced telemetry requirement, but larger portfolios with larger resources that can affect power system security more severely will be able to meet the 4s frequency of aggregated telemetry requirements.

Frequency of aggregated telemetry data required, and considerations for impact on VSRs of different technology types

In relation to the frequency of aggregated telemetry data suggestions made by EnergyAustralia, AEMO does not consider that lowering the granularity of telemetry required for participation in Regulation FCAS, or for all future services is appropriate. Unlike requirements in IPRR that will be at the DUID-level, VPPs participating in Contingency FCAS currently are required to have 4 second metering at both the NMI and participating device so that AEMO can monitor and assess that the aggregation is responding as expected. Similarly, for Regulation FCAS, VSR aggregations will need to meet the requirements outlined in the MASS. Please also see AEMO's commentary on regulation FCAS in section 4.3.

Cyber security considerations with aggregated telemetry requirements

AEMO acknowledges SA Water's concerns regarding cyber security risks. AEMO notes that these concerns are already prevalent today in relation to the operation and control of CER/DER aggregations and are being addressed under the National CER Roadmap, as outlined in section 4.1.2.

Periodic capability assessment

AEMO has adapted its approach to periodic VSR capability assessments after considering the views presented by EnergyAustralia and SA Water. This is reflected in the draft VSR Guidelines which include a capability re-assessment requirement that will be triggered by significant portfolio changes to a VSR, or due to a VSRP submitting a resumption notice or reactivation notice after being inactive for greater than 12 months. AEMO considers significant portfolio changes to include:

- Major changes to the overall nameplate or combined nameplate rating of the VSR.
- The churn of a significant number of NMIs within the VSR.

AEMO notes that a VSR experiencing performance issues or identified as non-conforming will be subject to AEMO's usual conformance process, as described in section 4.10.

4.5.3. AEMO's conclusion

AEMO has proposed in its Draft Guidelines a frequency of aggregated telemetry data that provides two data snapshots for each five-minute trading interval. These snapshots would be:

- One in the middle, T-150s (2 minutes and 30 seconds into the TI)
- One at the end, T-5s (5 seconds before the end of the TI)

AEMO has proposed that capability re-assessments would be triggered by the following incidences:

- Material change in voluntarily scheduled resource characteristics, including:
  - Nameplate rating or combined nameplate rating of the voluntarily scheduled resource changes by the larger of:
    - 0.5 MW; or
    - 20% of the total nameplate rating or combined nameplate rating of the voluntarily scheduled resource.
  - Qualifying resources in a voluntarily scheduled resource aggregation change by the smaller of:
    - 20 qualifying resources; or
    - 20% of the total number of qualifying resources within the voluntarily scheduled resource.
- A voluntarily scheduled resource submits a resumption notice.
- A voluntarily scheduled resource submits a reactivation notice after a deactivation period lasting more than 12 months.

4.6. Deactivation and temporary hibernation

4.6.1. Issue summary and submissions

AEMO is required to specify in the Guidelines matters required by clause 3.10A.2 regarding the deactivation and temporary hibernation of VSRs. This includes the notice periods and notice information that AEMO proposes to be required for switching between the participation modes.

Red and Lumo supported the seven-day notice period that will apply to VSRPs for deactivation, hibernation and resumption requests. They also supported a per day basis approach for switching between modes, but noted that if this market grows and matures further in the future, intra-day switching could be proposed and implemented.

Enel X generally supported AEMO's proposed notice information requirements and apart from emergency conditions addressed under NER 4.8.1, it also supported restricting mode switching on a per day basis. They have added that any finer granularity could be reasonably addressed via the normal bidding/rebidding processes.

EnergyAustralia and Incite Energy did not support AEMO's proposal for a seven-day notice period for notices to switch between the active, inactive and hibernated participation modes. EnergyAustralia noted they are more inclined to accept short notice periods, where deactivation and hibernation mode mean that a VPP can operate off-market and continue for instance to export electricity, outside the dispatch process.

Incite Energy stated that the proposed seven-day notice period is unnecessarily rigid, and that AEMO's proposed notice periods for switching between VSR participation modes should be more flexible to accommodate real-world operational needs.

Jemena agreed with a per day mode switching basis.

SwitchDin suggested the expected use cases for switching modes should guide the timing restrictions, and that these use cases should be detailed in the Guidelines, including any measures to avoid participants gaming the system. They supported a per day mode switching approach.

SA Water noted that they do not agree with the requirement of only having per day mode switching. They also raised that, under AEMO's current proposal, they struggle to see the difference in benefits for participants between inactive mode and hibernation modes. SA Water suggested that notices for deactivation and reactivation should be able to be submitted with bids to facilitate intra-day switching between active and inactive modes, and that this should only use reason codes.

4.6.2. AEMO's assessment

Notice periods for mode switching

AEMO has assessed the appropriateness of the seven-day notice period requirement for participant mode switching, considering information provided in stakeholders' submissions.

AEMO has changed its previous position proposed in the consultation paper by:

- Clarifying that notices must be given in trading days.
- Shortening the notice period to be provided for deactivation from seven to 5 (trading) days. This was because considering stakeholder feedback on providing more flexibility about mode switching, and balancing this against visibility in operational timeframes, AEMO found that a 5 trading day period was more appropriate.

- Requiring a notice period with a gate closure of 1230 hrs on the previous business day for reactivation notices. AEMO notes that this notice period only applies in instances where:
  - a VSRP has previously not provided and end date to its inactive period and wishes to switch to active mode; or
  - a VSRP has provided an end date to its inactive period, but wishes to switch to active mode earlier than contemplated in the original deactivation notice.
- Upon further analysis, AEMO concluded that such notice period was necessary to ensure that internal systems and AEMO's demand forecasts appropriately reflect the change. This change then manifests itself to the market in the form of demand forecasts and appropriately calculated reserve level forecasts.

AEMO notes that regardless of the length of the notice period for deactivation, VSRPs will need to be conscious that a deactivation notice period that is shorter in length than the notice period required for deactivation will only be allowed to be extended if the relevant deactivation notice period is observed. A practical example of this would be if a VSRP submitted a deactivation notice stipulating a period of 4 trading days being inactive. In this case, the deactivation period could only be extended if a new deactivation notice was sent to AEMO prior to the commencement of the original deactivation period, i.e. at least 5 trading days in advance.

AEMO understands that for VSRPs that are uncertain about the extent of the deactivation period of the VSRs and require more flexibility in their decision making, submitting deactivation notices without an end date and then submitting a re-activation notice, observing the 1 business day 12:30 deadline could provide a workable solution.

Table 7 summarises AEMO's current understanding of the implementation and system requirements to action the relevant participation mode switching notices. Since the release of its consultation paper, AEMO has progressed implementation options regarding the deactivation and temporary hibernation modes:

- To implement dispatch mode, AEMO will flag inactive VSR in AEMO's CompMon system with a suspended flag to exclude them from the requirement to conform to dispatch instructions.
- Resumption and reactivation notices for VSRs that have been inactive for longer than 12 months will undergo a capability re-assessment, to ensure the VSR is capable of meeting the obligations of active mode, including bidding, and meeting dispatch targets.
- Constraints will not be changed across the modes, but rather changes will occur in NEMDE regarding a VSR's different participation modes.

Table 7 AEMO's implementation and system requirements for actioning relevant participation mode switching notices

NOTICE	IMPLEMENTATION/SYSTEM REQUIREMENTS	NOTICE PERIOD
Deactivation notice	• Automatic changes in CompMon, including a suspended flag for inactive VSR DUID • System set to provide VSR with zero dispatch target • Revisions to AEMO's forecasting systems	Five trading days
Reactivation notice (VSR inactive < 12 months)	• Automatic changes in CompMon, including removal of suspended flag for the inactive VSR DUID • System roll-back to enable active dispatch targets • Revisions to AEMO's forecasting systems	Must be submitted before 12:30pm on the business day prior to trading day of reactivation
Reactivation notice (VSR inactive > 12 months)	• Automatic changes in CompMon, including removal of suspended flag for the inactive VSR DUID • Capability re-assessment (required for VSR that have been inactive for 12 months or longer)	Seven trading days

NOTICE	IMPLEMENTATION/SYSTEM REQUIREMENTS	NOTICE PERIOD
Hibernation notice	• Bid validation (i.e. ability to submit a dispatch bid) blocked for hibernated VSR. • Switch maximum availability to 0 for the hibernated VSR. • Revisions to AEMO's forecasting systems	Seven trading days
Resumption notice	• Capability re-assessment	Seven trading days

AEMO also notes that given the different implementation and system requirements associated with the different participation modes, AEMO does not consider the option to allow notices for deactivation and reactivation to be submitted with bids to be feasible.

Intra-day mode switching for VSRs

AEMO does not consider that intra-day mode switching for VSRs is required. AEMO notes that, where stakeholders may have concerns regarding potential issues that may arise within the trading day in relation to changes to the price-responsivity of a voluntarily scheduled resource due to core business operation requirements, there are alternative options to intra-day mode switching that can cater to these concerns. This includes the option to use a fixed loading profile.

Benefits and use cases of the participation modes

AEMO considers examples of use cases for switching modes may include those outlined in Table 8.

Table 8 Potential scenarios for use of the deactivation or temporary hibernation participation modes

	Possible scenario
Deactivation	A VSRP might want to commence in inactive mode to ensure the capabilities of their VSR to meet the requirements of central dispatch participation before commencing full operation under conformance obligations in active mode.
	A VSRP anticipates, due to technical or communication issues, that the VSR may not be able to conform to its dispatch instructions, it could deactivate for that period without completely hibernating.
	Support periods after NMI churn when a VSRP wants to test the operation of the VSR without facing non-conformance.
Temporary hibernation	A VSR consisting of an aggregation of residential small customers with behind-the-meter solar and household battery systems may choose to only participate in dispatch during summer months. During other seasons, when solar irradiance is lower and household passive load is higher due to electric heating requirements, the household may want to conserve household battery capacity for self-consumption. As such, the VSRP may only operate the VSR during summer or during the shoulder seasons and allow customers to opt-out for other periods of the year when their household demand is higher.
	A VSR is active during the week, and hibernated on weekends (or vice versa)

Further, in response to SA Water's question, AEMO considers the main benefits for participants between inactive mode and hibernation mode include:

- **Hibernation mode**: VSRs cannot participate in central dispatch and will not be able to submit bids. This provides participants the opportunity to maintain both their VSRP registration and nominated VSRs but not be subject to the obligations of a scheduled resource for duration of the hibernation period.
- **Inactive mode**: VSRs are treated as scheduled resources except they are exempt from conforming to dispatch instructions. This means that VSRPs are still required to provide dispatch bids and aggregated telemetry data, which will be used in AEMO's operational forecasting. Inactive mode was designed to provide the benefits of price-responsive resource 'visibility' to the market, as described in the AEMC's final IPRR determination.

4.6.3. AEMO's conclusion

AEMO has revised its notice periods for switching between the different participation modes in the draft Guidelines, as has been outlined above.

AEMO will not support intra-day mode switching, but only the switching of participant modes per trading day, aligned with the start of the trading day.

4.7. Bidding

4.7.1. Issue summary and submissions

Under clause 3.8.2B of the final rule, a VSRP must submit bids in respect of its active and inactive VSR for each trading day. A VSRP will be able to submit bids for energy and FCAS for their VSR using existing bidding channels and processes.

Two stakeholders commented on AEMO's approach to bidding of VSRs in their submissions. One stakeholder submitted a confidential submission.

SA Water supported AEMO's proposal to use the existing bidirectional unit (BDU) bidding mechanism for VSRs. They have queried whether FRMPs not currently registered as IRPs would be required to register as an IRP in order to access BDU bidding structures.

Incite Energy expressed that VSR bidding should be straightforward and uncomplicated. They raised concerns about the competitive neutrality of the framework, suggesting it might enable the existing oligopoly to expand into the VSR market. In line with the goal of achieving competitive outcomes, Incite Energy recommended that the AEMO propose the most effective solution. Furthermore, they highlighted the need for the AEMO to clarify how integration between aggregators and retailers will function and to enforce coordination requirements between VSRs and retailers.

4.7.2. AEMO's assessment

In the consultation paper AEMO provided and proposed the below analysis and approach, which has been updated with responses to stakeholder submissions and further analysis conducted since the publication of the consultation paper.

Bid submission format

AEMO still proposes that VSRs will use the same five-minute bid format as a scheduled BDU. The BDU classification enables storage units, or units with generation and load capacity, to submit a single bid and to receive a single dispatch instruction (compared with the previous state where storage participated as two units –

generation and load). In response to SA Water's submission, AEMO notes that VSRPs will have access to BDU bidding structures in relation of their VSRs that are registered with the BDU dispatch type.

AEMO understands Incite Energy's concerns about applying an existing framework for bidding to the new concept of VSRs. However, AEMO must also balance this against creating a level playing field for all participants and technologies which is also a consideration that is key aspect of a competitive market. Further, AEMO is of the view that it does not currently have discretion to elaborate and provide guidance on the relationships between market participants.

AEMO currently supports bids submissions through an Application Programming Interface (API), via its Markets Portal (manually or through a CSV file), and via File Transfer Protocol (FTP) on the Participant File Server. Bids can be re-submitted and adjusted in accordance with the AER's Rebidding and Technical Parameters Guidelines.[4]

Bidding for inactive or hibernated VSRs

Under NER 3.10A.2(e)(2), AEMO must specify for the purposes of central dispatch how an inactive VSR is to be treated by AEMO.

In accordance with the NER, VSRPs must submit bids in relation to their inactive VSRs, expecting that:

- Energy bids will reflect expected MW production/consumption (to the extent feasible). This will be used to maintain operational visibility and regional demand forecasting for AEMO.
- Contingency FCAS bids will reflect the VSR's availability to provide the service.
- Regulation FCAS is bid unavailable to prevent inactive VSR from being enabled for this service.

Energy bids for inactive VSR will not be used in dispatch by AEMO and will not be subject to dispatch conformance monitoring as they would be in active mode.

Hibernated VSR will not be required to submit energy or FCAS bids while they are hibernated, as they will not be able to participate in central dispatch.

Bid validation

Under NER 3.10A.2(e)(1), for the purposes of central dispatch AEMO is not required to include dispatch bids submitted in respect of an inactive voluntarily scheduled resource in central dispatch or validate those dispatch bids in accordance with clause 3.8.8. AEMO, however, will apply the same bid validation for both active and inactive VSR.

NER schedule 3.1, which refers to the standard data requirements for verification and compilation of dispatch bids, will be applicable to active and inactive VSRs.

Bid price validations for a VSR will be undertaken as specified in the Bidirectional unit price band bid validation factsheet.[5]

Bid validation is currently automatic and non-compliant bids are automatically rejected by AEMO's systems.

[4] See: https://www.aer.gov.au/industry/registers/resources/Guidelines/rebidding-and-technical-parameters-Guidelines

[5] See: https://aemo.com.au/-/media/files/initiatives/integrating-energy-storage-systems-project/fact-sheets/fact-sheet---bdu-bid-validation---may-2024.pdf?la=en#:~:text=This%20fact%20sheet%20provides%20background%20information%20and%20guidance,monotonically%20for%20bid%20price%20bands%20with%20available%20capacity.

4.7.3. AEMO's conclusion

AEMO has not changed its position on bidding for active VSRs and they'll be subject to the same requirements as scheduled resources currently are

Inactive VSRs will be required to provide bids that reflect their expected MW production/consumption and their availability to provide contingency FCAS service(s). Inactive VSRs will have to bid to be unavailable to provide regulation FCAS.

Bids of both active and inactive VSRs will be subject to AEMO's bid validation processes.

Hibernated VSRs will not be required (or able to) provide bids while they are hibernated.

4.8. NEMDE processes

4.8.1. Issue summary and submissions

Active VSRs participating in central dispatch will generally be treated the same as any other scheduled resource. This also means that an active VSR will be subject to limitations of how much FCAS and energy it can provide as NEMDE will co-optimise these services across all participating units in the NEM.

Three stakeholders commented on AEMO's approach to NEMDE processes for VSRs in their submissions.

SwitchDin was of the view that NEMDE's technical limitations were driving the proposed thresholds that would in turn limit smaller aggregators to participate in the market. They suggested that AEMO publishes a roadmap that would help prospective VSRPs understand the viability of their participation.

SA Water suggested that the Guidelines should cover information necessary for FCAS registration for VSRs.

Incite Energy was of the view that to ensure clarity and accessibility for prospective VSRPs, AEMO should provide comprehensive guidance. Incite Energy suggested that a structured guide detailing the interaction between VSRPs and NEMDE is essential. This guide should cover aspects such as bid submission, dispatch instructions, and compliance obligations, and include worked examples of typical bid scenarios to illustrate how NEMDE prioritizes and schedules VSR bids.

Furthermore, Incite Energy argued that a clear explanation of VSR-specific constraints is necessary. This explanation should detail how NEMDE will factor in the aggregated nature of VSRs and highlight any differences in the dispatch process compared to conventional scheduled generators.

Lastly, Incite Energy suggested that bid validation and submission rules should be thoroughly explained. This should include a detailed account of bid validation requirements, any unique conditions for VSR bids, and guidance on how VSRs can update bids dynamically, particularly in response to real-time market conditions.

4.8.2. AEMO's assessment

In the consultation paper AEMO proposed that if an active VSR is considered for enablement for a particular FCAS in NEMDE, further constraints will be imposed within NEMDE to ensure that the unit can physically deliver all the energy for which it has been dispatched, and all the FCAS for which it has been enabled.

This process is known as energy and FCAS co-optimisation within NEMDE, and includes a series of constraints to represent the unit's combined ramping and capacity capabilities. This co-optimisation may result in further limitations to the active VSR's FCAS maximum frequency response capabilities.

For VSRs that meet all the nomination requirements and pass the capability assessment to provide a particular service (i.e. energy and specific FCAS) NEMDE processes will be indistinguishable from other scheduled unit types that participate in central dispatch. The only exception to this rule is that VSRs will not be constrained on, due to network constraints, as the IPRR rule does not add them to NER 3.9.7.

In relation to SwitchDin's submission, AEMO notes that in the draft determination and draft Guidelines, it has altered its original proposal by lowering the 5 MW minimum size threshold to 1 MW, allowing for a faster accumulation of VSR portfolios. AEMO will provide further information on the details of VSR participation through its rules consultation process, stakeholder forums, direct stakeholder engagement and industry testing.

AEMO's view differs from SA Water, as the most appropriate approach for providing detailed information on FCAS participation is in AEMO's Market ancillary service specification (MASS)[6] which serves as AEMO's comprehensive guide on market ancillary services.

AEMO appreciates Incite Energy's submission on a collating a single, comprehensive guide, however, including all these topics into the Guidelines in such detail would be out of scope and to an extent, represent a significant duplication of information that's already provided to participants in various other documents[7] such as the MASS, the Dispatch procedure[8] or the FCAS model in NEMDE.[9] In particular, the rules pertaining to updating bids are covered by the AER's Rebidding and Technical Parameters Guidelines.[10] Further, constraints in which VSRs will appear will be indistinguishable from constraints featuring other scheduled resources.

4.8.3. AEMO's conclusion

AEMO has not changed its position on NEMDE processes and will be using existing requirements on the formation of FCAS trapeziums, ramping limitations and energy-FCAS co-optimisation.

4.9. Dispatch

4.9.1. Issue summary and submissions

As is the case for any other scheduled resource, VSRPs must comply with the applicable requirements of NER 3.8.6 when submitting a dispatch bid in relation to their VSRs. Upon receiving dispatch instructions, VSRPs are then required to follow these instructions.

Only active VSRs are required to submit bids and follow dispatch instructions. Inactive VSRs must submit bids, but are not required to follow dispatch instructions. Hibernated VSRs will not submit bids or follow dispatch instructions.

Three stakeholders commented on AEMO's approach on dispatch for VSRs in their submissions. This included one confidential submission.

[6] See: https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/ancillary_services/2024/market-ancillary-services-specification---v82-effective-3-june-2024.pdf?la=en

[7] See: https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/market-operations/policy-and-process-documentation

[8] See: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3705%20Dispatch.pdf

[9] See: https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/dispatch/policy_and_process/fcas-model-in-nemde.pdf?la=en

[10] See: https://www.aer.gov.au/industry/registers/resources/Guidelines/rebidding-and-technical-parameters-Guidelines

Jemena proposed that DNSPs have near real time visibility of VSRs involvement in dispatch to help with recalculating their DOEs.

SA Water queried the value of requiring aggregated state of charge information for VSRs, in particular in the case where the VSR is an aggregation of multiple small units.

4.9.2. AEMO's assessment

In the consultation paper AEMO provided and proposed the below analysis and approach, which has not changed in light of stakeholder submissions and further analysis conducted since the publication of the consultation paper.

Dispatch bids

Dispatch bids include a bid for a VSR meeting the same requirements as that for an existing scheduled BDU, that is the bid may contain up to 10 price bands for production from, and up to 10 price bands for consumption by, the VSR for each of the 288 trading intervals in the trading day. Like bids for existing unit types, prices in BDU bid bands used for a VSR are required to monotonically increase in each direction. Prices specified in dispatch bids will apply at the market connection point of the VSR, or each market connection point of the VSR aggregation.

For VSRs comprised of one or more market bidirectional units, the actual SCADA state of charge (initial energy available) in each trading interval in respect of the VSR DUID must also be provided, (the change has been made as part of the implementation of the Enhancing Reserve Information (ERI) rule change[11]). In response to SA Water's submission, AEMO notes that in its view the policy intent behind the ERI and the IPRR rule changes with respect to providing information on state of charge of batteries does not appear to suggest that VSRs should be exempted from this requirement. The benefit of providing transparency to the market on energy constrained plant remains the same, irrespective of the plant's composition, i.e. being an aggregation or a single bidirectional unit.

Under clause 3.8.3A(b)(1)(iv), the minimum ramp rate is equal to the minimum ramp rate requirement for the aggregation of NMIs within the VSR. AEMO proposes that dispatch bids for a VSR must, to a VSR's best effort, meet the requirements of AEMO's Dispatch procedure, under Section 2.8 Ramp rates in energy dispatch instructions.

As proposed in section 4.2.1, all VSR portfolios regardless of VSR zone will receive a loss factor of one for the purposes of central dispatch.

Dispatch instructions

VSRPs will be required to build capability to receive and conform with dispatch instructions from AEMO for VSRs in active mode using the existing BDU dispatch instruction format. Dispatch instructions are typically received via Automatic Generation Control (AGC), the Markets Portal or through FTP. A VSRP must ensure that each of its qualifying resources in an active VSR can always comply with its latest dispatch bid. AEMO may at any time give an instruction to a VSRP in relation to any of its VSRs, in accordance with NER 4.9.5(b), nominating the level or schedule of power.

In relation to Jemena's submission, AEMO notes that the NER currently limits the type of information that can be shared with actors different to the participant itself in near real time. Further information on AEMO's approach to data and information sharing is provided in section 4.12.2 of this draft determination.

[11] See https://www.aemc.gov.au/sites/default/files/2024-03/Enhancing%20reserve%20information%20final%20determination.pdf

Under the IPRR rule, inactive VSR are required to submit dispatch bids but are not required to follow dispatch instructions, and hibernated VSR are not required to submit dispatch bids or receive dispatch instructions as they do not participate in central dispatch.

Upon further technical analysis, AEMO determined the most efficient way to comply with the IPRR rule's requirements for inactive VSRs is for them to receive zero energy dispatch targets while being inactive.

4.9.3. AEMO's conclusion

AEMO has not changed its position on dispatch for VSRs.

Dispatch bids of active and inactive VSRs will have to comply with the applicable requirements of NER 3.8.6, but inactive VSRs will be expected to bid unavailable for the provision of regulation FCAS while being inactive.

Only active and inactive VSRs will receive dispatch instructions, but inactive VSRS will always receive an energy target of zero MW.

Hibernated VSRs will not be required to submit dispatch bids and will not receive dispatch instructions as they will not participate in central dispatch.

4.10. Conformance

4.10.1. Issue summary and submissions

NER 3.10A.3(b)(5)(iv) requires AEMO to specify the dispatch conformance criteria that will be applied to VSR to ensure they conform to AEMO's operational requirements. Dispatch conformance criteria are only applicable to active VSRs. While inactive VSRs are still required to submit bids in accordance with NER 3.8.6, they are not required to follow dispatch instructions.

Nine stakeholders commented on AEMO's approach to conformance assessment in their submissions. Two out of these nine submissions were confidential.

Red and Lumo argued that the error trigger threshold should be based on the combined nameplate rating of the portfolio of VSRs and should be equal to 20% of the portfolio, when it doesn't exceed 30 MW. Under their proposal, the VSR portfolio would be declared non-conforming after error trigger was breached in three consecutive trading intervals.

Enel X was of the view that achieving linear ramping in portfolios consisting of mixed technologies would likely be difficult in the early days of implementation. Therefore, they suggested an initial 25% error trigger which would be reviewed after three years to ensure participation and market integrity are still appropriately balanced. However, they've added that AEMO proposed a suitable operating framework for new VSRPs to mature their technical capabilities.

The EEC recommended that the error threshold chosen for VSRs is appropriate and directly correlates to the minimum nameplate rating of individual or combined VSRs.

Jemena queried whether the non-conformance process is contemplating informing DNSPs and whether DNSPs should consider non-conformance in their DOE calculations.

SA Water, while not opposing AEMO's initial approach of favouring ease of participation, questioned the necessity of many other provisions requested for VSRs.

EnergyAustralia suggested a lenient approach that, for example, takes into account the lower availability of small-scale battery assets. This approach would see the error trigger threshold be set at higher, 88% rate of the

VSR's nameplate rating. EnergyAustralia agreed with imposing a limit after repeated non-conformance, which, in their view strikes a reasonable balance between encouraging participation while ensuring limited adverse market impacts.

AGL suggested that VSRPs should not be held accountable for non-conformance under circumstances where the market participant could not reasonably foresee the impact of network limits on its operations, such as where a DNSP changes a network limit with short notice or where the DNSP overrides the VSRPs' instructions without prior knowledge from the VSRP. They also agreed that setting dispatch conformance in an appropriate way is critical in enabling participation of different asset classes.

SwitchDin agreed with AEMO's initial approach that, in their view, allows for smaller market players to gain operational experience. They noted that once operational data becomes available, the suitability of non-conformance processes can be reviewed at a later stage.

Incite Energy suggested that there should be transparency on how quickly VSRs need to respond to dispatch instructions, tolerances for deviations and how AEMO will assess conformance.

AEMO has been made aware of an issue that relates to the requirement of dispatch bids having to be submitted as integer values. Sufficiently large units that:

- cannot modulate their generation or load, i.e. either fully on or fully off,
- have a nameplate capacity ending with a non-zero decimal, and
- otherwise qualify and are logical candidates for a standalone VSR,

would need to either round or truncate their bids to bring them to an integer value. If actual unit output or consumption doesn't follow this rounding or truncating, this could automatically lead to non-conformance.

4.10.2. AEMO's assessment

AEMO's initial proposal

In the consultation paper, for conformance monitoring, for active VSRs AEMO proposed that:

1) The error threshold for VSR would be set to be appropriate in relation to the chosen minimum nameplate or combined nameplate rating for VSR.
2) Normal performance constraints would not be applicable to VSR as they are to scheduled and semi-scheduled generators, scheduled bidirectional units, scheduled loads and aggregates, including the minimum Small Error Trigger and Larger Error Trigger threshold of 6 MW. This is because the current 6 MW trigger threshold has been set for generators typically 30 MW or greater, and would therefore likely result in constant triggers in the context of the expected size of VSRs.
3) A Conformance Data Report would be published to participants for their applicable VSR following each Conformance Module calculation, once per trading interval. This was with the expectation that VSRPs would undertake any necessary technical, telemetry or communication improvements in order to resolve the dispatch non-conformance issue.
4) In the case of identification of non-conformance, AEMO would not declare the VSR as non-conforming or send market conformance notices out to the VSRP.
5) Instead of using the existing process in relation to the stages and trading interval limits of the non-conformance process, AEMO would monitor for repeated incidences of dispatch non-conformance by a VSR under NER 3.8.23B(b) that it deems to be unacceptable or a threat to power system security.

6) In case of repeated non-conformance without rectification:

   a) Under NER 3.8.23B(e) AEMO would limit the available capacity of the non-conforming VSR to a maximum figure (a non-conformance constraint) determined by AEMO for so long as the VSR remains non-conforming.
   b) The Market Participant would be advised that the VSR has been declared non-conforming and that a non-conformance constraint has been applied.
   c) The VSR was going to remain at the loading determined by the non-conformance constraint until AEMO is advised by the Market Participant that it is now capable of meeting its dispatch instructions.

AEMO's assessment

AEMO has considered the advantages of taking an initially lenient position to enable faster growth of VSR portfolios and balanced it against the principle and expectation of encouraging market participants to follow their dispatch targets. It has also considered the severity of consequences of non-conformance, stemming from the initially expected small size of VSRs.

Considering this and stakeholder submissions, AEMO decided to make a number of changes to its previous position. These changes are outlined in section 4.10.3 of this draft report.

AEMO has not changed its initial approach regarding conformance data reporting (3) and the process in case of repeated non-conformance without rectification (6). AEMO received no submissions relating to these approaches.

However, AEMO's position has changed in relation to the error threshold settings (1), performance constraints (2), and non-conformance processes (4 and 5). Because these are closely intertwined issues, reasoning for the changes is provided jointly, together with relevant stakeholder submissions.

Current error trigger threshold settings in the conformance monitoring process are proportional to the severity of supply and demand imbalance, risk to power system security and additional cost to market caused by units not following their dispatch targets.

Consequently, the imbalance, risk and cost to market of a 1 MW unit non-conforming is very different from a 100 MW one doing the same. Because of this, AEMO is of the view that due to the lower risks associated with lower unit sizes, the current non-conformance framework remains appropriate, noting that as the size of VSRs grow, associated risks will also grow. However, their increased size will also result in higher likelihood of the current error thresholds being triggered.

In addition to lower unit sizes representing lower risks, AEMO must also consider whether the complexity and cost of IT and project implementation are commensurate with addressing such risks. AEMO is of the view that retaining its current error trigger thresholds strikes the right balance in this trade-off.

The rest of the changes in AEMO's initial positions flow on from and are logical consequences of retaining the existing error trigger thresholds. This is because if there are no changes to the error trigger thresholds, small VSRs below 6 MW, in practice will not be triggering non-conformance action.

In addition, it is expected that error triggers for VSRs between 6 MW and 30 MW will be breached infrequently. However, to address the larger risk associated with the non-conformance of larger VSRs, these units will continue to be subject to normal performance constraints. Normal performance constraints, the identification and declaration of unit non-conformance will, therefore, retain the current process, but as a practical consequence of also retaining the existing error trigger thresholds, smaller units closer to the minimum threshold size will not be triggering non-conformance action from AEMO.

In response to Red and Lumo, Enel X's and ECC's submission AEMO understands there are currently a number of sub-30 MW units participating in central dispatch for which the same error triggers apply as for every other scheduled unit. AEMO is of the view, that creating error triggers that are specifically tailored to each unit's nameplate rating would introduce significant complexity to current processes and requirements that are more onerous for units of similar size currently operating in the market.

In relation to Jemena's query AEMO notes that as part of AEMO's revised position, non-conformance notices will now be published and DNSPs will gain visibility of non-conformance action in near real time.

In response to AGL's submission, AEMO notes that as part of due diligence being done at nominating qualifying resources, VSRPs will familiarise themselves with the type of network limitations (fixed or flexible export limits, etc.) that apply to the resources forming part of a VSR. If this due diligence was done, VSRPs should have the information that's required to submit bids that consider Flexible Export Limits (FELs) or DOEs as required by clause 7(i) of the draft Guidelines. With this information, the impact of network limits on VSR operation should be clear to VSRPs and, therefore, conformance with dispatch targets would not be affected by such limits. However, if the DNSP limits were changed without the VSRPs prior knowledge or without sufficient notice, in AEMO's view, the parties best placed to mitigate and address the consequences would be the affected VSRP and the DNSP.

AEMO believes that its revised position will now appropriately address EnergyAustralia's proposed lenient approach on error triggers threshold and non-conformance action.

In relation to SwitchDin's submission AEMO notes that its revised position will provide smaller market players the opportunity to gain operational experience. Conformance, among many other aspects of VSR participation set out by the Guidelines will be subject to review 3 years (or earlier) after the implementation of the IPRR rule.

AEMO believes that its revised position and a unified approach on conformance will provide the transparency Incite Energy has sought in its submission.

4.10.3. AEMO's conclusion

For each trading interval in which an active VSR receives a dispatch instruction, AEMO will perform a dispatch conformance assessment. This assessment will be done in accordance with AEMO's Dispatch procedure[12], which covers scheduled generating units, semi-scheduled generating units, scheduled bidirectional units, scheduled loads, and aggregates. Dispatch conformance monitoring operates continuously in AEMO control rooms, and conformance calculations are initiated immediately following each dispatch calculation.

Approach unchanged:

- AEMO will monitor for repeated incidences of dispatch non-conformance by a VSR under NER 3.8.23B(b) that it deems to be unacceptable or a threat to power system security.
- Following existing processes Conformance Data Report would be published to participants for their applicable VSR following each Conformance Module calculation, once per trading interval.

Key changes from previous position:

- VSRs will not have error trigger thresholds separate to the ones that currently apply to all units in the NEM that are under conformance monitoring.

[12] See: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3705%20Dispatch.pdf

- Normal performance constraints will be applicable VSRs.
- In the case of identification of non-conformance, AEMO will declare the VSR as non-conforming and publish non-conformance market notices.
- AEMO will use the existing process in relation to the stages and trading interval limits of the non-conformance process.
- In case of repeated non-conformance without rectification if AEMO deems it to be unacceptable or a threat to power system security:
  - Under NER 3.8.23B(e) AEMO will limit the available capacity of the non-conforming VSR to a maximum figure (a non-conformance constraint) determined by AEMO for so long as the VSR remains non-conforming.
  - The VSRP will be advised that the VSR has been declared non-conforming and that a non-conformance constraint has been applied.
  - The VSR will have to remain at the loading determined by the non-conformance constraint until AEMO is advised by the VSRP that it is now capable of meeting its dispatch instructions.

4.11. Metering

4.11.1. Issue summary and submissions

AEMO is required to specify the acceptable types of metering installation for participating market connection points.

EEC noted that requiring a Type 4 category 4S meter may limit VSR participation, and asked for clarification on whether a customer with a Type 4 'smart' meter would meet the telemetry requirements.

Enel X sought clarification on whether VSR telemetry can be derived from non-pattern approved metering.

SA Water questioned and asked for further clarification on whether the requirement for provision of telemetry from each VSR unit at a sub 60s or 4s frequency for VSRs over 30MW or enrolled in FCAS can be met with sufficiently capable grid metering, or whether telemetry must be sourced and aggregated from other metering separate to the grid metering.

SwitchDin stated that consideration should be given to how the metering and telemetry requirements align. For instance, if VSR telemetry is expected to come from revenue smart meters, then those meters must be capable of providing data at much finer granularity than 5min.

4.11.2. AEMO's assessment

In response to the EEC's comments, AEMO notes that all modern smart metering installations should be capable of recording and storing energy data in five-minute intervals, including all metering installation types from 1-4. For VSR participation, remote acquisition is also required, as defined in the NER to refer to the acquisition of interval metering data form a telecommunications network connecting to a metering installation. To focus on the outcomes of the metering installation requirements rather than specify the metering installation type, AEMO has revised its requirement in the Draft Guidelines to only specify the requirement that a metering installation has remote acquisition and can produce and store five-minute interval energy data.

In regards to the EEC's comments regarding participation, AEMO highlights that under the Accelerating smart meter deployment rule change:

- The rollout of smart meters will see all existing Type 5 and Type 6 metering installations ('legacy' meters) replaced with a Type 4 ('smart' meter) meter by 1 December 2030.
- From 1 December 2025, when the rule change will take effect, customers will be enabled to request a smart meter from their retailer for any reason, and retailers will be required to install a smart meter on receipt of such a request.

AEMO clarifies that it is at the discretion of the VSRP regarding whether a customer with a Type 4 'smart' meter would meet the telemetry requirements for participation in a VSR. As outlined in section 4.5.2, AEMO is not proposing to mandate telemetry requirements for each qualifying resource within a VSR, but requiring the aggregated telemetry data provided by the VSRP to AEMO is a fair and accurate representation of their portfolio.

AEMO notes that a customer with a smart meter may be required by the VSRP to have an additional SCADA system to enable operational metering, which includes the ability to allow the equipment to make autonomous decisions and to provide a high speed power read. This is compared to a smart meter's core revenue metering function, focussed on provided high accuracy energy data, but with collection of information from the metering installation only on a daily or weekly basis.

The above explanation also speaks to Enel X's question, noting AEMO's requirement that each qualifying resource meets the metering installation requirements and that the VSR, at the aggregate level, must meet AEMO's telemetry and communication requirements as outlined in section 4.5.2 and in the Draft Guidelines. Similarly, in relation to SwitchDin's comment, AEMO has addressed the alignment between metering and telemetry requirements in section 4.5.2.

AEMO notes, in response to SA Water's queries, that providing grid metering meets the metering installation requirements for a VSR (remote acquisition and capable or recording and storing energy data in five-minute intervals) and it can meet the aggregated telemetry requirements, then it should be sufficient. AEMO also refers again to the above commentary on the differences between metering and telemetry and that it is the VSRP's responsibility to consider the appropriateness of the telemetry for each qualifying resource.

For FCAS participation, VSRs must meet the measurement requirements outlined in the Market Ancillary Services Specification (MASS).

4.11.3. AEMO's conclusion

AEMO has revised its metering installation requirements in the Draft Guidelines to focus on the outcomes of the metering installation, that is its capabilities, rather than specify eligible meter installation types.

4.12. Data and information sharing

4.12.1. Issue summary and submissions

As part of the Guidelines, AEMO is required specify the processes for VSRPs to share data with DNSPs or (where relevant) TNSPs, and to specify the processes for the disclosure of data collected by AEMO from VSRPs to DNSPs and TNSPs (as applicable), including obligations of confidentiality that will apply to any such disclosures.

Eleven stakeholders commented on AEMO's data and information sharing requirements that were proposed in the consultation paper in their submissions.

AGL noted the complex interactions between network limits and dispatch mode, including the lack of clarity in the consultation paper on how VSRPs will receive information on network limits from DNSPs in a standardised and effective manner. VSRPs will need to consider how to manage their VSRs within these limits, and in many instances will need to account for multiple DNSPs within a single VSR zone

The EEC noted that consistency of data across network providers would support participation, and that potential VSRPs will need information from network providers to account for dynamic operating envelopes and network limits more broadly. They also note that data which potential VSRPs already have access to (and can grant permission for the network provider to access) may be achievable, but requiring further information from VSRPs may be problematic as the costs involved in acquiring further data may limit willingness to participate.

Enel X recommended that AEMO balance the operational costs of delivering DNSP/TNSP information requests against a business-as-usual case where a retailer aggregates and coordinates price-responsive resources outside of the IPRR framework. Enel X noted they prefer to not provide confidential data to parties where protections rely on the effectiveness of internal ring fencing arrangements that are difficult to audit and enforce.

EnergyAustralia commented that any data sharing to support VSR integration into the NEM, and any data sharing with AEMO, should match the data provided by batteries for bi-directional electricity flows and the data provided by scheduled loads.

Ergon & Energex considered that DNSPs will require more granular information on the VSRP such as the NMI, electricity supply bid and actuals of the dispatch at a NMI level, tagged by the relevant DNSP to cater for selection of broader zones, noting the individual NMI level bid information may be an estimate only. They note that, from a DNSP's perspective, they will have an interest in understanding the individual and combined/coordinated impacts of NMIs in a VSR. They also raised that their preference is to receive near real-time data via Apache Kafka Event Streaming.

Incite Energy stated that they would like a clear description of what data VSRs need to provide before, during, and after dispatch events, and to be provided with examples of telemetry reporting formats and expectations. They added that they anticipate that it will be the VSRP that discloses data with NSPs and questioned the role the AEMO foresaw for itself.

Jemena stated their preference is to know the changes in the VSR/VSRP/Zone level as near real time as possible to DNSP to assist in network assessment, and that their preference is to be notified through some interface where there is a visibility to DNSP about the involvement of VSR to help in recalculating the DOEs. Jemena also asked if there was any discussion or workflow for sharing non-conformant VSR information with the DNSP.

Red and Lumo pointed to the lack of information about export limits to the grid for VSR applicants. This is because VSRPs are not privy to the details of the connection contract between the DNSP and the qualifying resource. Without this information, VSRPs won't be able to accurately declare the availability of their qualifying resources.

SA Water noted data and information should include DNSPs, TNSPs and embedded network managers and has not identified any privacy or confidentiality concerns with regards to information sharing.

SAPN considered that efficient integration of VSRs into the distribution network can only be achieved by providing DNSPs with NMI-level forecast bid quantities. They do not support the provision of post-market sharing of bid quantities and of only aggregate VSR bid quantities to DNSPs, reflective of the fleet-wide behaviour of a VSR, as this would require DNSPs to disaggregate the data to a NMI-level for use as input to DOE calculations. SAPN presented that they do not consider that there are any confidentiality, privacy or competitive concerns with respect to forecast bid quantities being shared with DNSPs. As such, they recommended an opt-in,

DNSP-led framework for the voluntary provision of forecast NMI-level VSR bid quantities from VSRPs to DNSPs, with no need for AEMO to be 'in-the-loop' with any new VSRP or DNSP systems that may be established. SAPN considered that VSRPs that elect to provide day-ahead, NMI-level forecasts of their VSR bid-quantities would receive a more optimal allocation of network capacity, by way of allowing DNSPs to remove a layer of conservatism in their DOE generation due to errors associated with forecasting residential BESS.

SwitchDin argued that as NMI data is related to the qualifying resources, then consent should be obtained from the owners of those resources before data sharing occurs, and there should be a strong operational need for sharing any data beyond the VSRP. SwitchDin also question if consideration has been given to data retention periods, especially once data is no longer required for operation purposes.

4.12.2. AEMO's assessment

Granularity and scope of data required by DNSPs to manage VSRs

During AEMO's follow-up workshop with DNSPs and TNSPs to discuss key matters within the VSR Guidelines, data and information sharing was discussed. During the workshop, AEMO reiterated that the IPRR framework is about facilitating direct access to the wholesale market, including bidding, dispatch, and scheduling, and as such does not provide a framework for DER/CER to provide local network services to DNSPs. Rather, AEMO considers that DER/CER will be able to do so via separate agreements with DNSPs (as previously outlined in section 4.2.2).

The IPRR framework provides a mechanism for the integration of aggregated unscheduled price-responsive resources into the wholesale market.[13] As such, all requirements on VSRs are at the aggregate DUID-level, including:

- Bid quantity and targets:
  - Under the IPRR rule framework, VSRPs are therefore not obliged to provide NMI-level bids and therefore AEMO does not have access to NMI-level bids in the first instance.
- Telemetry requirements:
  - Under the IPRR rule framework, AEMO does not have the power to enforce telemetry requirements at the NMI-level, but only at the DUID-level. As outlined in section 4.5.2, NMI-level telemetry requirements is the responsibility of the VSRP.
- Dispatch conformance framework:
  - Under the IPRR rule framework, there is no conformance framework in place to assess the accuracy of NMI-level data.

AEMO acknowledges and agrees that it will be important for DNSPs and TNSPs to have visibility of qualifying resources in a VSR to the extent that they need to manage the behaviour of these resources in their networks. AEMO considers that the data sharing requirements to support VSR integration establishes new data sharing needs and requirements to those for scheduled BDUs, generators and loads as EnergyAustralia has suggested. This is because VSRs are expected to mainly comprise of distribution-connected qualifying resources, distributed across the distribution network but acting in an aggregated, price-responsive manner. DNSPs will need to be aware of these qualifying resources within a VSR to allow them to manage their network.

[13] See: https://www.aemc.gov.au/sites/default/files/2024-12/Final%20determination.pdf

As such, AEMO proposes that DNSPs, and where relevant TNSPs, will have access to the following to achieve this visibility:

- NMIs in their network that are within a VSR DUID
- VSR zone within which a NMI is located
- Access to standing data for VSR (including VSR participation status)
- VSR ramp rates
- Post-market dispatch bid and target information
- Visibility, alongside VSRPs and AEMO, of five-minute revenue metering data
- Telemetered aggregate MW data updated every 5 minutes[14]

While AEMO understands the reasoning behind SAPN's request to be provided with pre-dispatch bid information for VSRs AEMO considers that the sharing of this information will require clear justification to why the provision of the information will be necessary to maintain power system security and reliability of supply.

AEMO also considers that the sharing of pre-dispatch bid information may require further consultation, such as through the Rules consultation procedure, so stakeholders including Enel X and SAPN would have the opportunity to share their views regarding any confidentiality concerns related to the sharing of pre-dispatch information with DNSPs.

On the question of provision of NMI-level dispatch information, as stated above, AEMO will not have access to NMI-level bids from VSRPs. Further, AEMO expects that NMI-level dispatch forecasts that VSRPs may be able to provide outside of the rule framework, such as voluntarily to NSPs, could be inaccurate as:

- These may be managed in real-time across the VSR, with flexibility within the VSR's capacity used to address variability and meet targets meaning that NMI dispatch may change dynamically.
- Sharing of NMI-level dispatch information was not part of the final rule and therefore there is no conformance framework in place to assess the accuracy of provided NMI-level data in the case where VSRPs provide this information to DNSPs.
- AEMO welcomes proposals and is open to considering data sharing arrangements, voluntary or otherwise, that can address NMI-level data needs of DNSPs with portfolio-level requirements outlined in the IPRR rule change for VSRP.

AEMO considers that AGL's and Red and Lumo's comments about the sharing of network/export limits between DNSPs and VSRPs is an outstanding requirement, independent of IPRR, related to data sharing arrangements to support CER/DER aggregations. As outlined in section 4.2.2, AEMO considers that this will be addressed through the CER Data Exchange and under the National CER Roadmap Data Sharing stream.

Near real-time changes to the VSR/VSRP/Zone level

AEMO notes that real-time changes to zone will not occur as any changes to the VSR zones will occur through the standard Rules Consultation procedures. Further, AEMO is required under NER 3.10A.3(c)(5) to set a minimum lead time for a change in zones, which has been set in the Draft Guidelines to be 12 months.

[14] This data is currently publicly available for all scheduled DUIDs through the DISPATCH_UNIT_SCADA table in the MMS Data Model, and also at https://www.nemweb.com.au/REPORTS/CURRENT/Dispatch_SCADA/

AEMO notes that changes to the VSR/VSRP will be shared as frequently as changes occur (Table 7 in the Draft Guidelines), but that AEMO does not consider (near) real-time changes are required under the rules framework and intent AEMO has reiterated in the previous section. This includes consideration of the timing outlined in NER 3.10A.1(m).

Ergon & Energex also raised that their preference is to receive near real-time data via Apache Kafka Event Streaming. AEMO considers there will be several different ways to exchange standing data, one of which will be the CER Data Exchange.

In relation to Jemena's question on the sharing of non-conforming VSRs with DNSPs, AEMO refers to its revised position on conformance in section 4.10.2. As mentioned, in AEMO's systems today, once a DUID is declared as non-conforming, market notices are released on AEMO's website in near real-time.

Confidentiality and consent associated with data sharing between VSRPs, AEMO and NSPs

AEMO supports stakeholders' highlighting of the importance of ensuring consumer protections and considering consent when establishing any data sharing processes VSRPs, AEMO and NSPs.

In relation to consumer protections, AEMO acknowledges the explanation provided by the AEMC in their IPRR Final Determination that notes FRMPs are already engaging, and will continue to engage, with customers to use their CER to respond to spot prices and that IPRR does not change the nature of this engagement, or the need for appropriate consumer protections governing this engagement. The issues that have, outside of IPRR, been identified within these current relationships are however of ongoing importance despite being considered outside of scope. AEMO notes that consumer protections are captured under the first workstream of the National CER Roadmap.

The Consumer Data Right (CDR) legislation rules and standards also ensure that AEMO can only share CDR data with a retailer following a retailer's legitimate CDR request, which in turn only occurs following a consumer's express authorisation for their retailer to share that data with the Accredited Data Recipient (ADR) who is providing a service which the consumer has requested.

Data retention periods

AEMO notes there has been no changes included in the IPRR rule regarding data retention periods, or that are intended for review, and therefore that VSR-related data will be under the same rules requirements as for other market and metering data. NER 7.11.1 specifies that AEMO must create, maintain and administer a metering database (either directly or under a contract for provision of the database) containing information for each metering installation registered with AEMO. NER 7.11.1(h) specifies that AEMO must retain settlements ready data for all metering installations for a period of 7 years.

NER 3.13.8(d) specifies that AEMO must retain all information provided to it under the NER for at least 6 years in whatever form it deems appropriate for reasonably easy access. This includes market information, such as bidding, telemetry, dispatch targets, and pre-dispatch information, that is made public by AEMO.

Inclusion of embedded network managers in data sharing processes

AEMO agrees that embedded network managers will need to be included in data sharing processes, in relation to information regarding on-market child NMIs that are participating in a VSR.

4.12.3. AEMO's conclusion

AEMO will retain in the Draft Guidelines that dispatch information, including bids and targets, will be shared post-market with DNSPs and TNSPs due to this information currently being confidential under the NER.

Near real-time changes to the VSR/VSRP will not be included, but will remain to be shared as frequently as changes occur, and that AEMO is made aware of such changes. No changes required concerning real-time changes to the zone, as explained above.

No changes are required to data retention periods, under the above logic.

AEMO will include embedded network managers to data sharing processes in the Draft Guidelines.

5. Other matters

Terminology of "VSR zones"

AEMO consulted on the appropriateness of the terminology "VSR zones" to refer to the network boundaries within which qualifying resources must be connected to be aggregated within a VSR. EnergyAustralia stated that VSR zones should be VSR Districts.

AEMO has chosen to retain the VSR zones terminology instead of adopting the term VSR districts, as the final rule has referred to these network boundaries as zones, including under NER3.10A.3(c).

Proposed effective date

The EEC recommended that the technical specifications are provided to potential VSRPs as soon as practical to enable potential VSRPs to confirm that they can comply with the specifications prior to participating in the tender process.

AGL supported the guideline's effective date and, more broadly, AEMO's intent to publish the Guidelines in the second half of 2025 to provide prospective participants time for development and testing. They have also strongly encouraged AEMO to bring forward the delivery of these specifications ahead of the commencement of the Voluntary Incentive Mechanism (VIM).

AEMO plans to publish technical documentation, such as draft technical specifications and the Electricity Market Management System (EMMS) Data Model, with sufficient time before the commencement of Industry testing to support participant development. To assist industry participants in preparing for the VIM, AEMO will also endeavour to release a draft of technical specifications as early in the delivery timeframe as possible with updates on a monthly basis to ensure currency of design. This is to provide early insight into the design which will support participants with dispatch mode implementation and VIM participation. Industry readiness for both dispatch mode and VIM participation will mainly be communicated through AEMO's NEM reform program, including via its monthly forums and working groups.

Settlements

The VSRP, as the FRMP in respect of a market connection point nominated as a VSR under NER 3.10A.3(b)(3), will also be the Cost Recovery Market Participant (CRMP) in respect of that market connection point nominated as a VSR.

VSRs have various Non-Energy Cost Recovery (NECR) obligations and exemptions in relation to FCAS, Frequency Performance Payments (FPP), Non-market ancillary services (NMAS), AEMO interventions or administered price cap/floor price costs that also varies based on their dispatch mode.

AGL, SA Water, SwitchDin and Enel X's supported assisting potential participants by including information on settlement and non-energy cost recovery information in the guidelines.

Stakeholders have not raised any concerns about its proposed approach with regards to how VSRs are treated in its settlements processes.

AEMO, since the publication of the consultation paper changed its approach about how it will provide information on NECR obligations and exemptions. While acknowledging the importance of providing clarity for participants AEMO is of the view that such information is better provided in a separate document that will be collated and published in parallel with the final Guidelines. The document will contain the NECR arrangements

that are associated with the different participation statuses for *voluntarily scheduled resource* under the NER which are summarised in Table 9 overleaf.

Table 9 NECR arrangements for *Voluntarily Scheduled Resource Providers* under the NER associated with the different *voluntarily scheduled resource* participation statuses

Area	Recovery item	Active	Inactive	Hibernated
FCAS	Contingency raise	CRMPs based on ASOE	CRMPs based on ASOE	CRMPs based on ASOE
	Contingency lower	CRMPs based on ACE	CRMPs based on ACE	CRMPs based on ACE
	Regulation	CRMPs with appropriate metering/SCADA for contribution factors, and other CRMPs for the residual	CRMPs with appropriate metering/SCADA for contribution factors, and other CRMPs for the residual	CRMPs for the residual
FPP		CRMPs with appropriate metering/SCADA for contribution factors, and other CRMPs for the residual	CRMPs with appropriate metering/SCADA for contribution factors, and other CRMPs for the residual	CRMPs for the residual (unless the hibernated VSR continues to provide appropriate metering/SCADA, in which case same as active/inactive)
NMAS	Network support control ancillary services (NSCAS)	CRMPs based on ACE	CRMPs based on ACE	CRMPs based on ACE
	System restart ancillary services (SRAS)	CRMPs based on ASOE (half) and based on ACE (half)	CRMPs based on ASOE (half) and based on ACE (half)	CRMPs based on ASOE (half) and based on ACE (half)
Interventions	Direction – *energy*	Excluded	CRMPs based on ACE	CRMPs based on ACE
	Direction – FCAS	CRMPs based on ASOE and ACE	CRMPs based on ASOE and ACE	CRMPs based on ASOE and ACE
	Reliability and emergency reserve trader (RERT)	Excluded	CRMPs based on ACE	CRMPs based on ACE
	Market suspension	CRMPs based on ACE	CRMPs based on ACE	CRMPs based on ACE
	Other directions under clause 4.8.9 related to system security	CRMPs based on ASOE and ACE	CRMPs based on ASOE and ACE	CRMPs based on ASOE and ACE
Other	Administered price cap or administered floor price compensation	CRMPs based on ACE	CRMPs based on ACE	CRMPs based on ACE

Prudentials

A Market Participant may only participate in any of the markets or trading activities conducted by AEMO if that Market Participant satisfies the relevant prudential requirements set out in Chapter 3 of the NER applicable to the relevant trading activity.

VSRPs will, like all registered Market Participants, have access to the NEM Prudential Forecast that is part of AEMO's EMMSs web portal. The NEM Prudential Forecast provides participants with a forecast of their expected prudential position for the next NEM business day, enabling participants to better manage their prudential obligations.

AGL's view was that prudentials should account for reasonable market risk associated with more bidirectional assets.

Incite Energy recommended that AEMO modernise settlements processes to be fit-for-purpose for participants that are transacting smaller value amounts each week, proposing there is no good reason why AEMO continues to require AustraClear as the only payment method.

Changing payment providers is out of scope of the IPRR project and VSR Guidelines development. A change of providers could potentially be pursued through a consultation on the Guide to Market Clearing or engagement with the industry via the Electricity Wholesale Consultative Forum and using an Issue /Change Form.

Note that AEMO mandates the use of AustraClear through its Guide to Market Clearing,[15] with AEMO being responsible for nominating its selection of settlement process under the NER. AEMO considers that the use of Austraclear is crucial for providing forward control, protection and security for AEMO and market participants.

AEMO does not consider that it requires changes to its prudentials/settlement processes to accommodate VSRP operations. Considering an alternative to AustraClear is not within the scope of this consultation.

[15] See: https://aemo.com.au/-/media/files/gas/gas_supply_hubs/settlements-and-payments/prudentials/2014/guide_to_aemo_market_clearing.pdf

6. Draft determination on proposal

Having considered the matters raised in submissions to the consultation paper and at consultation meetings, AEMO's draft determination is to make the VSR Guidelines in the form published with this draft report, in accordance with NER 3.10A.3.

Effective date

AEMO's proposed effective date for the determination is **on 23 May 2027.** This date aligns with the date put forward in the AEMC's final rule as the implementation date for the IPRR's dispatch mode.

Appendix A. Glossary

Term or acronym	Meaning
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
ACE	Adjusted consumed energy
AGC	Automatic Generation Control
API	Application programming interface
ASOE	Adjusted sent out energy
BDU	Bidirectional unit
CDR	Consumer Data Right
CER	Consumer Energy Resources
CP	Connection point
CRMP	Cost recovery market participant
DER	Distributed Energy Resources
DFS	Demand Forecasting System
DLF	Distribution load factor
DNSP	Distribution Network Service Provider
DRSP	Demand Response Service Provider
DSP	Demand side participant
DUID	Dispatchable unit identifier
DOE	Dynamic operating envelope
DSO	Distribution System Operator
EMMS	Electricity Market Management System
ESB	Energy Security Board
FCAS	Frequency control ancillary services
FEL	Flexible export limit
FPP	Frequency Performance Payments
FRMP	Financially responsible market participant
FTP	File Transfer Protocol
IPRR	Integrating price-responsive resources into the NEM – rule change
IRP	Integrated Resource Provider
LV	Low voltage
MASS	Market Ancillary Services Specification
MMS	Market Management System
MSATS	Market settlement and transfer solutions
MT PASA	Medium term projected assessment of system adequacy
MW	Megawatt
MWh	Megawatt hour
NECR	Non-Energy Cost Recovery
NEM	National Electricity Market
NEMDE	National Electricity Market Dispatch Engine

NEPKI	National Energy Public Key Infrastructure
NER	National Electricity Rules
NMI	National Metering Identifier
NSP	Network service provider
PD / Pre-Processing	Pre-dispatch or other known as 'Pre-Processing' feeds into 'NEMDE'
PMS	Portfolio Management System
Post Processing	Process after 'NEMDE'
Price-Responsive resources	Price-responsive resources refer to the wide range of residential, community, commercial and industrial energy resources and load that are not currently scheduled through the market dispatch process and do, or could, respond (individually or as part of aggregation) to market price signals. It includes but not limited to household CER such as solar PV, batteries, EVs, flexible hot water systems, pool pumps and industrial loads with components of controllable demand (for example smelters, foundries and manufacturing facilities).
PKI	Public Key Infrastructure
RERT	Reliability and Emergency Reserve Trader
RMC	Registration Manager Client
SCADA	Supervisory Control and Data Acquisition
SOC	State of charge
SSP	Secondary settlement point
ST PASA	Short Term Projected Assessment of System Adequacy
TI	Trading Interval, a period for which AEMO settles trading amounts in the NEM. A trading interval is defined in the Rules as a 5-minute period.
TLF	Transmission loss factor
TNI	Transmission node identifier
TNSP	Transmission Network Service Provider
VIM	VSR incentive mechanism
VPP	Virtual Power Plants
VSR	Voluntarily Scheduled Resource
VSRP	Voluntarily Scheduled Resource Provider
WDR	Wholesale Demand Response Mechanism
WDRU	Wholesale Demand Response Unit

Appendix B. List of Submissions and AEMO Responses

No.	Stakeholder	Issue	AEMO response
Development and approach of guidelines			
1	SA Water	We note the inconsistency of the approach taken in balancing system security against ease of participation throughout the consultation paper, making it hard to determine if the right balance has been achieved. In many sections of the consultation paper, AEMO has emphasised concerns about risks to system security as warranting the need for offering less flexible approaches to managing VSRs for that component of the guideline. We further note that the resources that would register for VSR on day one are already operating in the market as non-scheduled resources with no visibility on AEMO's part for their operations or ability for AEMO to control their actions, without undermining the reliability or system security of the NEM. This adds to our questions about whether AEMO has accurately articulated the level of risk VSRs pose to NEM system security and reliability.	Refer to AEMO's response 4.1.2 and 4.1.3
2	SA Water	In drafting the guideline, SA Water suggests AEMO should include a section outlining what it perceives as the expected impact to system security of existing and new resources participating as VSRs, and the likely system security and reliability consequences to the network for them either being unable to receive sufficiently specific dispatch instructions relevant to the circumstances in the part of the grid where they operate, from them failing to or being incapable of conforming with the dispatch instructions that are issued, along with any other responses that AEMO deems relevant.	AEMO considers such a section would be outside of the scope of the Guidelines which are meant to provide guidance and information for participants that wish to utilise the IPRR framework. These considerations are better addressed in a report.
3	SA Water	As such, SA Water suggests that the Guidelines ought to take effect ahead of the initial round of the incentive mechanism in April 2026.	Refer to AEMO's response in section 5.
4	Incite Energy	AEMO is failing to ensure that the VSR framework supports broad participation without imposing undue complexity or barriers. Current market structures were designed for a small number of large generators, and adjustments are needed to facilitate the integration of participants focused on smaller, distributed energy resources.	Refer to AEMO's response 4.1.2 and 4.1.3
5	SwitchDin	Some key aspects of the proposed guidelines are driven by limitations in existing systems. These limitations perpetuate biases that favour larger established market participants, and present barriers to entry for new participants with novel models that differ significantly from the established gen-tailers.	AEMO appreciates these concerns and provides opportunities for stakeholders to raise their concerns through various channels, which include AEMO's standard consultation processes, engagement with the industry via the Electricity Wholesale Consultative Forum and using an Issue /Change Form.

No.	Stakeholder	Issue	AEMO response
		There should, therefore, be an active plan to examine and lift these restrictions in future, so the VSR mechanism can foster competition via the entry and growth of new smaller market participants	
6	EEC	The EEC recommends that the technical specifications are provided to potential VSRP's as soon as practical. Without the technical specifications it is difficult to determine whether this balance has been met.	Refer to AEMO's response 4.1.2 and 4.1.3
7	Red and Lumo	No. AEMO is required to facilitate the ease of participation in central dispatch by VSRs and only apply restrictions on them to the extent 'reasonably necessary' for it to manage power system security. This means VSRs must, to some extent be treated like scheduled generators to ensure the secure and reliable NEM power system. For AEMO's consideration, below we have suggested an approach that strikes the right balance between ease of participation for VSRs in central dispatch and the need to maintain a secure and reliable NEM power system.	Refer to AEMO's response 4.1.2 and 4.1.3
8	Jemena	While the rules explain the overall process of VSR and VSRP engagement w.r.t Grid reliability, as DNSP we would like to know detailed information around the Control aspect of CER/VSR and guidelines around the same between the VSRP and DNSP. It will be helpful to have clear roles and responsibilities between DNSP,DSO and VSRP	Refer to AEMO's response in section 4.1.2.
9	AGL	While the IPRR Rule is technology agnostic, AGL would welcome AEMO's guidance on whether there is a class of unscheduled price-responsive resources that would ideally be captured in the initial years of dispatch mode. AGL would then welcome the opportunity to discuss our experience managing different asset classes, and to explore whether certain requirements can be feasibly met by these technologies in the short-term.	AEMO does not have a view with regards to the type of qualifying resources that would be early adopters of the IPRR framework.
10	AGL	AEMO's guidance could also benefit from worked examples and diagrams, which could be used to further illustrate how some of the requirements would work in practice.	In relation to AGL and other stakeholder submissions, AEMO has sought to add several examples throughout this draft determination, including on the use cases of the participation modes and options for VSRP's to calculate aggregated telemetry.
VSR Zones			
11	AGL	AGL agrees with VSRs being allocated a loss factor of 1.	Refer to AEMO's response in section 4.2.2.
12	AGL	In all circumstances, VSRPs will need to consider the impact of different network limits across multiple DNSPs and the potential for these limits to change inadvertently if dynamic operating envelopes are implemented. As outlined in question 6, for CER portfolios retailers will also need to consider the system build	Refer to AEMO's response in section 4.2.2.

No.	Stakeholder	Issue	AEMO response
		required to de-couple assets from a DNSP or state where these do not match the VSR zone. Moving to smaller zones (e.g., congestion modelling zones) may be more accurate and easier to integrate into AEMO systems but would lead to further complexity as these do not match distribution areas.	
13	AGL	We have a VPP portfolio that operates across NSW, SA, Victoria and Queensland. As of FY24 AGL had 1.25 GW of decentralised assets under orchestration, with a FY27 target of 1.6 GW. Most of these assets are installed behind the connection point, and include residential batteries and solar, as well as flexible loads and backup generation systems at commercial and industrial customer sites.	Refer to AEMO's response in section 4.2.2.
14	AGL	Due to the impact on product offerings and systems, AGL's view is that zone changes should occur as infrequently as possible. AGL supports AEMO's proposal to maintain zones consistent for the first three years of the program and would support similar timeframes for future changes and subject to industry consultation.	Refer to AEMO's response in section 4.2.2.
15	EEC	The EEC notes that the requirements include that the VSRP will be responsible for ensuring resources within each VSR comply with their individual distribution connection agreements. It is noted that the VSRP will have no visibility of this distribution agreement and related network limits so further consideration should be given to this requirement.	Refer to AEMO's response in section 4.2.2.
16	EEC	Conversely, a large zone that crosses multiple distribution networks may pose challenges associated with requiring the VSRP to comply with network requirements from multiple network providers (e.g. specific limits on exports) and require the VPP technology to account for site-specific circumstances of the participating sites. This complexity may deter some potential VSRPs from participating.	Refer to AEMO's response in section 4.2.2.
17	Enel X	Enel X have not identified any material issues arising from an inconsistent approach in zonal classifications between VSRs and WDRUs. Based on our experience as an aggregator of commercial and industrial flexible demand and a WDRM participant, we expect there will be little overlap between the pools of resources suited to VSR versus WDRM. The two mechanisms are complementary in activating additional flexible demand resources by enabling participation from resources with different characteristics.	Refer to AEMO's response in section 4.2.2.
18	Enel X	Enel X suggest that provided the size of VSRs remains small relative to other dispatchable resources, and there is an insignificant influence on transmission network congestion and power system security assessment there is little benefit in VSR zones smaller than NEM regions. To support initial participation by emerging VSRPs Enel X recommend that VSR zones are initially defined by NEM regions and if	Refer to AEMO's response in section 4.2.2.

No.	Stakeholder	Issue	AEMO response
		necessary, congestion modelling zones if there is a material impact on network congestion.	
19	Enel X	Enel X support the use of NEM regions as VSR regions in the early years of IPRR implementation with a transition to zones based on congestion only where necessary. Enel X accept that there is a risk that disaggregating already established portfolios may interact with the need to achieve minimum VSR eligibility aggregate capacity. This consequence would be reduced if the minimum size for VSR eligibility is 1MW.	Refer to AEMO's response in section 4.2.2.
20	Enel X	Enel X's VPP operates across NEM regions but is capable of coordination at a network area/feeder level if required. Enel X recommend that the VSR Guidelines are VPP technology agnostic and are based on balancing customer and market benefits.	Refer to AEMO's response in section 4.2.2.
21	Enel X	Selection of zones smaller than NEM regions would impact the feasibility of establishing VSRs in Enel X's VPP. Smaller zones will affect both the ability to achieve scale to meet minimum eligibility requires and reduce portfolio diversity which is essential to delivering predictable dispatch responses. Larger aggregations facilitate lower cost VPP headroom/footroom to be drawn upon to correct transient deviations from dispatch targets.	Refer to AEMO's response in section 4.2.2.
22	Enel X	Enel X support AEMO's view that the complexity of implementing loss factors for VSRs outweighs any market scheduling efficiency benefits that may arise from applying a notional loss factor to a zone.	Refer to AEMO's response in section 4.2.2.
23	Enel X	Enel X recommend AEMO's minimum lead time for a change in zones is set at 12-months. A 12- month transition period is better aligned with common end user flexible demand resource contracting terms and tenures.	Refer to AEMO's response in section 4.2.2.
24	EnergyAustralia	We believe the congestion model strikes a right balance between allowing for small enough zones to support market forecasting and operation, and maintaining a sufficiently large area to support participants being able to meet the minimum capacity threshold across a single DUID.	Refer to AEMO's response in section 4.2.2.
25	EnergyAustralia	We strongly urge AEMO to select an approach and not change it, even after three years. Reducing the size of the zones at a later time could cause some VSRPs to fall below the MW capacity threshold in a single DUID and strand their investment. The congestion model also broadly aligns with WA's use of a TNI as a basis for integrating VPPs into the market. We do not support changing the VSR zones after they are set, as this could render VSRP investment stranded if they no longer meet the MW capacity threshold because the VSR zone is changed and the DUID is set on a smaller basis. This lack of certainty could deter uptake of the VSR mechanism in the first place.	Refer to AEMO's response in section 4.2.2.

No.	Stakeholder	Issue	AEMO response
26	EnergyAustralia	The impact of using different types of zonal aggregations could undermine the VPPs operation. For instance, the zone delineation that is selected, must be consistent with NEM regions, to avoid a situation where a DUID is responding to a price signal in NSW vs Victoria. Provided that DUIDs are a subset or aligned with the NEM region boundaries, this problem can be avoided.	Refer to AEMO's response in section 4.2.2.
27	EnergyAustralia	Our community batteries in SA have a total MW of 4.5MW and so would be excluded. In Endeavour and Essential distribution networks, our community batteries will be 1.5MW and 0.5MW so depending on the VSR zone, they would also not qualify, unless the zone is large enough to aggregate across Ausgrid (where we have 20MW of community batteries).	Refer to AEMO's response in section 4.2.2.
28	EnergyAustralia	VSR zones should be VSR district	Refer to AEMO's response in section 4.2.2.
29	Incite Energy	AEMO must ensure that its systems can model VSR zones at the substation level, which can then be combined into larger zones if no differentiation exists. Substation level is needed as VSR may offer non-network solutions under the Regulatory Investment Test – which is triggered by investment of this scale.	Refer to AEMO's response in section 4.2.2.
30	Ergon and Energex	Retail customers themselves already have a loss factor applied as required under the NER. As such, it is appropriate that losses are not 'double counted' by applying an additional loss factor to VSRs.	Refer to AEMO's response in section 4.2.2.
31	Ergon and Energex	We support the use of congestion modelling zones as proposed in the Guidelines, as they strike the right initial balance between being large enough to enable VSR aggregation in a developing market, whilst still linking back to transmission level constraints that could be relevant to dispatch. However, the downsides with congestion modelling zones that will need to be managed through the implementation phase are: • these will not have sufficient granularity to assist with distribution network constraints and so DNSPs will likely need to utilise VSR information along with dynamic operating envelopes to forecast and manage impacts at a much more granular level in the distribution network. As such, additional data will be required to support these functions. • as the boundaries are not obvious or well understood by VSR proponents, this may present difficulties in securing sufficient capacity within a zone. For example, where a proponent's portfolio comprises several separate connections, each identified by a different national meter identifier (NMI), a proponent may have to manage constraints from different network service providers that apply to each NMI across a zone, adding to complexity with implementation. From a DNSP's perspective, the behaviour of a particular NMI will have an impact at a local network level. Concurrently, where that NMI is part of a coordinated response of several NMIs, due to for example, market participation, this may have	Refer to AEMO's response in section 4.2.2.

No.	Stakeholder	Issue	AEMO response
		an impact across a broader area. Therefore, DNSPs have an interest in understanding the individual and combined/coordinated impacts of NMIs.	
32	Ergon and Energex	DNSPs have an interest in understanding the individual and combined/coordinated impacts of NMIs as behaviour of particular NMI will have impact at local network level.	Refer to AEMO's response in section 4.2.2.
33	Ergon and Energex	We recommend that the process of setting the final VSR zones be independent to the process of reviewing the Guidelines, as this may warrant further review prior to May 2030 as we believe more granular zones will ultimately be required. Alternatively, if the review of zones cannot be reviewed/revised independent of the Guidelines, it may mean the Guidelines' review will have to occur earlier than the 23 May 2030 deadline.	AEMO considers that there is significant reasoning and benefits in using the congestion-based VSR zones and therefore that the option to use this zone classification is sufficiently formed to be included in the Guidelines review.
34	Ergon and Energex	The benefit of using NEM regions is that it may promote the market's development more than other approaches, resulting in a greater number of potential participants for each VSRP. However, complexity and dissatisfaction may arise in cases where the zones are changed and portfolios are broken up with the new fragmented parts in a particular congestion zone(s) no longer meeting the minimum (e.g., 5 MW) VSR threshold.	Refer to AEMO's response in section 4.2.2.
35	Ergon and Energex	Inconsistency [between VSRs and WDRUs zonal classifications] is likely to cause confusion among proponents which may impact consumer outcomes when engaging with service providers.	Refer to AEMO's response in section 4.2.2.
36	Jemena	Preference is towards to DNSP boundaries over the larger congestion zones. As considering Congestion zones will increases the complexity around managing NMIs across DB Boundary and other existing process. In terms of generating DOE for each NMI (including FELs and FILs) will be challenging and force to have common format across DBs.	Refer to AEMO's response in section 4.2.2.
37	Jemena	Growth rate of VSR/VSRP. Security of Data and access to the Data with right level of roles.	Refer to AEMO's response in section 4.2.2.
38	Jemena	As mentioned in the 3.5.1.5 comments, considering the approach of Congestion Zones will have impacts on DOE generation , format , control, and aggregation of NMIs around the DB boundaries. Need more detailed guidelines and roles/responsibilities for DNSP and VSRPs. Preference is to consider DB boundaries over Congestion zones.	Refer to AEMO's response in section 4.2.2.
39	Powerlink	However, we question whether the proposed congestion modelling zone aggregation is sufficient for incorporation into the left hand side of constraint equations to facilitate participation in dispatch.	Congestion modelling zones are used in constraint equations and NEMDE.
40	Powerlink	We recommend that data capture and systems for VSRs consider the relationship between National Meter Identifier (NMI), Transmission Node Identifier (TNI), and	Refer to AEMO's response in section 4.2.2.

No.	Stakeholder	Issue	AEMO response
		AEMO VSR zones. While aggregation at a congestion modelling zone level may provide opportunities in responding to price signals, if the amount of VSR scales up to a material level, it is likely to be limited if the aggregation is not granular enough to be able to respond to (or be used to manage) network issues. We feel that greater power system opportunities for VSR may be visible if we are able to understand the capability at a TNI level.	
41	Red and Lumo	Red and Lumo do not agree that a loss factor of one should be allocated to VSRs. This is inconsistent with arrangements for scheduled and semi-scheduled generators, who are subject to marginal loss factors. Loss factors are needed to account for energy lost when the marginal unit of energy is transmitted to the node. The fact that VSRPs may themselves make adjustments to account for energy losses from units, or that settlement occurs at the NMI level, does not change the need for this requirement. Allocating a loss factor of one would unfairly privilege VSRs over other types of generation.	Refer to AEMO's response in section 4.2.2.
42	Red and Lumo	Red and Lumo support AEMO adopting the current NEM regions as VSR zones. The large regional zones that are currently in place in the NEM will result in the aggregation of more NMIs compared to other smaller zones supporting the development of VSRs. However, we do not support a transition to other VSR zones like AEMO's congestion modelling zones in the future. A change to the VSR zones could be highly disruptive to VSRs operations and could hinder their development. Of course, if AEMO wants to adopt the congestion modelling zones as VSR zones in the future, it could lodge a rule change with the AEMC to determine if this would be in the long term interests of consumers. AEMO may choose to take this action when the development of the market for VSRs has matured.	Refer to AEMO's response in section 4.2.2.
43	SA Water	While not opposed to AEMO's proposal for applying universal loss factors of one, SA Water supports approaches that maintain consistency of treatment between VSRs and other registered participation units through alignment between the Zone and loss calculations. For bidding, should a whole NEM region be initially used as a VSR Zone, it is logical to treat each VSR as if it operates at the Regional Reference Node and therefore also has a loss factor of one. Should smaller VSR zones be used, a reference node for each zone could be identified, perhaps selected as a reference Transmission Connection Point for that zone, with the losses to that reference node then being used to app	Refer to AEMO's response in section 4.2.2.
44	SA Water	SA Water supports the proposal to adopt a transitional arrangement that initially uses NEM regions for VSR with a potential future transition to a long term zone hierarchy to better support system security in the future, where appropriately justified. This approach would allow time for design and consultation with industry on long term zoning in the NEM.	Refer to AEMO's response in section 4.2.2.

No.	Stakeholder	Issue	AEMO response
		SA Water believes that a target state for NEM zones should be the establishment of a common approach to zoning in the NEM used by all participants, especially AEMO, TNSPs and DNSPs, to manage system security, congestion and other matters. We consider this view aligns with AEMO's identified factor of supporting future dynamic operating envelope integration but goes a step further in establishing consistent approaches to congestion management across all network levels. We do not support the proposed use of congestion modelling zones based on the information currently provided.	
45	SA Water	The choice of zones would affect aggregation options within our portfolio which may result in some possible VSRs we are considering being unable to be offered. While we do not currently operate a VPP, our portfolio spans both the Distribution and Transmission networks within the South Australian NEM region.	Refer to AEMO's response in section 4.2.2.
46	SAPN	However, we do not support the current proposal to use congestion modelling zones as the bounds for VSR zones. The use of congestion modelling zones is likely to restrict early VSR uptake, particularly when coupled with AEMO's proposed capacity threshold of 5MW for VSR registration. We note that the two parameters are inherently coupled – a lower registration threshold could allow for a greater number of VSR zones, whilst larger zones could allow for a higher registration threshold.	Refer to AEMO's response in section 4.2.2.
47	SAPN	Where a VSR is participating in a state supplied by multiple DNSPs, such as Victoria or New South Wales, the resources within that VSR would likely receive DOEs from multiple DNSPs, regardless of whether the VSR was aggregated within a congestion modelling zone or across the NEM region. Whilst this may introduce short-term complexities for VSRPs, we do not consider this to be a material issue in the longer term, noting that significant effort is currently underway to ensure that the rollout of DOEs and emergency backstop functions by DNSPs is done in a nationally consistent fashion. We do not see a need to align VSR zones with DNSP network boundaries and would suggest that doing so would unnecessarily restrict VSR uptake.	Refer to AEMO's response in section 4.2.2.
48	SAPN	However, the majority of VSR participation is likely to come from aggregated resources, whether aggregated large batteries or aggregated behind-the-meter resources. In the latter case, many virtual power plants (VPPs) today are in a nascent state, with few being likely to have sufficient resources aggregated within a single congestion modelling zone to participate as a VSR.	Refer to AEMO's response in section 4.2.2.
49	SwitchDin	One possible issue with using a loss factor of 1 is that it ignores any constraints between the distribution & transmission networks, or within the distribution network where CER are actually connected. We suggest, therefore, that the	Refer to AEMO's response in section 4.2.2.

No.	Stakeholder	Issue	AEMO response
		operational data for connected CER systems should be reviewed to evaluate the suitability of this approximation.	
50	SwitchDin	Having VSR Zones reflect network constraints is a good approach for managing network stability. The considered options for VSR zones largely ignore distribution network topology despite the constituent CER being connected to the distribution network. The expectation is that distribution level constraints will become more impactful as a more significant share of total generation is distribution connected. And there is international evidence that ignoring local network constraints in wholesale / national market responses can cause problems	Refer to AEMO's response in section 4.2.2.
51	SwitchDin	Further work should be done to understand how aggregated DER behaves at the VSR zone level and how any dispatch commands are translated into individual DER responses (including the application of individual Dynamic Operating Envelopes - DOEs). Some possible ways to reflect distribution network topology could be to use Zone substations, or DNSP bulk supply points as the basis for VSR zones.	Refer to AEMO's response in section 4.2.2.
Nomination			
52	Red & Lumo Energy	Red and Lumo did not support implementing an initial lower VSR rating threshold and then increasing it as dispatch mode capability grows. They noted that VSRs will become a significant source of generation in the future and as such, larger VSR nameplate rating requirement that is proportional to the forecast size of this generation would be warranted. Red and Lumo, while acknowledging that the smaller the VSR nameplate rating the easier it is to form a VSR, pointed to potentially significant administrative problems that AEMO would face including handling small units in AEMO's control room. They also supported a 1 MW bidding threshold.	Refer to AEMO's response in section 4.3.2
53	Ergon & Energex	Ergon & Energex supported AEMO's proposal of a minimum combined nameplate rating of 5MW for dispatch to manage the challenges associated with handling a larger number of smaller VSRs by AEMO's control room, and its alignment with the existing standing exemption from registration of 5 MW.	Refer to AEMO's response in section 4.3.2
54	AGL	AGL supported the 5 MW threshold, but noted that it would need to review the technical specifications to comment further. In their view for residential NMIs in order to determine nameplate rating contribution, there must be either a static or dynamic baseline referenced, at the assets or the point of connection.	Refer to AEMO's response in section 4.3.2
55	Incite Energy	Incite Energy stated that even a 1 MW threshold would be a barrier to entry and there should be no lower limit, as it would reduce competition and be in direct conflict with the market objectives. They also added that the definition of qualifying resource is static and is anticipated to be problematic in a dynamic environment, questioning whether it is needed, and whether simply the metering	Refer to AEMO's response in section 4.3.2

No.	Stakeholder	Issue	AEMO response
		installation is sufficient (without AEMO involvement or consideration of behind-the-meter assets).	
56	Incite Energy	Incite Energy strongly opposed AEMO's minimum nameplate or combined nameplate rating of 5 MW, adding that there was no good reason for this limit other than AEMO seeking to protect incumbent players from new entrants. In their view, during the introductory period, participants should be limited to an upper limit of 5MW, thereby ensuring all VSR participants are treated equally during the introductory period.	Refer to AEMO's response in section 4.3.2
57	EnergyAustralia	EnergyAustralia supported adopting a low minimum threshold for VSRs for participation and bidding, stressing that the threshold should not create a barrier to use of the VSR mechanism. They also noted that AEMO should be cognisant of how a 5MW threshold would translate into smaller scale assets which are starting from a very small capacity threshold.	Refer to AEMO's response in section 4.3.2
58	EnergyAustralia	EnergyAustralia cited the example of average home battery system size being 10KW, which, with 88% asset availability would make it impractical to create a 5 MW sized VSR. EnergyAustralia have included examples of their community battery sizes that were, in most cases lower than the 5 MW threshold. They questioned the 5 MW threshold on the basis of many batteries and loads currently sized between 4 and 5 MW, which, in their view, the AEMC rule change was intending to incentivise to participate on a singular basis.	Refer to AEMO's response in section 4.3.2
59	EnergyAustralia	EnergyAustralia disagreed with increasing the capacity threshold over time, as this could strand existing investments made by participants in becoming a VSRP.	Refer to AEMO's response in section 4.3.2
60	SwitchDin	SwitchDin supported setting the threshold as low as possible to encourage participation, noting that the current value of 5MW is way too high for this and AEMO should consider a lower value, even if only initially. They also supported lowering the initial nameplate rating, but suggest that it be maintained or even reduced over time to allow for broader participation. SwitchDin suggested that AEMO should be actively working to remove barriers to entry for players with portfolios of large numbers of small capacity VSRs. Finally, they believed the minimum bid threshold should also be reduced to 100 kW.	Refer to AEMO's response in section 4.3.2
61	EEC	The EEC suggested that in order to encourage a larger number of participants, that a lower threshold should be set to 1 or 2 MW to encourage a wider diversity of participants and technology.	Refer to AEMO's response in section 4.3.2
62	SAPN	SAPN noted that the VSR registration threshold of 5MW would require a VSRP to aggregate multiple sub-5MW batteries together in order to participate as a VSR. In their experience, an increasing number of proponents are seeking to install sub-5MW battery systems, with many parties only operating a single battery. SAPN was of the view that it was unlikely that a VSRP would be able to aggregate assets of	Refer to AEMO's response in section 4.3.2

No.	Stakeholder	Issue	AEMO response
		such size and different ownership into a single VSR, which would thus significantly reduce the ability of these resources to participate as VSRs in general. SAPN also note for distributed CER VPPs, they expect many of these would not have 5 MW of aggregated resources available within the state and therefore would be restricted from registering as a VSR.	
63	Enel X	Enel X submitted, that based on their experience as an aggregator the 5 MW threshold would be a material barrier to entry, particularly for aggregations utilising resources smaller than 0.5MW per site. This concern was further elaborated the time it would take to build a portfolio of 5MW, the impact on achieving commercial operation and meeting conditions for incentive payments. They have noted that the proposed 5MW threshold is unintendedly biased toward supporting aggregations of larger resources.	Refer to AEMO's response in section 4.3.2
64	Enel X	Enel X supported an initial lower VSR nameplate rating threshold that adapts as dispatch mode capability and capacity grows and recommended a 1 MW minimum threshold for nameplate rating or combined nameplate rating. They have questioned the relevance of AEMO's proposed alignment with the standing exemption from registration of 5MW and requested AEMO state the benefits of such an alignment.	Refer to AEMO's response in section 4.3.2
65	Enel X	Enel X agreed with the 1 MW bidding threshold, suggesting that together with the 1 MW aggregation threshold it presents the most technology/participant agnostic building block option.	Refer to AEMO's response in section 4.3.2
66	SA Water	SA Water submitted that if the 1 MW bid size is not lowered, a 1 MW minimum VSR size would also be of limited value and the minimum bid size should drive the minimum aggregation size. In their view both conformance (also affected by NMI churn) and bidding becomes difficult for VSR portfolios that have relatively large loads with non-integer capacities, if bidding is only available in 1 MW blocks. They added that registration can be delayed if the f the composition of available NMIs for registration an aggregated VSR is not an integer multiple of 1MW. In SA Water's view a 1 MW nameplate unit will not be capable of being dispatched for energy and a 1 MW minimum bid size coupled with a 1 MW nameplate rating requirement will not allow units to participate in both FCAS and energy markets. SA Water has also supported increasing minimum nameplate rating requirements over time, provided its evidence based and in line with the IPRR rule.	Refer to AEMO's response in section 4.3.2
67	Enel X	Enel X appreciated the proposal to add an Application Programming Interface (API) as an alternative to a manual CSV upload as is currently required. They added that the availability of both a system-to-system API and a manual CSV upload facilitates aggregators with varying maturity and technology platforms.	Refer to AEMO's response in section 4.3.2

No.	Stakeholder	Issue	AEMO response
68	SA Water	SA Water did not support an API based nominations system if it was the only way to submit nominations. In their view it could potentially increase the cost of participating in a VSR. The also noted that the requirement for VSRP should reflect the requirement for FRMP as these supersede some of the VSRP requirements and potentially these categories could be combined.	Refer to AEMO's response in section 4.3.2
69	SwitchDin	SwitchDin, however, supported an API based nomination system as in their view it provides an opportunity for automation and reducing management overheads.	Refer to AEMO's response in section 4.3.2
70	SA Water	SA Water believed that registration for FCAS should be a separate process to VSR nomination and capability assessment. If this was not the case, VSRs registered for FCAS could be exempted from some VSR capability assessment components due to an equal or higher standard being applied through holding a FCAS registration.	Refer to AEMO's response in section 4.3.2
71	SA Water	SA Water also suggested that some of the issues with the responsiveness of the current proposal could be addressed if AEMO were better able to separate VSR creation and NMI nomination to a VSR, noting rule requirements that some criteria must be demonstrated as part of forming a VSR. SA Water's proposition for this was for AEMO to require pre-qualification of each NMI as being suitable to participate in a VSR prior to VSR nomination.	Refer to AEMO's response in section 4.3.2
72	ECC	The ECC expressed concerns that the requirement of a VSRP having to be the FRMP could limit participation in some cases, including the preclusion to participate in WDRM or other market services. In their view, these relationships should be flagged to the customer and to the market through MSATS. The EEC also considered that the requirement that the VSRP is also the FRMP may also pose a barrier to the participation of smaller aggregators, unless they partner with a FRMP, and recommend that the requirements, conditions and processes for VSRPs are designed in a way which allows broad participation, which may mean establishing specific Guidelines specifying how smaller aggregators can participate without being a FRMP.	Refer to AEMO's response in section 4.3.2
Portfolio management			
73	AGL	VSRPs nominating aggregated fleets of CER (including price responsive flexible loads) may have tens of thousands of individual NMIs aggregated into a single nominated resource. FRMP churn levels on an aggregated fleet of that scale will be significant, daily and on average predictable. AEMO is already notified of FRMP churn automatically. If the process for removing NMIs from a VSR aggregation and notifying AEMO is not entirely automatic, it will make it operationally impossible for VSRPs to nominate and manage large fleets of aggregated assets as a nominated resource.	Refer to AEMO's response in section 4.4.2.

No.	Stakeholder	Issue	AEMO response
		AGL's understanding is that AEMO is considering changes to the PMS to streamline VSRP's applications. We welcome these changes, as AGL's view is that this system is simply not suitable for dispatch mode in its current state. However, AGL cautions that any new software build needs to be well built and highly fit-for-purpose, or it will increase the complexity of participation in dispatch mode.	
74	EEC	The EEC recommends that the process for dealing with NMI churn be as simple as automatic as possible.	Refer to AEMO's response in section 4.4.2.
75	Enel X	To avoid unnecessary additional reporting Enel X requests that individual qualifying resource availability and operating status is only collected when AEMO determines that it must represent the VSR within the aggregation as two or more dispatchable units in constraints used in central dispatch to maintain power system security. Enel X recommends such a request is accompanied with an explanation setting out the underlying system security concern and relevant constraints.	Refer to AEMO's response in section 4.4.2.
76	Enel X	If the threshold is set at the 1MW minimum bid increment then immediately switching the VSR to inactive mode is important for the integrity of the market. However, if a 5MW threshold is utilised and the market is continuing to build experience Enel X suggest there is room for some tolerance provided the VSR Guidelines set out expectations for returning above the minimum threshold (potentially 3- months) and the shortfall tolerance (15% seems reasonable). For the avoidance of doubt, Enel X recommend that VSRP bids remain consistent with the broader Rules requirements and only genuinely available capacity is made available to the market.	Refer to AEMO's response in section 4.4.2.
77	EnergyAustralia	While we understand the intent behind AEMO directions of this sort, we consider that any AEMO directions on NMI changes must be transient only, and not lead to permanent changes to the NMI being part of the DUID. We also question how much lead time will be provided to participants. We support an approach where the NMI is made inactive in cases of customer churn to a different FRMP.	Refer to AEMO's response in section 4.4.2.
78	Incite Energy	We do not believe its within scope for AEMO to consider individual CER assets. Therefore we would limit the AEMO's ability to request availability and operating status to the NMI level. It is logical that a materiality test applies to any such request.	Refer to AEMO's response in section 4.4.2.
79	SA Water	SA Water views the system would have a higher level of uptake if it is able to support more dynamic nominations process with more flexibility for participants, minimising the level of assessment that is required when a nomination to a VSR is made. One option that AEMO may consider is a full separation between VSR creation and NMI nomination to a VSR. This may involve registration of a VSR,	Refer to AEMO's response in section 4.4.2.

No.	Stakeholder	Issue	AEMO response
		nominating a zone in which it would operate, demonstration of VSR operational capability	
80	SA Water	SA Water is concerned that an unrelated FRMP could accidentally disrupt the operation of an otherwise valid VSR by erroneously initiating a churn for a NMI for which they do not have customer permission, potentially resulting in the inactivation of an entire VSR if below the threshold. While customers must be free to churn to another retailer, this is an uncontrollable risk for the VSRP.	Refer to AEMO's response in section 4.4.2.
81	SA Water	If AEMO's proposed requirements for VSRs greater than 30MW are adopted, AEMO would also either need a similar process or would need to prevent the nomination of additional nameplate capacity exceeding the 30 MW threshold if at any time a NMI within a VSR does not meet the technical criteria to participate in a VSR of that size.	Refer to AEMO's response in section 4.4.2.
82	SwitchDin	AEMO should hold the VSRP accountable for managing their portfolio within appropriate bounds (as per section 3.5.9) and have any remedies managed at the portfolio level (as section 3.5.9 outlines). AEMO should not try to manage individual resources at the NMI level. In cases where a VSRPs portfolio needs to be disaggregated, this should be done in consultation with the VSRP, and the VSRP should not unreasonably refuse to negotiate on such a request.	Refer to AEMO's response in section 4.4.2.
83	SwitchDin	Churn is an expected feature of aggregated systems, and processes should be put in place to facilitate consumers churning to enable retailer selection (much like with the NBN). It's reasonable for the VSRP to be held accountable for handling churn and maintaining a minimum level of capacity (with some reasonable leniency) in the VSRs they manage, and that there should be consequences for dropping below this minimum. A sustained capacity below the minimum would reasonably imply suspension or removal from the scheme.	Refer to AEMO's response in section 4.4.2.
Capability assessment			
84	AGL	AGL is unclear whether the telemetry requirements enable smart meters to be considered as the source of telemetry data for a qualifying resource, or if additional metering would be required for individual resources, and how this feeds in with the requirements at a DIUD level. AGL's view is that prescribing metering at a device level could limit the participation of flexible loads. AEMO could also consider presenting telemetry requirements in a diagram, and creating a few 6 examples for hypothetical VSRs comprised of different types of resources to aid discussion and feedback from prospective VSRPs.	Refer to AEMO's response in section 4.5.2. and section 4.11.2.
85	Enel X	Enel suggest that AEMO apply a more pragmatic requirement for processing latency. No system processes and communicates data 'instantaneous' and suggesting so is not consistent with existing SCADA implementations. Enel X	Refer to AEMO's response in section 4.5.2.

No.	Stakeholder	Issue	AEMO response
		recommend processing latency is reflective of the telemetry systems used for other dispatchable generation systems. With the exception of our process latency comment in Question 19 Enel X is comfortable that the proposed telemetry approach achieves a reasonable balance between enabling participation and system security considerations.	
86	EnergyAustralia	A four second interval for communication requirements is not feasible for VSRs, even above a 30MW capacity, due to the time lapse that will occur via communication from the asset e.g. battery to the VPP operator, and then to AEMO. We support a 60 second timeframe across the board for all services, including Regulation FCAS, and energy trading, and any future services.	Refer to AEMO's response in section 4.5.2.
87	EnergyAustralia	We do not see a need for periodic capability assessments. Rather, capability assessments beyond the initial assessment should only occur on an 'as needs' basis. i.e. if there are changes to the VSR portfolio – inclusion of a community battery for example (which can be flagged to AEMO by the participant), or if there is repeated non-conformance by a VSRP.	Refer to AEMO's response in section 4.5.2.
88	Red and Lumo	Red and Lumo support AEMO's: 1. initial capability assessment on VSRPs to ensure their capability to operate VSRs 2. proposed 'periodic capability assessments' 3. operational requirements for telemetry and communications equipment for VSR.	Refer to AEMO's response in section 4.5.2.
87	Incite Energy	The proposed approach makes progress in balancing market participation and system security; however, further refinements are needed: • Telemetry Intermittency: While frequent updates are important for system reliability, excessive granularity for all VSR may not be necessary and could impose unnecessary costs. We see this as simply a requirement to provide timely information to AEMO if you wish to receive revenue for a VSR in a particular trading interval. This doesn't require that telemetry is up and available in other periods. • Incentives for Voluntary Telemetry Upgrades: Rather than mandating high-cost telemetry solutions upfront, AEMO could introduce incentives or staged implementation options for participants willing to enhance telemetry capabilities over time. This allows telemetry costs to be considered against revenue streams. • Alignment with CER Aggregation Models: The proposed telemetry approach should integrate smoothly with existing CER aggregation models, ensuring that additional layers of telemetry requirements do not create unnecessary redundancy.	Refer to AEMO's response in section 4.5.2.
88	Incite Energy	The solutions being pursued are central control heavy, and do not suitably weight: • Cost-Effectiveness for VSRPs: The financial burden of telemetry installation and	Refer to AEMO's response in section 4.5.2.

No.	Stakeholder	Issue	AEMO response
		maintenance should not act as a barrier to entry, especially for smaller aggregators. SCADA-lite and other lower-cost telemetry solutions should be allowed. • Scalable & Interoperable: The system should be designed to accommodate future technological advancements and evolving grid conditions. Ensuring interoperability with existing CER platforms will prevent unnecessary duplication of infrastructure. • Cybersecurity & Data Privacy: AEMO must ensure that telemetry systems comply with best practices for cybersecurity and data privacy to protect sensitive market and operational data from unauthorized access. • Aligned with International Best Practices: A review of telemetry requirements in other jurisdictions (e.g., California ISO, PJM, Chile and European markets) could provide useful insights into best practices for balancing market participation and grid reliability. • Flexibility for Different Resource Types: The telemetry requirements should be technology neutral and not be limited to the operational characteristics of known/common VSR types today.	
89	SwitchDin	The proposed telemetry requirements are driven by a desire to align with existing AEMO systems and processes. However, aggregations of large numbers of small systems behave very differently from traditional SCADA connected plant. Further detail on how AEMO expects aggregate telemetry to be formed from individual resources (which may be reporting slower than the proposed aggregate telemetry rates) is needed.	Refer to AEMO's response in section 4.5.2.
90	SA Water	The proposal for telemetry requirements appears inconsistent with the current structure and topography of telemetry for existing registered generators in the NEM. Under current arrangements, a SCADA feed from a single site is provided to exchange AGC and telemetry data with AEMO. SA Water is aware that multiple participants routinely report experiencing significant latency in receipt of AGC signals delivered to them by AEMO under this model.	Refer to AEMO's response in section 4.5.2.
91	SA Water	This means that the VSRP would need to gather data from each site, collate the data in a single location including aggregation calculations and then forward the data to AEMO via the SCADA lite system. This likely results in the need for additional SCADA endpoints and puts an additional participant system between AEMO and the data feed. It also increases potential cybersecurity risks by more heavily integrating the AEMO SCADA system with participant control and data systems.	Refer to AEMO's response in section 4.5.2.
92	SA Water	Given AEMO's current proposal is to not apply any limits in real time to VSRs that are not conforming, SA Water suggests that telemetry via SCADA may be unnecessary and once again not consistent with the balance required for AEMO to	Refer to AEMO's response in section 4.5.2.

No.	Stakeholder	Issue	AEMO response
		establish under the rule. Instead, a daily aggregated telemetry delivery at 5s/60s frequency, as applicable, may be more appropriate. An alternative might also be to establish a new a higher performance grid metering requirement for VSRs and do away with any requirement for telemetry, such a solution may even be able to build upon existing RP/MP/MDP capabilities and avoid the need for establishing a costly telemetry pathway.	
93	SA Water	SA Water believes that for VSRs that demonstrate conformance, limited periodic capability assessments (e.g. annual) would be appropriate. Where non-conformances have occurred, undertaking more detailed and event triggered capability assessments would be warranted. SA Water believes the settings for these capability assessments will need to be tested and potentially adjusted based on experience and the measured effect that VSRs have on system security and reliability.	Refer to AEMO's response in section 4.5.2.
Deactivation and temporary hibernation			
94	Enel X	Enel X agrees with AEMO's notice periods for switching between VSR participation modes. Setting aside emergency conditions addressed under NER 4.8.1 Enel X support restricting mode switching on a per day basis. Any finer granularity is reasonably address via the normal bidding/rebidding processes.	Refer to AEMO's response in section 4.6.2.
95	EnergyAustralia	We are more inclined to accept short notice periods, where de-activation and hibernation mode mean that a VPP can operate off market and continue for instance to export electricity, outside the dispatch process. This was our understanding of the AEMC rule change, but we would like to clarify this question with AEMO.	Refer to AEMO's response in section 4.6.2.
96	Incite Energy	AEMO's proposed notice periods for switching between VSR participation modes should be more flexible to accommodate real-world operational needs. The proposed seven-day notice period is unnecessarily rigid.	Refer to AEMO's response in section 4.6.2.
97	Jemena	Yes (agree that VSR can only switch between modes on a per day basis, rather than per time intervals within the day).	Refer to AEMO's response in section 4.6.2.
98	Red and Lumo	Red and Lumo support the seven-day notice period that will apply to VSRPs for deactivation, hibernation and resumption requests. Red and Lumo suggest that at this early stage of development, switching between modes on a per day basis is appropriate. However, if the amount of VSRs continues to grow in the future and the market wants this feature introduced, a market participant could propose a rule change to initiate this change.	Refer to AEMO's response in section 4.6.2.

No.	Stakeholder	Issue	AEMO response
99	SA Water	We do not agree with the proposed notice periods for switching between inactive and active as they are far too long. Notice periods for switching to and from hibernation mode appear largely reasonable.	Refer to AEMO's response in section 4.6.2.
100	SA Water	SA Water does not agree with only having per day mode switching. SA Water notes AEMO's identification that minimum active periods would be required and would seek to better understand the implications of these minimum periods. Under AEMO's current proposal, we struggle to see the difference in benefits for participants between inactive mode and hibernation modes and would suggest participants would always choose to default to entering hibernation mode if they anticipate a period of non-price responsiveness longer than 30 days.	Refer to AEMO's response in section 4.6.2.
101	SA Water	We view that notices for deactivation and reactivation should be able to be submitted with bids to facilitate intra-day switching between active and inactive modes. As such, the information requests should be appropriately scaled to require reason codes only. The proposed information requirements for hibernation seem reasonable.	Refer to AEMO's response in section 4.6.2.
102	SwitchDin	VSR switching modes once per day seems reasonable based on our current knowledge. The expected use cases for switching between modes should drive the timing constraints. When detailing the limitations around switching between modes, the guidelines should describe use cases for each mode and the expected scenarios when VSRPs might choose to switch modes.	Refer to AEMO's response in section 4.6.2.
Bidding			
103	SA Water	SA Water supported AEMO's proposal to use the existing BDU bidding mechanism for VSRs. They have queried whether FRMPs not currently	Refer to AEMO's response in section 4.7.2
	Incite Energy	Incite Energy expressed that VSR bidding should be straightforward and uncomplicated. They raised concerns about the competitive neutrality of the framework, suggesting it might enable the existing oligopoly to expand into the VSR market. In line with the goal of achieving competitive outcomes, Incite Energy recommended that the AEMO propose the most effective solution. Furthermore, they highlighted the need for the AEMO to clarify how integration between aggregators and retailers will function and to enforce coordination requirements between VSRs and retailers.	Refer to AEMO's response in section 4.7.2
NEMDE processes			
104	SwitchDin	SwitchDin was of the view that NEMDE's technical limitations were driving the proposed thresholds that would in turn limit smaller aggregators to participate in the market. They suggested that AEMO publishes a roadmap that would help prospective VSRPs understand the viability of their participation.	Refer to AEMO's response in section 4.8.2

No.	Stakeholder	Issue	AEMO response
105	SA Water	SA Water suggested that the Guidelines should cover information necessary for FCAS registration for VSRs.	Refer to AEMO's response in section 4.8.2
106	Incite Energy	Incite Energy was of the view that to ensure clarity and accessibility for prospective VSRPs, AEMO should provide comprehensive guidance. Incite Energy suggested that a structured guide detailing the interaction between VSRPs and NEMDE is essential. This guide should cover aspects such as bid submission, dispatch instructions, and compliance obligations, and include worked examples of typical bid scenarios to illustrate how NEMDE prioritizes and schedules VSR bids.	Refer to AEMO's response in section 4.8.2
107	Incite Energy	Incite Energy argued that a clear explanation of VSR-specific constraints is necessary. This explanation should detail how NEMDE will factor in the aggregated nature of VSRs and highlight any differences in the dispatch process compared to conventional scheduled generators.	Refer to AEMO's response in section 4.8.2
108	Incite Energy	Incite Energy suggested that bid validation and submission rules should be thoroughly explained. This should include a detailed account of bid validation requirements, any unique conditions for VSR bids, and guidance on how VSRs can update bids dynamically, particularly in response to real-time market conditions.	Refer to AEMO's response in section 4.8.2
Dispatch			
109	Jemena	Jemena proposed that DNSPs have near real time visibility of VSRs involvement in dispatch to help with recalculating their DOEs.	Refer to AEMO's response in section 4.9.2
110	SA Water	SA Water queried the value of requiring aggregated state of charge information for VSRs, in particular in the case where the VSR is an aggregation of multiple small units.	Refer to AEMO's response in section 4.9.2
Conformance			
111	Red and Lumo	Red and Lumo argued that the error trigger threshold should be based on the combined nameplate rating of the portfolio of VSRs and should be equal to 20% of the portfolio, when it doesn't exceed 30 MW. Under their proposal, the VSR portfolio would be declared non-conforming after error trigger was breached in three consecutive trading intervals.	Refer to AEMO's response in section 4.10.2
112	Enel X	Enel X was of the view that achieving linear ramping in portfolios consisting of mixed technologies would likely be difficult in the early days of implementation. Therefore, they suggested an initial 25% error trigger which would be reviewed after three years to ensure participation and market integrity are still appropriately	Refer to AEMO's response in section 4.10.2

No.	Stakeholder	Issue	AEMO response
		balanced. However, they've added that AEMO proposed a suitable operating framework for new VSRPs to mature their technical capabilities.	
113	EEC	The EEC recommended that the error threshold chosen for VSRs is appropriate and directly correlates to the minimum nameplate rating of individual or combined VSRs.	Refer to AEMO's response in section 4.10.2
114	Jemena	Jemena queried whether the non-conformance process is contemplating informing DNSPs and whether DNSPs should consider non-conformance in their DOE calculations.	Refer to AEMO's response in section 4.10.2
115	SA Water	SA Water, while not opposing AEMO's initial approach of favouring ease of participation it questioned the necessity of many other provisions requested for VSRs.	Refer to AEMO's response in section 4.10.2
116	EnergyAustralia	EnergyAustralia suggested a lenient approach that, for example, takes into account the lower availability of small-scale battery assets. This approach would see the error trigger threshold be set at higher, 88% rate of the VSR's nameplate rating. EnergyAustralia agreed with imposing a limit after repeated non-conformance, which, in their view strikes a reasonable balance between encouraging participation while ensuring limited adverse market impacts.	Refer to AEMO's response in section 4.10.2
117	AGL	AGL suggested that VSRPs should not be held accountable for non-conformance under circumstances where the market participant could not reasonably foresee the impact of network limits on its operations, such as where a DNSP changes a network limit with short notice or where the DNSP overrides the VSRPs' instructions without prior knowledge from the VSRP. They also agreed that setting dispatch conformance in an appropriate way is critical in enabling participation of different asset classes.	Refer to AEMO's response in section 4.10.2
118	SwitchDin	SwitchDin agreed with AEMO's initial approach that, in their view allows for smaller market players to gain operational experience. They noted that once operational data becomes available, the suitability of non-conformance processes can be reviewed at a later stage.	Refer to AEMO's response in section 4.10.2
119	Incite Energy	Incite Energy suggested that there should be transparency on how quickly VSRs need to respond to dispatch instructions, tolerances for deviations and how AEMO will assess conformance.	Refer to AEMO's response in section 4.10.2
Metering			
120	EEC	The EEC notes that requiring a Type 4 category 4S meter may limit VSR participation. The EEC asks that AEMO clarifies whether a customer with a Type 4 'smart' meter, would meet the telemetry requirements.	Refer to AEMO's response in section 4.11.2. and section 4.5.2.

No.	Stakeholder	Issue	AEMO response
121	Enel X	Provided AEMO accept that VSR telemetry can be derived from non-pattern approved metering then AEMO's proposed metering approach for settlement and compliance is fit for purpose.	Refer to AEMO's response in section 4.11.2. and section 4.5.2.
122	SA Water	We note that AEMO also has requirements for provision of telemetry from each VSR unit at a sub 60s or 4s frequency for VSRs over 30MW or enrolled in FCAS. It is unclear whether this requirement can be met with sufficiently capable grid metering, or whether telemetry must be sourced and aggregated from other metering separate to the grid metering. Further clarification on these potential interactions would be of value. Otherwise, the proposed metering requirements appear reasonable.	Refer to AEMO's response in section 4.11.2. and section 4.5.2.
123	SwitchDin	Consideration should be given to how the metering and telemetry requirements align. For instance if VSR telemetry is expected to come from revenue smart meters, then those meters must be capable of providing data at much finer granularity than 5min.	Refer to AEMO's response in section 4.11.2. and section 4.5.2.
Settlement			
124	AGL, SA Water, SwitchDin, Enel X	AGL, SA Water, SwitchDin and Enel X's supported assisting potential participants by including information on settlement and non-energy cost recovery information in the guidelines	Refer to AEMO's response in section 5
Prudentials			
125	AGL	AGL's view is that prudentials should account for reasonable market risk associated with more bi-directional assets.	Refer to AEMO's response in section 5
126	Incite Energy	For example, we recommend modernizing settlements processes (e.g. there is no good reason why AEMO continues to require AustraClear as the only payment method), reviewing registration, bid and conformance requirements, and ensuring that telemetry and communication requirements are appropriate for decentralized resources.	Refer to AEMO's response in section 5
Data and information sharing			
127	AGL	AGL notes the dissemination and use of this information should be tightly controlled to avoid DNSPs leveraging their advantages as regulated monopolies in the delivery of ring-fenced activities.	Refer to AEMO's response in section 4.12.2.
128	EEC	The EEC notes that potential VSRPs will need information from network providers to account for dynamic operating envelopes and network limits more broadly. Consistency of data across network providers would also support participation. In relation to data being provided to DNSPs, data which potential VSRPs already have	Refer to AEMO's response in section 4.12.2.

No.	Stakeholder	Issue	AEMO response
		access to (and can grant permission for the network provider to access) may be achievable, but requiring further information from VSRPs may be problematic as the costs involved in acquiring further data may limit willingness to participate.	
129	Enel X	Enel X recommend that AEMO balance the operational costs of delivering DNSP/TNSP information requests against a business-as-usual case where a Retailer aggregates and co-ordinates price responsive resources outside of the IPRR framework. DNSPs and TNSPs are expanded their non-regulated (ring-fenced) activities. Enel X prefers to not provide confidential data to parties where protections rely on the effectiveness of internal ringfencing arrangements that are difficult to audit and enforce.	Refer to AEMO's response in section 4.12.2.
130	EnergyAustralia	We believe that any data sharing to support VSR integration into the NEM, and any data sharing with AEMO, should match the data provided by batteries for bi-directional electricity flows and the data provided by scheduled loads. This should resolve any privacy concerns around data.	Refer to AEMO's response in section 4.12.2.
131	Ergon & Energex	We believe that a forecast of the bid and actuals of the dispatch at a NMI level under the VSR is likely to be required, tagged by the relevant DNSP to cater for the selection of broader zones. However, as a VSR is an aggregation of resources and VSRPs are required to make accurate bids at a portfolio level only, the individual NMI level bid information may be an estimate only.	Refer to AEMO's response in section 4.12.2.
132	Ergon & Energex	Our preference is to receive NRT data via Apache Kafka Event Streaming.	Refer to AEMO's response in section 4.12.2.
133	Incite Energy	AEMO should provide a clear description of what data VSRs need to provide before, during, and after dispatch events. Examples of telemetry reporting formats and expectations. We anticipate that it will be the VSRP that discloses data with NSPs and question the role the AEMO foresees for itself here.	Refer to AEMO's response in section 4.12.2.
134	Jemena	Preference is to know the changes in the VSR/VSRP/Zone level as near real time as possible to DNSP to assist in network assessment. In terms of generating DOE for each NMI (including FELs and FILs) will be challenging and force to have common format across DBs. Is there any discussion or workflow for passing this non-conformant VSR or related Flag DNSP? Do DNSP need to Consider this during DOE calculation ?	Refer to AEMO's response in section 4.12.2.
134	Red and Lumo	While VSRPs will have a broad idea of the capacity of the qualifying resources within one of its VSRs, it won't know their export limits to the grid. This is because they are not privy to the details of the connection contract between the DNSP and	Refer to AEMO's response in section 4.12.2.

No.	Stakeholder	Issue	AEMO response
		the qualifying resource. Without this information, VSRPs won't be able to accurately declare the availability of their qualifying resources.	
135	SA Water	SA Water notes that intending VSRPs may be connected to a market connection point on the transmission network or to an embedded network and that all references to engagement with DNSPs should be extended to include both TNSPs and Embedded network managers.	Refer to AEMO's response in section 4.12.2.
136	SAPN	We thus do not support the provision of only aggregate VSR bid quantities to DNSPs, reflective of the fleet-wide behaviour of a VSR where multiplate resources are being aggregated. This would require DNSPs to disaggregate the data to a NMI-level for use as input to DOE calculations, an operation that we feel DNSPs are not best-placed to do.	Refer to AEMO's response in section 4.12.2.
137	SAPN	We do not consider that there are any confidentiality, privacy or competitive concerns with respect to forecast bid quantities being shared with DNSPs. The AER's ring-fencing guidelines restricts DNSPs from operating network owned batteries in the market. A class-waiver has however been granted to allow DNSPs to lease some portion of the capacity of these batteries to a third-party for market operations, but this operation would be entirely managed by that third party. A DNSP has no additional insights or control of the market portion of these batteries' operation than any existing third-party owned battery.	Refer to AEMO's response in section 4.12.2.
138	SAPN	The Consultation Paper proposes that DNSPs be provided with MW bid quantities from VSRPs, but that this data would only be provided in a post-market manner, and that only aggregate VSR bid quantity data would be available from AEMO. We do not support this proposal, noting that post-market data does not provide a material uplift in our ability to generate efficient DOEs for VSRs and that the provision of aggregate VSR bid data introduces additional uncertainties in the generation of NMI-level DOEs.	Refer to AEMO's response in section 4.12.2.
139	SAPN	Recognising the importance of these data-sharing arrangements, but also the operational limitations on both AEMO and VSRPs, we propose an opt-in, DNSP-led framework for the provision of forecast NMI level VSR bid quantities. VSRPs that elect to provide day-ahead, NMI-level forecasts of their VSR bid-quantities would receive a more optimal allocation of network capacity, by way of allowing DNSPs to remove a layer of conservatism in their DOE generation. This would reduce the level of constraints imposed on that VSR and allow them to increase their bid quantities when compared with a VSR connected to the same part of the network opting not to provide this data to a DNSP. We consider that this increased network access could materially improve the access of a VSR to market revenue and would additionally drive unit cost reductions for all consumers by way of increasing network utilisation.	Refer to AEMO's response in section 4.12.2.

No.	Stakeholder	Issue	AEMO response
140	SwitchDin	As the NMI data is related to the Qualifying Resources, then consent should be obtained from the owners of those resources before data sharing occurs, and there should be a strong operational need for sharing any data beyond the VSRP. Ideally the spread of NMI enrolment data should be limited, and primary responsibility should rest with VSRPs to manage enrolments. If withholding this data from the DNSPs/TNSPs limits participation then, rather than withholding the data, better trust mechanisms (including customer consent) should be established to allow DNSPs/TNSPs to access it.	Refer to AEMO's response in section 4.12.2.
141	SwitchDin	Has there been any consideration given to data retention periods — especially once data is no longer required for operation purposes? If so, then documenting the requirements & restrictions around data retention would be useful.	Refer to AEMO's response in section 4.12.2.