Integrating price responsive resources into the National Electricity Market: High level implementation assessment

February 2025

Preliminary view for participants for their comment on how the rule change may be implemented by AEMO

Important notice

Purpose

AEMO has prepared this document to provide preliminary information about the implementation design of the *Integrating price responsive resources into the National Electricity Market* rule.

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Version control

Version	Release date	Changes
0.1	1 August 2024	Draft for industry comment
0.2	12 September 2024	Draft for AEMC's consideration in determining the final IPRR rule.
1.0	06 February 2025	Draft for industry comment based on final IPRR determination and rule.

Contents

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1 Introduction

This section explains:

- The background and high-level policy rationale for the Integrating price-responsive resources into the National Electricity Market (IPRR) reform
- The purpose of this High-level Implementation Assessment (HLIA) document
- How stakeholders can contribute to the development of the IPRR reform.

1.1 Rule change process: Integrating price-responsive resources into the NEM

Final rule

On 19 December 2024, the Australian Energy Market Commission (AEMC) published a final determination and more preferable final rule titled **Integrating price-responsive resources into the NEM**. The final rule set the main IPRR commencement date to be Sunday 23 May 2027.[1]

The final IPRR rule integrates unscheduled price-responsive resources, such as exempt storage/generation and virtual power plants (VPPs), into NEM scheduling and dispatch processes. Market Participants, such as Market Customers (retailers) and Small Resource Aggregators, will be able to nominate and aggregate their resources together (e.g. on behalf of their customers) to participate in the mechanism on a voluntary basis. This will support predictability and dispatchability in the NEM and provide new opportunities for these resources to participate in energy and other markets.

Issue

Currently, unscheduled price-responsive resources, and their response to market price signals, are not integrated into the NEM's planning and operation functions. They are not visible to AEMO or the market and therefore cannot be appropriately considered when determining how much energy demand needs to be met, how to meet this demand, the price at which it is purchased, or decisions about interventions when required. They are also unable to participate in some services that are available to scheduled resources, such as regulation frequency control ancillary services (FCAS), limiting the value that customers can receive for their consumer energy resources (CER).

Benefits

Over time, the integration of unscheduled price-responsive resources into NEM scheduling processes is expected to reduce total system costs and therefore likely decrease prices for all consumers:

- AEMC's published benefits analysis indicates $1.5 to $1.8b in potential cost reductions (net value between 2025 and 2050) from undertaking the IPRR reform, compared with doing nothing.[2]

[1] AEMC, *Integrating price responsive resources into the National Electricity Market* project page at https://www.aemc.gov.au/rule-changes/integrating-price-responsive-resources-nem

[2] AEMC, *Benefit analysis of improved integration of unscheduled price-responsive resources into the NEM*, 12 February 2024, p.68

- AEMO's 2024 Integrated System Plan (ISP) anticipates that 'coordinated CER storage' (or VPPs) could provide around half the NEM's dispatchable capacity by 2050, subject to these resources being integrated into market scheduling processes.[3] The 2024 Integrated System Plan highlights that there is $4.1 billion of potential avoided costs, predominantly associated with avoided investment in large-scale storage systems, that could be realised from integrating CER and having coordinated CER able to support dispatch. Therefore, integrating price-responsive resources provides an opportunity for distributed resources / CER to make valuable contributions to the firming capacity required by the future power system.

Background

The rule change request was initiated by AEMO in January 2023, with the submission of the 'Scheduled Lite Mechanism' rule change request to the AEMC. AEMO was tasked by the Energy Security Board (ESB) to prepare the rule change in accordance with the ESB's:

- Post 2025 Market Design Final Advice to Energy Ministers
- Consumer Energy Resources (CER) implementation plan.

1.2 HLIA document purpose

This High-Level Implementation Assessment has been produced as the first stage of AEMO's IPRR reform implementation process under the NEM Reform Program. It provides an indicative and preliminary view to participants on how the IPRR rule may be implemented by AEMO. It outlines the proposed system, data exchange, process and operational changes and the indicative timeline that would likely be required to give effect to the IPRR rule. This HLIA also provides a general assessment of what these changes may mean for NEM participants.

By publishing at an early stage in tandem with the AEMC's final determination and inviting participant feedback, the HLIA is intended to:

- Assist and inform affected participants in developing their own implementation timelines and impact assessments
- Enable AEMO and participants to plan for this initiative in the context of the broader implementation roadmap (NEM Reform Implementation Roadmap), specifically looking for bundling opportunities, efficient sequencing and to reduce delivery congestion
- Enable stakeholders to provide input on the early implementation design and timeframes, including whether AEMO's HLIA is consistent with the final IPRR rule.
- Confirm the key implementation activities and milestones against which progress will be managed and communicated to Industry

In the case of any inconsistency between the HLIA and the IPRR rule, the AEMC's IPRR rule and determination will prevail.

[3] AEMO, *2024 Integrated System Plan for the National Electricity market*, Figure 2, p.11 and Figure 20, p.66

1.3 Key dates

Table 1 Indicative IPRR rule and HLIA timeline

Activity	Timeline
AEMC IPRR Draft Rule and Determination published	**Thu 25 Jul 2024**
AEMO IPRR Draft HLIA v0.1 published	**Thu 01 Aug 2024**
AEMO Industry briefing on IPRR Draft HLIA	**Wed 07 Aug 2024**
Stakeholder feedback on IPRR Draft HLIA due	**Mon 19 Aug 2024**
AEMO IPRR Draft HLIA v0.2 published	**Thu 12 Sep 2024**
Stakeholder submissions on AEMC's Draft Determination due	**Thu 12 Sep 2024**
AEMC IPRR Final Rule and Determination published	**Thu 19 Dec 2024**
AEMO IPRR Final HLIA v1.0 published for industry comment	**Thu 06 Feb 2025**
AEMO Final HLIA industry forum	**Thu 13 Feb 2025**
Stakeholder feedback on IPRR HLIA v1.0 due	**Thu 27 Feb 2025**
AEMO IPRR Final HLIA v1.1 published	**Thu 20 Mar 2025**

1.4 Seeking feedback

AEMO welcomes any stakeholder feedback on this Final HLIA by Thursday 27 February 2025. Comments should be sent via email to NEMReform@aemo.com.au. AEMO is particularly seeking feedback on matters set out in Table 2.

Table 2 Summary of areas for feedback on Final HLIA

HLIA SECTION	TOPICS
2	To what extent has AEMO appropriately captured the IPRR market design based on the AEMC's IPRR rule? What changes do you propose and why?
3, 4 & 5	• To what extent do you agree with the impact and impact ratings AEMO has identified for its: – business process changes, – procedure changes, and – system changes? • What alternatives to these do you propose and why?
6 & 7	• To what extent have the key IPRR implementation considerations been appropriately described? • To what extent do you agree with the impact and impact ratings AEMO has identified for each stakeholder type? What changes do you propose and why? • What additional participant impacts and challenges do you anticipate? • What are your views on each of the elements of the indicative readiness approach and their timings?

2 Market design

The IPRR rule has three major implementation components:

1. A voluntary framework known as “dispatch mode” to integrate presently unscheduled price-responsive energy resources into NEM scheduling and dispatch processes.
2. A time-limited incentive scheme to drive participation in the IPRR mechanism in its early years.
3. A monitoring and reporting framework to transparently evaluate the effect of price-responsive resources on the accuracy of AEMO’s short-term demand forecasts and associated impacts on market efficiency.

This section provides a high-level overview of each of these aspects of the IPRR rule. The following chapters provide an indicative and preliminary view to participants on how the IPRR rule may be implemented by AEMO.

2.1 IPRR rule: Voluntary framework to enable participation of unscheduled price-responsive energy resources in the NEM

The rule establishes a mechanism called “dispatch mode” to integrate unscheduled price-responsive energy resources into NEM scheduling and dispatch processes so that the benefits described briefly in section 1.1 and in more detail in the IPRR final determination can be realised.

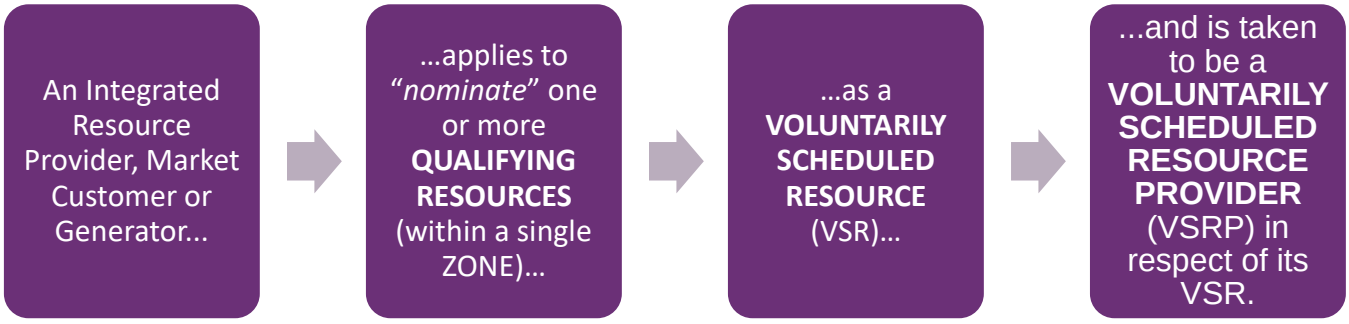
A key market design principle of the IPRR mechanism is that (the currently) unscheduled price-responsive energy resources should have similar NEM participation opportunities to those available to larger-scale scheduled resources. As appropriate, these resources will have the opportunity to take part in the main NEM services, including:

- Energy
- FCAS – both regulation and contingency services.

2.1.1 Voluntarily scheduled resource participation in the NEM

The rule introduces new terminology and concepts to facilitate a framework for participation by unscheduled price-responsive energy resources as shown in Figure 1 and explained further in the IPRR final determination. The final rule allows participants to nominate a qualifying resource or multiple qualifying resources as a voluntarily scheduled resource (VSR), which can participate in central dispatch processes.

Figure 1 IPRR rule terminology and concepts

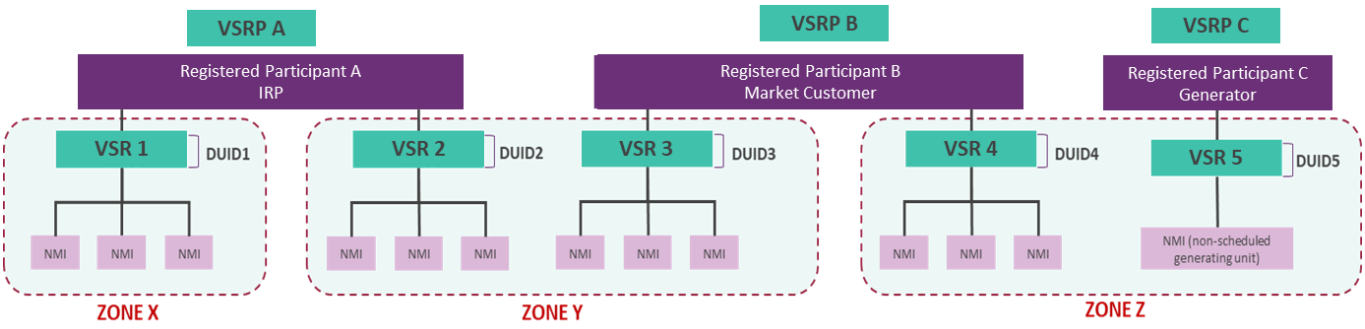


In Figure 1:

- There is no new unique participant registration category for market participants with VSRs. VSRPs will be registered as an Integrated Resource Provider (IRP), Market Customer or Generator in accordance with the existing participant registration framework.
- The term 'qualifying resource' could cover:
  - Non-scheduled generating units
  - Non-scheduled bidirectional units (BDU)
  - 'Market loads' i.e. market connection point that is a non-scheduled load
  - Small resource connection points, i.e. exempt small BDU or small generating unit (GU).
- The VSRP must be the financially responsible market participant (FRMP) for the connection point/s nominated as a VSR.
- The term 'Zone' refers to boundaries within which the connection points of a single VSR must be contained. Determination of zonal aggregation requirements will be undertaken as part of IPRR procedure development.

Figure 2 provides an indication of how VSRs will be organised under the IPRR mechanism set out in the IPRR rule. In this example, VSRP A and VSRP B are registered as an IRP and Market Customer respectively, and each have two VSRs in two different zones. Their VSRs are aggregates of many 'qualifying resources' (represented as NMIs). VSRP C, a registered Generator, operates one VSR which comprises a single 'qualifying resource' (a non-scheduled generating unit). Note that any market participant with a subset of its NMIs in a VSR may also have NMIs outside of a VSR; in respect of these NMIs, the market participant is not considered a VSRP and does not have IPRR-related obligations associated with these non-VSR NMIs.

Figure 2 Theoretical example of IPRR participation in the NEM

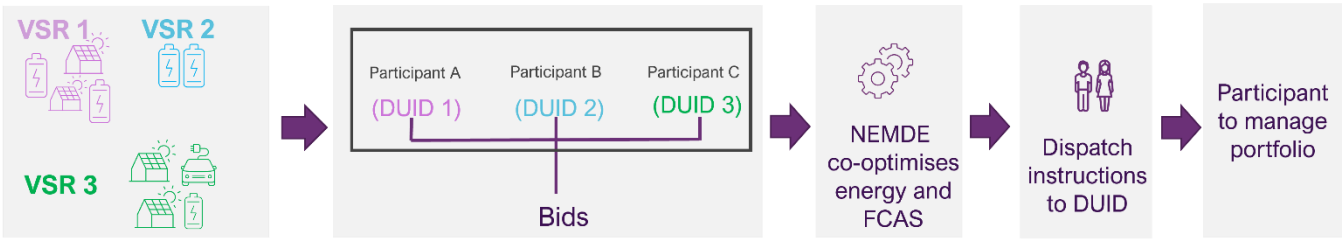


DUID = Dispatchable unit identifier NMI = National metering identifier

Figure 3 is a stylised example of how the IPRR rule requires VSRs to be integrated into the NEM's scheduling and dispatch processes. This approach is consistent with existing processes for scheduled BDU bidding and dispatch as follows:

- VSRPs will submit 5-minute bids for a VSR DUID reflecting the VSR's (aggregate) physical capability. The bids can include both generation and load and may contain 20 price and quantity bands.
- For every trading interval for which it is scheduled, a VSRP will receive a dispatch instruction for its VSR DUID containing:
  - A single bi-directional dispatch instruction representing the net energy flow to be achieved by its DUID.
  - Enablement for each FCAS service for which it is registered.
- VSRPs will need to:
  - Disaggregate the dispatch instruction out to the resources within the VSR.
  - Ensure VSR conformance (at an aggregated level) with its dispatch instruction for the services it provides.

Figure 3 Theoretical example of high-level VSR participation in NEM scheduling and dispatch



VSR participation in NEM scheduling processes has largely been modelled on the scheduled BDU participation model. However, VSRs are primarily expected to be aggregations of resources (such as exempt stand-alone batteries/ generation, or household/ C&I scale resources) with different operational characteristics to typical scheduled BDUs.

2.1.2 VSR participation features

Recognising the operational characteristics of VSRs, the IPRR final determination and rule set out market design features for these resources. These are listed below with respect to the life cycle of the participation of a VSR in the NEM, and further detail is provided throughout the document, including:

1. Options to change a VSR's *participation mode*[4] at the DUID level, recognising that some resources may only be able to participate in the NEM over specific periods:

- **Deactivation:** VSRs may temporarily deactivate[5] during which the VSR is exempt from certain rule clauses, including directions and conformance to dispatch instructions[6] (except in relation to provision of market ancillary services):
  - Deactivation request is made by submitting a deactivation notice to AEMO, and once deactivated, has a status of 'inactive VSR'.
  - During the deactivation period, participants submit bids but are not subject to conformance against dispatch instructions.
  - The inactive VSR status must apply to every qualifying resource aggregated in the VSR.
  - Detailed criteria and process to apply for deactivation are to be determined in AEMO's VSR guidelines (including a notice period).
- **Hibernation:** VSRs can hibernate[7] for at least 30 days and no more than 18 months (maximum hibernation period) during which the VSR will not participate in central dispatch and is not considered to be a *scheduled resource*:
  - Hibernation request is for longer-term opt-out (without deregistration) by submitting a hibernation notice to AEMO.
  - The hibernation status must apply to every qualifying resource aggregated in the VSR.
  - While a qualifying resource is hibernating, the classification approved by AEMO for that resource (e.g. as a non-scheduled generating unit, non-scheduled bidirectional unit, non-scheduled load (as applicable)) and the obligations that attach to that classification apply.
  - Most criteria and process to be determined in AEMO guidelines (including a notice period).

2. VSRs are not required to provide mandatory Primary Frequency Response (PFR).[8]
3. VSRs are subject to the same Short Term Projected Assessment of System Adequacy (ST PASA) requirements as other scheduled resources.[9]
4. VSRs will provide state of charge information under the Enhancing Reserve Information (ERI) rule.[10]
5. VSRs will be eligible for co-optimisation of energy and FCAS bids in the same way as other scheduled resources.[11]

[4] IPRR final rule, clause 3.10A.2

[5] IPRR final rule, clauses 3.10A.2(b) to (i)

[6] IPRR final rule 3.10A.2(f) for full list of exemptions applying to VSRPs in relation to inactive VSRs.

[7] IPRR final rule, clauses 3.10A.2(j) to (p)

[8] IPRR final determination, p.58

[9] IPRR final rule, clause 3.7.3

[10] IPRR final rule, clause 3.7G

[11] IPRR final determination, p.81

6. VSRs will not be able to be constrained-on due to network constraints in dispatch.[12]
7. VSR load bid at the market price cap is to be considered a load requirement and under conditions of supply scarcity will be treated as a non-scheduled load (that is, it will be able to consume up to, and including the point of rotational load shedding rather than being dispatched to 0 MW).[13]
8. AEMO will be able to give directions to active VSRs, and clause 4.8.9 instructions to all VSRs. VSRs will be eligible for compensation for directions under certain conditions prescribed in NER 3.15.7.[14]
9. VSRs will be eligible for compensation due to an administered price cap or administered floor price under clause 3.14.6[15].
10. VSRs will be eligible for Frequency Performance Payments (FPP).[16]
11. VSR capacity will count as an offset in the Retailer Reliability Obligation (RRO).[17]
12. The ramp rate calculation has been amended to accommodate VSRs such that the aggregated VSR capacity is used when calculating minimum ramp rates.[18]
13. Active VSRs will be excluded from the Reliability and Emergency Reserve Trader (RERT) and directions cost recovery calculations.[19]
14. VSRPs will be responsible for complying with any applicable distribution level limits that apply to a resource within their VSR, such as fixed or flexible export limits. That is, the VSRP will be responsible for ensuring that their bids and any subsequent dispatch comply with these limits[20]. There is also a new requirement for distribution network service providers (DNSPs) to consult with VSRPs when designing flexible export limits.[21]
15. VSRPs will need to always have operational contacts available to receive and act on dispatch instructions.[22] VSRPs will also need to advise AEMO of the personnel responsible for power system operational communications (NER 4.11.3).

2.1.3 VSR guidelines

The IPRR final rule 3.10A.3 requires AEMO to develop 'VSR guidelines' to establish the technical characteristics of VSRs and manage their operation. The content of the VSR guidelines will be wide ranging, including:

- Requirements for nomination of one or more qualifying resources as a VSR.

[12] IPRR final determination p.58

[13] AEMO understands, from discussions with the AEMC, that the intent of the rule is that VSR load bid in at the market price cap is to be treated as a load requirement as it is likely to represent passive consumer load that should be able to consume up to and including the point of load shedding under conditions of supply scarcity, similar to how other non-scheduled consumer load is treated. As such, VSR load bid in at the market price cap that is subject to rotational load shedding would be considered unserved energy (USE) for the purposes of the reliability standard.

[14] IPRR final rule, clause 4.8.9 and 3.15.7

[15] IPRR final determination, section E.4 p. 110.

[16] IPRR final determination, p.58

[17] IPRR final determination, p.79

[18] IPRR final rule, clause 3.8.3A

[19] IPRR final rule, clause 3.15.9(e) and 3.15.8

[20] IPRR final determination, p.65 (A.4.3) states VSRP are required to ensure that each NMI in the VSR (if aggregated) would stay within any applicable FEL imposed by a DNSP at that NMI as it's not feasible to factor in any applicable FEL in dispatch instructions to VSRs.

[21] IPRR final determination, p.63

[22] IPRR final rule, clause 4.9.2(d)

- Requirements and process for aggregation of NMIs into VSRs.
- Framework for testing the capabilities of qualifying resources
- Operational requirements for VSRs, including:
  - Types of data to be submitted
  - Telemetry & communications requirements
  - Thresholds for participation
  - Demonstration of disturbance ride through capabilities
  - Dispatch conformance criteria
  - Metering installation requirements
  - Distribution Network Service Provider (DNSP) or (where relevant) Transmission Network Service Provider (TNSP) data sharing requirements
  - Zonal aggregation requirements
  - Deactivation and temporary hibernation requirements
  - Any other information AEMO considers reasonably necessary, such as specifying how distribution network limits[23] and VSR dispatch interrelate.

2.2 VSR incentive mechanism to further encourage VSR participation

The IPRR rule sets out a time-limited mechanism to further encourage VSR participation in the NEM called the 'VSR incentive mechanism'.[24] The AEMC considers that an incentive scheme in the NER, with dollar and time limits, is in the long-term interests of consumers. Between the draft and the final determination, the AEMC worked with the Australian Renewable Energy Agency (ARENA), the Commonwealth and jurisdictional governments regarding alternatives to having the incentive scheme as an AEMO obligation in the NER. While some progress was made, there was enough uncertainty that the AEMC considered it appropriate to include the incentive mechanism in the final rule.

The VSR incentive mechanism is a process of tenders (at least 2) to be administered by AEMO to run for 5 years with an overall cap of $50m. The final rule allows for governments to increase the $50m cap should they choose to provide funding for the increased cap.

The key features of the VSR incentive mechanism are set out in Table 3.

Table 3 High-level features of the provisional VSR incentive mechanism in the IPRR rule

Feature	Summary description
Form	• Tenders for 'VSR participation agreements' (and associated 'VSR participation payments').
Objective	• To maximise VSR participation in the IPRR mechanism through VSR participation agreements and participation payments. • In turn, this is expected to maximise the benefits to consumers through increased VSR participation in central dispatch providing benefits such as reduced system costs, avoided generation, avoided emissions and reduced RERT costs.

[23] Distribution network limits could include Flexible export limits (FELs) or Dynamic operating envelopes (DOEs)

[24] IPRR rule, clause 3.10B

Feature	Summary description
Eligible VSR tender participants	• VSRPs or 'intending VSRPs' could take part in the VSR incentive mechanism subject to criteria set in the VSR incentive procedures. If successful, these VSRPs would receive VSR participation payments.
Tender service provider	• AEMO would be required to design and conduct the tenders. • AEMO would establish VSR tender process details via the development of 'VSR incentive procedures'. – These procedures would be aligned with the VSR incentive principles and other criteria set out in the IPRR rule e.g. assessment criteria, price caps, settlement of payments and aspects of the VSR participation agreements.
Timing	• AEMO would conduct at least two VSR tenders across a five-year 'incentive period' of 1 April 2026 to 31 December 2031.
Cost recovery	• Costs of establishing, administering, and conducting the VSR incentive mechanism would be recovered from all NEM registered participants through fees imposed under NER 2.11. • Costs of VSR participation payments would be recovered from Cost Recovery Market Participants (CRMPs) in each region, based on the CRMPs' adjusted consumed energy. – CRMPs are Market Generators, Market Customers and IRPs.
Reporting	AEMO would be required to report: • Annually: The aggregate amount of all participation payments payable in each financial year under VSR participation agreements. • At the end of the five-year incentive period: A summary of outcomes, trends and learnings from the VSR incentive mechanism.

2.3 IPRR rule: A monitoring and reporting framework

The IPRR rule introduces a new framework to monitor and report on unscheduled price-responsive resources.[25] The reporting framework includes reporting by AEMO and the Australian Energy Regulator (AER) on the impacts, efficiency implications, and costs associated with unscheduled price-responsive resources in the market. The AEMC will consider if a "visibility market model" is warranted if reporting reveals an emerging material problem over time through a review process informed by the AER's annual reporting.

The AEMO monitoring and reporting framework introduced in the IPRR rule has two key elements:

- To monitor and report on the magnitude and impact of unscheduled price-responsive resources on deviations of actual demand from forecast in operational timeframes.
- To describe any actions AEMO has taken to reduce forecast deviations by accounting for unscheduled price-responsive resources.

2.3.1 AEMO price responsive reporting guidelines

AEMO is required to develop and publish the 'AEMO price responsive reporting guidelines' in accordance with the Rules consultation procedures by 31 December 2025.[26] The Guidelines must specify how AEMO will meet its reporting obligations and the information and metrics that will be included in its annual and quarterly reporting/ data publication.

[25] IPRR final rule, clause 3.10B. See also IPRR final determination, section 3.4 and Appendix C

[26] IPRR final rule, clause 11.180.3(a)(1)

2.3.2 AEMO annual reporting

The IPRR rule requires AEMO to prepare and publish a report by 30 September each year, starting in 2026, analysing medium-term implications of monitored issues and outlining changes made to forecasts for unscheduled price-responsive resources. The IPRR determination and rule describes the topics AEMO must cover in its reporting, in accordance with the 'AEMO price responsive reporting guidelines'. They include:

- Analysis of statistics and trends around volumes of unscheduled price-responsive resources, patterns in the use of these resources, and to the extent identifiable their approximate contribution in response to forecast and actual spot prices.
- Estimation of the contribution of unscheduled price responsive resources to forecast deviations in relation to additional amounts paid to Ancillary Service Providers and CRMPs.
- An assessment of the degree of forecast deviations in regional demand across a range of market conditions, and the factors contributing to the size of forecast deviation, and analysis of impacts of unscheduled price responsive resources on the load forecast used by AEMO for pre-dispatch and dispatch.
- Identification of additional information or inputs required to improve or account for unscheduled price responsive resources in load forecasts and any actions taken by AEMO to reduce forecast deviations by accounting for unscheduled price responsive resources.
- A description of the methodologies used by AEMO to consider and manage the impacts of unscheduled price responsive resources on load forecasts for pre-dispatch and dispatch; and any barriers to using those methodologies.

2.3.3 AEMO quarterly statistics

In addition to the annual reporting framework, the IPRR rule requires AEMO to publish statistics on its website on a quarterly basis as a single source of information for unscheduled price responsive resources. The information and metrics AEMO is required to include in the quarterly publication will be specified in the 'AEMO price responsive reporting guidelines' described above. The purpose of the quarterly statistics will be to give a view of trends over time, including comparing seasonal trends from year-to-year. AEMO is required to consult with stakeholders as part of developing the reporting guidelines to determine what metrics and format of publication will be most beneficial for industry.

2.3.4 AER annual reporting

The IPRR rule introduces a new reporting requirement for the AER to periodically consider the impact of unscheduled price-responsive resources on efficiency in the wholesale market and inform future market reforms. Under the new reporting framework, the AER will be required to provide transparency on the impacts of unscheduled price responsive resources on efficient market outcomes to inform future market reform. The IPRR final determination requires the AER to publish 'AER price responsive reporting guidelines' and provides a range of topics for the AER to report on. These topics are reflected in the IPRR rule. The final rule also contains an obligation for AEMO to provide the AER with information to fulfill its reporting obligations.

2.3.5 Implementation schedule

The IPRR final determination outlines a 12-month implementation period for the reporting framework:

- AEMO publishes the 'AEMO price responsive reporting guidelines' by 31 December 2025

- AEMO publishes its first quarterly statistics by 1 April 2026
- AEMO publishes its first annual report by 30 September 2026
- AER publishes its first annual report by 31 December 2026.

3 Summary of key AEMO impacts

This section provides an indicative heatmap of impacts to AEMO's processes from the IPRR final rule.

Figure 4 shows the impact complexity of the IPRR rule for key business areas (focus areas). Table 4 then lists these focus areas alongside descriptions of each impact from the IPRR rule.

Figure 4 Heat map of focus area impacts from the IPRR rule

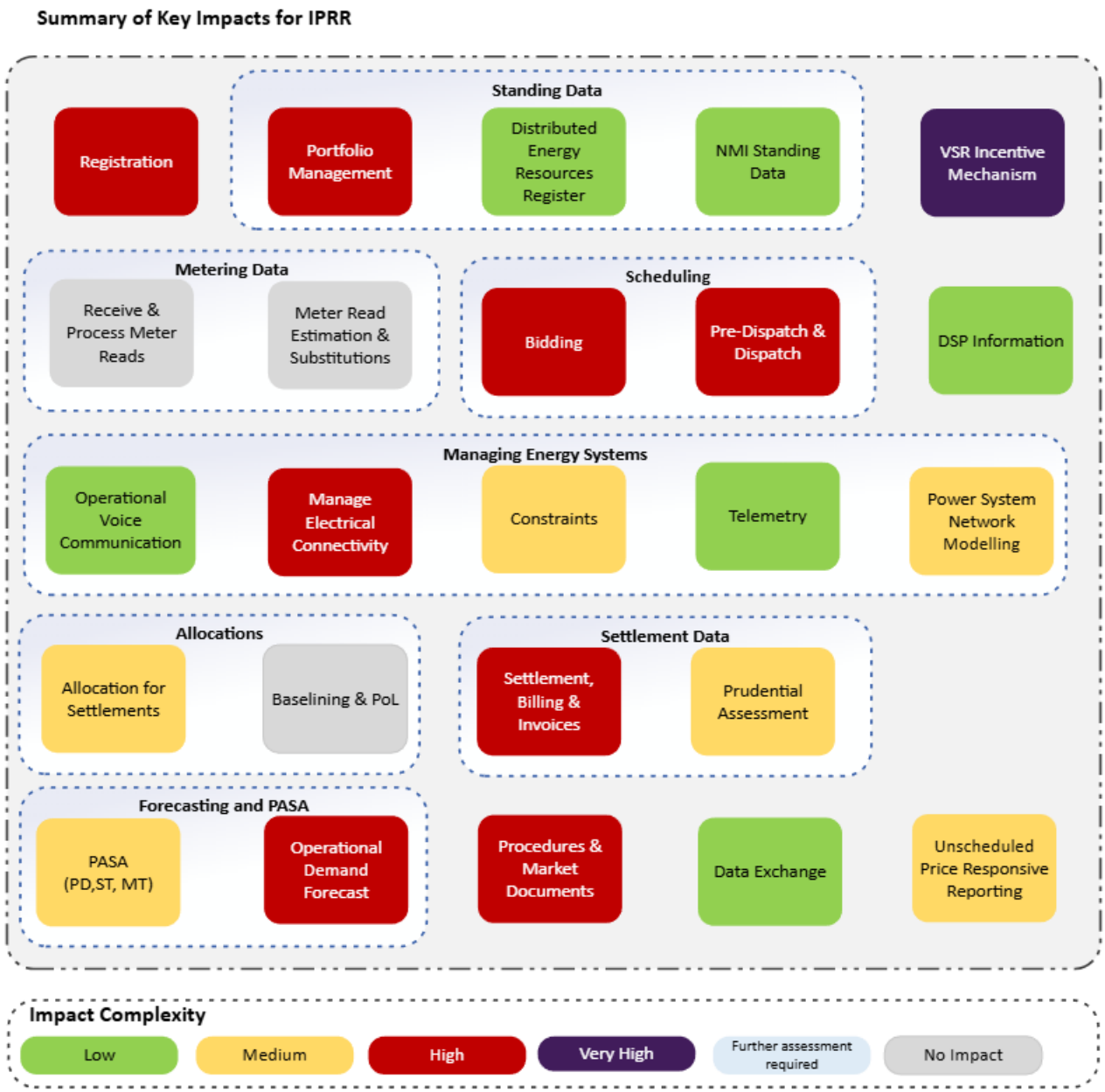


Table 4 Tabular view of focus area impacts from the IPRR rule

Focus area	Impact	Impact description
Registration	**High**	• No new unique participant registration category for market participants with VSRs. VSRPs will be registered as IRP, Market Customer or Generator in accordance with the existing participant registration framework. A VSRP must be the financially responsible Market Participant (FRMP) for the NMIs it is nominating into VSRs. • Introduction of a new 'unit type' of VSR and development of a new 'nomination' process to allow one or more qualifying resources to be nominated into VSRs by the FRMP (VSRP). • Development of a new initial capability assessment process for VSRs to ensure they have the technical capability to participate in scheduling and dispatch processes. • Introduction of minimum VSR capacity threshold for participation. • VSRP must be the FRMP for all NMIs they nominate as VSRs
Portfolio Management	**High**	• New portfolio management processes to establish and maintain VSR portfolios, including nomination/de-nomination, VSR aggregation within zones, addition/removal of NMIs, VSR configurations, updates to standing data, etc. • Existing processes will need to be streamlined and automated wherever possible to provide a timely experience for Participants. • Impacts associated with implementation and management of new participation modes, including 'temporary deactivation' and 'hibernation'. • Portfolio management capabilities to manage customer churn. • Potential system updates to manage a greater volume of assets and data. • Updates to AEMO validation processes to manage VSRs, for example VSR management within zones. • Set up validation controls to prevent double participation and verify NMI eligibility (e.g. when a NMI is already registered for WDR, it cannot be registered as a VSR).
DER Register	**Low**	• VSRPs will provide asset details first in the portfolio management system as part of the nomination process. AEMO believes there is an opportunity to improve the DER Register information based on asset details provided in the VSR nomination process. Further consultation will be required with NSPs on whether this information could be automatically populated into the DER Register.
NMI standing data	**Low**	• Potential changes may be required to Market Settlement and Transfer Solutions (MSATS) procedures to ma nage customer churn. Note: This should not require system changes in MSATS.
VSR Incentive mechanism	**Very high**	• Develop new VSR incentive procedures to establish VSR tender processes, see section 4 for more details. • Develop new VSR tender process including assessment criteria, methodology and contract development for selecting successful VSR incentive mechanism participants for each VSR tender. • Implement process changes to: – Assess VSR participation and make VSR participation payments – Recover costs of establishing, administering and conducting the VSR incentive mechanism (via fees) – Recover costs of VSR participation payments (via CRMPs) – Manage any external government funding. • Potential adjustments to include VSR incentive mechanism participation payments in prudential estimations. • Assessment of VSR benefits & calculation of 'incentive MW price cap'. • Reporting of participation payments after VSR tender process (IPRR rule 3.10.B4. • Overall, requires development of new capabilities, governance arrangements, appropriate resourcing, etc.
Meter Read Estimation & Substitutions	**None**	• No impacts identified for meter read estimations and substitutions.
Receive & Process Meter Reads	**None**	• No impacts identified because the same data management processes will apply for VSR NMIs.
Bidding	**High**	• Manage bidding processes and systems to accommodate all participation mode changes for VSRs including temporarily deactivated and hibernated modes: – Active mode: full bidding participation – Inactive mode: bid submission but no dispatch conformance – Hibernated mode: no bidding required

Focus area	Impact	Impact description
		• Use existing BDU bid format and bidding channels for VSRs.
Pre-dispatch & dispatch	**High**	• VSRPs to build capability to receive & conform with dispatch instructions for VSRs in active mode using existing BDU dispatch instruction format: • Changes are needed to reflect participation modes in dispatch and conformance, including when VSRs are temporarily deactivated and hibernated for a duration of time (see section 2.1.1 for more detail). Further assessment is required to determine full impacts. – Active mode: full dispatch conformance required – Inactive mode: no conformance monitoring needed – Hibernated mode: no dispatch participation • Manage greater volume of assets as VSRs increasingly provide scheduling information. • Adjustments to appropriately treat VSR load during conditions of supply scarcity. • Establish process for declaring and managing non-conforming VSRs.
Demand Side Participation (DSP) information	**Low**	• Potential to add new information or a flag in the DSP Information Portal to identify VSRs. • VSRPs need to provide information to DSP Information Portal to support long term planning processes (as operators of VPPs or price-responsive aggregations would be required to do today).
Allocation for Settlements	**Medium**	• Process & system changes needed to exclude active VSRs from the RERT, Directions, cost recovery calculations including consideration of how data will be used to indicate NMIs within a VSR. • VSRs will be excluded from Frequency Performance Payments (FPP) residual calculations. • Further assessment required to include NMI-level processing into allocations to avoid future performance issues on current settlement systems as the scale of VSRs increases.
Baselining & Predictability of Load (PoL)	**None**	• No impacts identified as VSRs will not participate in wholesale demand response.
Prudential Assessment	**Medium**	• Adjustments for prudential estimation and prudential forecasting processes to accommodate VSRs, including for when VSRs are temporarily deactivated or hibernated, or a change in portfolio composition.
Settlements, Billing & Invoice	**High**	• Settlement of VSR **energy** transactions is not changing and uses existing settlement processes (VSRPs are the FRMPs for the NMIs within VSRs). • However, the treatment of VSRs in non-energy cost recovery (NECR) processes will impact how NMIs within a VSR need to be managed for settlement purposes. • Specifically, excluding active VSRPs from RERT and directions cost recovery may require VSR NMIs to be treated differently in the settlement process. AEMO is considering how this can be most efficiently achieved; including through changes to profiling and settlement data aggregation processes to provide additional data at the VSR aggregation level, Changes to the format of Settlement statements and/or reports for VSRs will be required, dependent on VSR treatment in settlements. • Settlement changes related to VSR incentive payments & cost recovery of VSR participation payments as part of the VIM. • Exclusion of Contribution Factor Calculated DUIDs from the FPP Residual Calculation will need to be modified to cater for VSRs given they will have multiple NMIs provided as an aggregate read. • VSRs will be included for the purposes of compensation for directions and market suspension.
Operational Voice Communication	**Low**	• VSRPs will provide operational communications system in accordance with NER 4.9.2(d), 4.11.3 and Section 3.3.1 of the NEM Generator Registration Application Guidelines.
Manage Electrical Connectivity	**High**	• Process and system changes may be required to manage geographically dispersed VSRs in physical model of network • Tuning & potential changes to Automated Generation Control (AGC) to work with distributed aggregations
Constraints	**Medium**	• Changes to constraint systems to manage geographically dispersed VSR at transmission level • Further assessments required to determine if adjustments for constraints calculations are needed to reflect VSRs that are 'temporarily deactivated' or 'hibernated' • Implement system controls to prevent VSRs from being constrained-on • Create constraint management framework for: – Geographically dispersed VSRs at transmission level – VSRs in different participation modes – Zonal aggregation impacts

Focus area	Impact	Impact description
Telemetry	**Low**	• VSRPs will provide aggregated telemetry for VSRs in accordance with the 'Power System Data Communications Standard'. It is expected this will include telemetry via: – SCADA via NSP – direct 'SCADA-Lite' connection once available[27] • Aggregated telemetry will likely be validated against revenue metering in the VSR capability assessment phase.
Power System Network modelling	**Medium**	• Process changes required to accommodate VSRs i.e. represent aggregated distributed resources across transmission node identifiers (TNIs). • Frequent changes to the composition of VSRs will increase the workload of the grid modelling function.
PASA (PD, ST, MT)	**Medium**	• VSRPs will provide same information as other scheduled resources – bid prices and quantities – available capacity for each trading interval – PASA availability for each trading interval – recall period for each TI (Trading Interval) – if applicable, projected operational energy limits • Implement SCADA state of charge (SOC) monitoring for VSRs with batteries • Aggregate reporting of regional reserve contribution from VSRs • No information required from VSRPs for MT PASA • Further assessment required for ST PASA to ensure that changes currently being implemented will cater for VSRs. If the changes implemented to accommodate the Wholesale Demand Response (WDR) cannot be leveraged, then the impact will be higher. • Extend Enhanced Reserve Information publication to includes VSRs with energy constraints: – Publish Region aggregated Daily energy availability for each trading day.
Data Exchange	**Low**	• IPPR project will use the existing data exchange channels and potentially newer capabilities developed by the Market Interface Technology Enhancements initiative (IDX and IDAM), if available. • New reports or data feeds to support distribution system operation functions at network service providers, specifically – visibility of NMIs that are part of a VSR – aggregated scheduling information in the dispatch and pre-dispatch timeframes.
Operational Demand Forecast	**High**	• Develop capability for new monitoring & reporting obligations • Management of VSR modes when they are hibernated & temporarily deactivated • More frequent demand forecast model changes triggered by hibernation.
Procedure & Market Documents	**High**	• Refer to section 4 for more details.

[27] SCADA Lite will enable NEM non-NSP participants to establish a bi-directional connection to exchange operational information (telemetry and control) with AEMO. See SCADA Lite project page for more information: https://aemo.com.au/initiatives/trials-and-initiatives/scada-lite

4 AEMO procedure impacts

This chapter indicates the high-level impact to AEMO's procedures and guidelines of implementing the IPRR final rule.

Table 5 sets out the new documents that will be required by the IPRR rule. Table 6 lists AEMO's existing procedures and other documents that will likely need updating to accommodate the IPRR rule.

Table 5 New AEMO procedures, guidelines, reviews and reports

NEW PROCEDURE	IPRR FINAL RULE	EFFORT	PROPOSED CONTENT AND TIMING
Voluntarily scheduled resource guidelines	• 3.10A.3 • 11.180.3(a)(2)	High	Develop, consult and publish by 31 December 2025. Required to cover a range of details including: • Requirements for nomination of one or more qualifying resources into VSRs • Requirements and process for aggregation of VSRs • Framework for testing the capabilities of qualifying resources • Operational requirements for VSRs, including: – Types of data to be submitted – Telemetry & communications requirements – Thresholds for participation – Dispatch conformance criteria – Acceptable types of metering installations – DNSP and (where relevant) TNSP data sharing requirements – Zonal aggregation requirements – Deactivation and temporary hibernation requirements – Any other information AEMO considers reasonably necessary.
Review of the Voluntarily scheduled resource guidelines	11.180.3(c)	High	Complete review by 23 May 2030.
AEMO price responsive reporting guidelines	• 3.10C.2 (e)-(g) • 11.180.3(a)	High	Develop, consult and publish by 31 December 2025. Required to specify: • How AEMO will meet its annual reporting obligations on unscheduled price-responsive resources • The information and metrics that AEMO will include in its quarterly reporting on unscheduled price responsive resources.
Annual report on unscheduled price responsive resources	• 3.10C.2(b) • 11.180.4(b)-(c)	High	Publish by 30 September each year. First report must be published by 30 September 2026. Required to be in accordance with the AEMO price responsive reporting guidelines and include: • An analysis of the statistics and trends of the volumes and types of unscheduled price responsive resources, and to the extent identifiable their approximate contribution in response to forecast and actual spot prices. • AEMO's best estimate of the impact of unscheduled price responsive resources on forecast deviations in relation to additional amounts paid to Ancillary Service Providers. • An assessment of the degree of forecast deviations in regional demand across a range of market conditions, as well as the factors contributing to the size of forecast deviation. • Analysis of impacts of unscheduled price responsive resources on the load forecast used by AEMO for pre-dispatch and dispatch. • Identification of additional information or inputs required to improve or account for unscheduled price responsive resources in load forecasts. • A description of any actions taken by AEMO to reduce forecast deviations by accounting for unscheduled price responsive resources.

NEW PROCEDURE	IPRR FINAL RULE	EFFORT	PROPOSED CONTENT AND TIMING
			• A description of the methodologies used by AEMO to consider and manage the impacts of unscheduled price responsive resources on load forecasts for pre-dispatch and dispatch
Quarterly reporting on unscheduled price responsive resources	• 3.10C.2(c)-(d) • 11.180.4(a)	High	Publish at least once per calendar quarter. First publication by 1 April 2026 in respect of the preceding calendar quarter. AEMO must develop, publish and maintain a single source of information for unscheduled price responsive resources that presents the information and metrics specified by the AEMO price responsive reporting guidelines.
VSR incentive procedures	3.10B.2(c) 3.10B.2(d)	High	• Develop, consult and publish by 1 December 2026 • Required to cover a range of details including the: – eligibility criteria for the tender process – If there is any external funding, any further requirements participants may need to satisfy. – assessment criteria for the tender process – procedures for conducting the tender process – timing of the tender process – offer requirements – procedures and timetable for participation payments – requirements of any standard participation agreements, including clarifying the consequences for non-compliance with the agreement.
Report after completion of incentive period	3.10B.4(t)	High	By 31 December 2032, AEMO to publish report that includes a summary of outcomes, trends and learnings from the VSR incentive mechanism.

Note that the IPRR rule also imposes an obligation on the AER to develop and publish:

- AER price responsive reporting guidelines
- AER annual report on unscheduled price responsive resources

See section 2.3.4 for further details on these impacts of the IPRR rule to the AER.

In relation to AEMO's existing procedures, the IPRR rule requires AEMO to review and where necessary amend and publish its procedures, guidelines and other documents by 1 June 2026.[28] It makes specific reference to:

- Market suspension compensation methodology
- Demand Side Participation Information Portal and associated demand side participation information guidelines
- DER Register and associated DER register information guidelines.

Note that the IPRR rule contains a similar provision for the AER in relation to its relevant guidelines and documents.

[28] IPRR rule, clause 11.180.2(b)

Table 6 Current relevant AEMO procedures

TYPE OF PROCEDURE	Consultation type	EFFORT	System dependency	CHANGE
Registration information resource & guidelines, including: • Guide to Registration Exemptions and Production Unit Classifications	Standard	Medium / High	• NA	• Most registration/classification documents will require updates to accommodate VSR nominations by Market Participants. • New application forms, guides and factsheets are likely to be required. • The Guide to Registration Exemptions and Production Unit Classifications may/may not require updates to reflect the new 'qualifying resource' nomination process, depending on the extent to which VSR requirements are included in the VSR guidelines versus registration documentation.
Portfolio management system user guide	None	High	• Portfolio management system (PMS)	• Amendments will be required to accommodate the PMS process changes described in section 3, including: – Establishing and maintaining VSR aggregations and portfolios, including nomination/de-nomination, addition/removal of NMIs, VSR configurations, updates to standing data, etc. – Implementing and managing new participation modes, including 'temporary deactivation' and 'hibernation'. – Portfolio management capabilities to manage declassification of NMIs and customer churn. – Updates to AEMO Validation processes to manage VSRs, for example VSR management within zones.
System and Market Operation Procedures, including: • SO_OP_3705 - Dispatch Procedure • SO_OP_3704 - Pre-dispatch Procedure • Spot Market Operations Timetable procedure • Market suspension compensation methodology • Intervention Pricing Methodology and Guide to Intervention Pricing • Minimum System Load Procedures (VIC, SA, QLD)	Combination of Standard and Minor and Administrative	Medium	• NEMDE	• Amendments may be required due to the inclusion of: – VSR (new unit type) – Changes to dispatch conformance process to manage VSRs in different modes of operation (active/temporarily deactivated/hibernated). – Data integration into market processes from new VSR unit type e.g. price adjusted demand curve definition; functionality and integration – Impact to System Operating Procedures will depend on the extent to which VSR requirements are included in the VSR guidelines. – Treatment of VSR load during conditions of supply scarcity. – Treatment of VSR during MSL periods. – Avoid double counting of VSR and other distributed energy resources.
Market ancillary services • Market ancillary services specification • Frequency contribution factors procedure • FCAS Model in NEMDE	Minor and Administrative	Low	• NA	• May need updating to incorporate requirements for VSRs to participate in regulation FCAS.

TYPE OF PROCEDURE	Consultation type	EFFORT	System dependency	CHANGE
Non-market ancillary services • SO_OP_3717 - Procedure for the Exercise of the Reliability and Emergency Reserve Trader (RERT)	Minor and Administrative	Low	• NA	• Amendments to include: – New VSR unit type – Which modes of VSR operation are eligible to participation in RERT.
Frequency Performance Payments • FPP and FCAS Cost recovery document • Constraint FCAS Processor Change Document • FPP Factor calculation guide	No changes	NA	• NA	• No amendments required. VSR units with appropriate metering are covered by the current Frequency Contribution Factors Procedure under 'eligible unit with appropriate metering'.
Directions • SO_OP_3707 - Procedures for Issue of Directions and Clause 4.8.9 Instructions	Minor and Administrative	Low	• NA	• Update procedure to specify how directions apply to VSR units and whether they apply based on active/temporarily deactivated/hibernated modes of operation.
Loss factors resources, including: • Forward-looking transmission loss factors • Treatment of loss factors in the NEM	Minor and Administrative	Low	• NA	• No change. Calculation of loss factors for VSRs will replicate WDR approach, using existing methodology,
Constraints resources & guidelines, including: • Constraint Formulation Guidelines • Constraint implementation guidelines • Schedule of constraint violation penalty factors	Minor and Administrative	Low/ Medium	• NA	• Additional sections may be required to describe how VSRs are represented in constraints and how they are formulated. • If switching VSRs between active/temporarily deactivated/hibernated modes should result in updates to constraints, then additional procedures should describe these processes.
Forecasting and Planning, including: • Demand Side Participation Forecast Methodology • Demand Side Participation Information Guidelines • Medium Term PASA Process Description • ST PASA Procedure • Reliability Standard Implementation Guidelines	Minor and Administrative	Low	• NA	• Updates to DSP methodology will be required to describe how VSRs are included in the Demand side participation forecasts. • Updates to Reliability Standard Implementation Guidelines may be required to reflect treatment of VSR loads during conditions of supply scarcity. • No changes to MT PASA system or ST PASA system. Minor changes to procedures may be needed to capture demand correctly in inputs.
Operational Forecasting • SO_OP_3710 Load Forecasting Procedure	Minor and Administrative	Medium	• NA	• Amend procedures to include VSR unit type. • New procedures will need to be added to describe how demand forecast models are updated when VSRs switch between active/ temporarily deactivated/hibernate modes. • Avoid double counting of VSR and other distributed energy resources.
Settlements and Prudentials • NEM Settlement Estimations Policy	Minor and Administrative	Medium	• NA	• Settlements and Prudentials procedures may require updates to reflect approach to VSRs in settlements and non-energy cost recovery arrangements for VSRs.

TYPE OF PROCEDURE	Consultation type	EFFORT	System dependency	CHANGE
• NEM Settlement Estimations Guide • Guide to NEM Prudential Forecast				• Settlement changes related to VSR incentive payments and cost recovery of VSR participation payments as part of the VIM.
DER register information guidelines		TBC	• NA	• Further assessment required as supporting IPRR will require DER data to be maintained.
Retail and metering procedures, including: • MSATS procedures		Low	• NA	• Potential changes may be required to Market Settlement and Transfer Solutions (MSATS) procedures to manage churn. Note: This should not require system changes in MSATS.
B2B procedures (maintained by the Information Exchange Committee)		Low	• NA	• AEMO will refer the IPRR final rule to the B2B Working Group to seek its view on any B2B impacts, particularly regarding whether there are any scenarios that would need a new transaction type. AEMO has not identified any B2B impacts from the IPRR rule.

There are no amendments required for Frequency Performance Payments documents. VSR units with appropriate metering are covered by the current Frequency Contribution Factors Procedure under 'eligible unit with appropriate metering'.

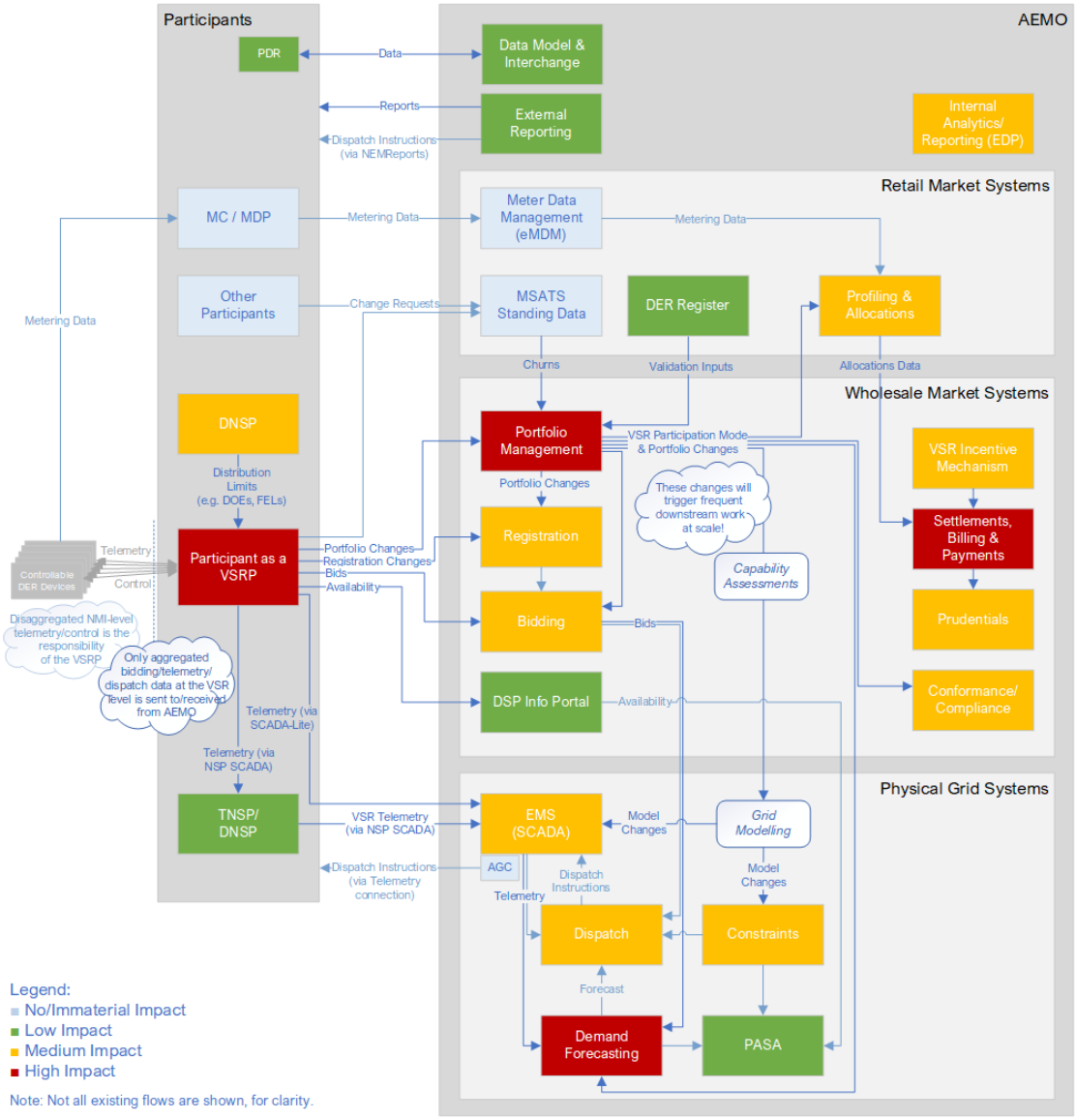
For all new and existing procedures, AEMO will look for opportunities to prioritise and/or bundle procedure consultations, including discussion of critical path consultations that may have dependencies with AEMO's and industry's development and testing. Section 7 sets out AEMO's initial view of the IPRR implementation, which indicates that some critical procedures will need to be consulted on and published in advance of the timeframes set in the IPRR rule to support AEMO's and industry's implementation.

5 AEMO system impacts

This section focusses on the system impacts associated with the IPRR rule. It provides:

- An overview of how VSRPs will participate in the market and highlights the scale of impact to different market systems which will be required to accommodate it (Figure 5 and Table 7)
- A summary of potential impacts to the participant data model and schemas
- Some analysis into the potential scale of participation from VSRs and the impact it could have on system performance.

Figure 5 Overview of IPRR impacts to AEMO's systems and data exchange capabilities



Please note that the diagram above shows some impact ratings that differ from section 3, as this diagram represents system impacts only, rather than holistic impacts across process, procedures, and systems.

Table 7 Tabular view of system impacts from IPRR rule

AEMO System	Summary
High System Impact	
Portfolio Management (PMS)	• Management of 'Zones' for validation purposes • Manage the VSR Participation Status of Active/Deactivated/Hibernated for time periods, including approval workflows. • Significant uplift in system usability and capability is required to support these new use cases, including richer, more interactive forms. • Cater for an increased number of NMI enrolments in an aggregation. • Cater for an increased frequency of NMI enrolment changes – automation of these changes is required to improve turn-around times. • APIs will be added to PMS to allow automation of data input from Participants to support the above points. • Cross-validation of input data against DER Register. • Manage NMI de-nomination process from VSRs based on FRMP churn.
Settlements, Billing & Payments	• Settlement logic is not expected to be impacted for Energy transactions, including in the case of 'hibernated' or 'temporarily deactivated' VSRs. • Modifications will be needed to exclude Active VRSs from the RERT, Directions cost recovery calculations. Consideration will be given to move some calculations into Allocations to avoid performance implications for VSRs composed of many NMIs. • Exclusion of Contribution Factor Calculated DUIDs from the FPP Residual Calculation will need to be modified to cater for VSRs given they will have multiple NMIs provided as an aggregate read. • Incorporation of VSR participation payments.
Demand Forecasting	• The stop/start nature of telemetry from VSRs during hibernation will require either manual work to keep models up-to-date or complex logic to deal with the conditional treatment of these inputs to produce accurate forecasts.
Medium System Impact	
Registration	• A new Dispatch Subtype of 'VSR' to be added under Dispatch Type 'Bidirectional' to drive logic in downstream systems. • Allow for changing capacity against a DUID as the portfolio composition changes over time on a frequent basis. Although it is not currently supported data flow, this may be fed automatically from PMS. • Thresholds may be required to automatically re-trigger Capability Assessments if Capacity is changed above a material amount.
Bidding	• An optional attribute may be added into the existing BDU bidding structure for 'Temporarily Deactivated' VSR Participation Mode. This would be backwards-compatible for existing BDU participants. However, this would not be able to be incorporated into an approval workflow. • New validation logic to cater for different VSR Participation modes (particularly Hibernated). • Cater for appropriate treatment of VSR load.
Dispatch	• Cater for different VSR participation modes. Detailed assessment is required to ensure the logic changes do not cause unintended consequences. • Include logic for not constraining-on VSRs • Dispatch Instructions will be exchanged over currently defined channels in existing formats (SCADA, SCADA-Lite, NEMReports/DI). • 'State of Charge' from *ERI (Enhancing Reserve Information)* will be used to constrain VSR assets from being dispatch when exhausted. • Cater for appropriate treatment of VSR load, including load bid in at the market price cap during conditions of supply scarcity.
VSR Incentive Mechanism	• A new system will be required to facilitate the VSR incentive mechanism: to uphold audit requirements, and feed data into Settlements, Billing and Payments for 'VSR participation payments'.
Profiling & Allocations	• To implement the exclusion of active VSRs from the RERT and directions cost recovery calculation, it is prudent to move some NMI-level processing existing in Settlements into Allocations to avoid future performance issues as the scale of VSRs increases. It requires collation of a new set of data at the DUID level to represent energy from non-hibernated VSRs.

AEMO System	Summary
Prudentials	• Potential adjustments to prudential estimation and prudential forecasting processes to accommodate VSRs, including for when VSRs are temporarily deactivated or hibernated.
EMS (SCADA)	• Telemetry will be exchanged over currently defined channels in existing formats (SCADA, SCADA-Lite) • Representing DUIDs without a single physical connection point located throughout the Distribution Network within the SCADA system will be challenging and requires further assessment. This will be required for all VSRs. • Further assessment is required because frequent changes to the composition of VSRs may require labour-intensive changes to the configuration on an ongoing basis if they are of a material size (total MW capacity in the VSR).
Constraints	• As per EMS, representing DUIDs without a single physical connection point will be challenging. • Frequent changes to the composition of VSRs may require labour-intensive changes to the configuration on an ongoing basis. • The stop/start nature of telemetry from VSRs during hibernation will require either manual work to keep constraint equations up-to-date, or complex logic to deal with the conditional treatment of these variables.
Internal Analytics/Reporting (EDP)	• Incorporation of new data elements/entities (such as VSR Participation Mode) that are required to implement the IPRR monitoring and reporting framework
Low System Impact	
Data Model & Interchange	• Minor changes to incorporate VSR Participation Status • For other areas, showing High impacts (such as Settlements systems), these impacts are “contained” to the calculations within those applications and the high-level analysis has concluded that the existing data structures should be compatible to carry the new data.
PASA	• Upstream systems will abstract differences to ensure that data flows related to VSRs conform with other DUIDs, resulting in minimal change. • Further assessment will need to be conducted for ST-PASA to ensure that changes currently being implemented will cater for VSRs. If the changes implemented to accommodate Wholesale Demand Response (WDR) cannot be leveraged then the impact will be higher.
External Reporting	• Changes in Settlements reports • Potential new market reports required. • Note that annual and quarterly reporting requirements under the Reporting Framework are expected to be produced manually in the short-term • Other impacts require further assessment.
DSP Info Portal	• Consider adding a flag to differentiate VSRs from existing unit types captured in the system.
DER Register	• Allow data integration to PMS to provide new data for validations. • AEMO believes there is an opportunity to improve the DER Register information based on asset details provided in the VSR nomination process. Further consultation will be required with NSPs on whether this information could be automatically populated into the DER Register.
No or Immaterial System Impact	
Meter Data Management (eMDM)	• No identified impacts. Meter data will be received for each NMI without change.
MSATS	• No identified impacts, assuming that there is no new role for a NMI with respect to VSR nomination. The ramification of this is that this information will not be able to be queried in NMI Discovery.
B2B e-Hub	• AEMO will refer the IPRR rule to the B2B Working Group to seek its view on any B2B impacts, particularly regarding whether there are any scenarios that would need a new transaction type. AEMO has not identified any B2B impacts from IPRR rule.

5.1 Data model, schemas, and technical specification impacts

Potential impacts to the participant data model, schemas, and technical specifications are described in the tables below.

Table 8 Potential changes to MMS Data Model

PACKAGE NAME	PROPOSED CHANGES
BIDS	• New field for VSR participation status if this becomes an attribute in bidding, otherwise no identified impact.
DISPATCH, PRE_DISPATCH, STPASA_SOLUTION, PD7DAY	• New field for VSR participation status • Potentially include new fields for regional aggregation of VSR energy storage
PARTICIPANT_REGISTRATION	• VSR Participation Mode – new table to track modes for time periods. • Potential changes to cater for Zones. New table to define Zones, with new field in PMS_GROUPSERVICE to link to a Zone.
SETTLEMENT_DATA	• Potential new table to cater for new VSR incentive mechanism participation payments. • Cost recovery for these payments will be included in existing tables. • To be able to fully reconcile the cost recovery of VSR participation payments, CRMPs would need to update to the new model. However existing use of the model would not be impacted.

Table 9 Potential impacts to technical specifications from the IPRR rule

TECHNICAL SPECIFICATION NAME	POTENTIAL IMPACTS FROM IPRR RULE
EMMS Technical Specification	• IPRR updates required to accommodate settlement changes such as any new reporting of VSR aggregations and the exclusion of VSRs from RERT cost recovery.
EMMS Data Model technical specification	• Changes will be required to reflect updates to packages in the data model as specified in Table 8.
MSATS technical specification	• No changes expected to metering installations or metering data management. • Further assessment required should there be changes to customer churn processes.

Table 10 Schema Impacts from the IPRR rule

SCHEMA	PROPOSED CHANGES
aseXML (B2M)	• AEMO believes that there will be no impact to B2M schema.
aseXML (B2B)	• AEMO will refer the IPRR rule to the B2B Working Group to seek its view on any B2B impacts, particularly regarding whether there are any scenarios that would need a new transaction type. AEMO has not identified any B2B impacts from the IPRR rule.
Bidding JSON Schema	• New field for VSR participation status if this becomes an attribute in bidding, otherwise no identified impact.
CDR/CDP JSON Schema	• No identified impact

5.2 Data growth impacts on system capacity

In the early stages post IPRR implementation, VSRs are expected to be comprised mainly of aggregations of stand-alone exempt generation/storage and larger commercial and industrial (C&I) resources, as these are expected to have more advanced capabilities for participation. Over the medium-to-long term, participation is expected to evolve to include larger volumes of residential NMIs as capability develops. These considerations are based on initial stakeholder engagement and the additional challenges associated with managing household-level aggregations and customers. Therefore, a non-linear volume increase is anticipated through market systems.

The increase in the number of DUIDs, whilst not an orders-of-magnitude increase, may also have an effect through time-sensitive scheduling and reporting systems.

The increase in the number of NMIs represents an increase of several orders of magnitude over the volumes handled by the portfolio management system today, which may lead to performance issues.

Approximations have been made in Table 11 and Table 12 for potential volume numbers of VSRs. These have been estimated using aggregated embedded energy storage numbers forecasted in the 2024 ISP from both the Progressive Change and Step Change scenarios which each have different assumptions around CER uptake and integration into VPPs.[29]

This modelling has been done on a zonal basis, with some limits placed on the number of participants per zone and has not changed since the previous version of this HLIA.

Table 11 Assumed volume cumulative growth projections (Progressive Change)

DATA ENTITY	NOW	2027	2028	2029	2030
Dispatchable Units (DUID)	100s	+11	+13	+17	+22
Portfolio NMI Enrolments	1,000s	+4,200	+10,800	+20,400	+25,600
Total Capacity [MW]		+86 MW	+119 MW	+167 MW	+193 MW

Table 12 Assumed volume cumulative growth projections (Step Change)

ENTITY	NOW	2027	2028	2029	2030
Dispatchable Units (DUID)	100s	+36	+62	+77	+87
Portfolio NMI Enrolments	1,000s	+60,000	+180,000	+370,000	+540,000
Total Capacity [MW]		+300 MW	+890 MW	+1800 MW	+2600 MW

[29] See forecasts for aggregated energy storage systems in the 2023 IASR Assumptions Workbook: https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp/current-inputs-assumptions-and-scenarios

Table 13 below uses the above volumetric assumptions as inputs into an assessment on the scalability of each system presented earlier in this section. Scalability refers to the ability of a system to continue to operate sustainably within defined service-level objectives, while data volumes and/or workloads increase.

Where a limitation has been identified, uplift to the relevant systems will be planned for accordingly. Work may either be undertaken by this project, already included for remediation by another initiative, or prioritised appropriately for inclusion by another NEM Reform initiative.

Table 13 System scalability assessment

SYSTEM / DOMAIN	SCALABILITY LIMITATION – PROGRESSIVE	SCALABILITY LIMITATION – STEP CHANGE
Portfolio Management (PMS)	Significant changes required by 2028	Significant changes for initial release
Settlements	No direct impacts expected.	Potential impacts by 2030.
Billing & Payments	No direct impacts expected.	No direct impacts expected.
Demand Forecasting	No direct impacts expected.	Potential impacts by 2030.
Registration	No direct impacts expected.	No direct impacts expected.
Bidding	No direct impacts expected.	No direct impacts expected.
Dispatch	Potential impacts by 2030.	Potential impacts by 2038.
Profiling & Allocations	No direct impacts expected.	Potential impacts by 2028.
Prudentials	No direct impacts expected.	No direct impacts expected.
EMS (SCADA)	No direct impacts expected.	No direct impacts expected.
Constraints	Potential impacts by 2030.	Potential impacts by 2028.
Internal Analytics/Reporting (EDP)	No direct impacts expected.	No direct impacts expected.
Data Model & Interchange	No direct impacts expected.	No direct impacts expected.
PASA	Potential impacts by 2030.	Potential impacts by 2028.
External Reporting (existing)	No direct impacts expected.	No direct impacts expected.
DSP Info Portal	No direct impacts expected.	No direct impacts expected.
DER Register	No direct impacts expected.	No direct impacts expected.
Meter Data Management (eMDM)	No direct impacts expected.	No direct impacts expected.
MSATS	No direct impacts expected.	No direct impacts expected.
B2B e-Hub	No direct impacts expected.	No direct impacts expected.

6 Participant impact assessment

This section provides AEMO's high-level view of the IPRR rule's potential impact on different participant types for the IPRR reform. However, **AEMO recommends that each participant perform their own detailed impact analysis of the IPRR rule** because AEMO cannot predict the exact scale or nature of impacts for individual participants.

Table 14 considers the direct IPRR impacts to participants of the IPRR rule, as well as the flow-on impacts to participants associated with IPRR changes that AEMO would be required make to its processes, procedures, and systems.

Table 14 Indicative IPRR high-level participant impact

STAKEHOLDER TYPE	INDICATIVE HIGH-LEVEL IMPACT	COMMENT
Integrated resource provider	Opting to participate in IPRR: High Not participating in IPRR: Low	**Please see Table 15 for more detail on indicative IPRR impacts to those market participants that choose to participate as VSRPs.** • Existing market participants choosing not to operate VSRs can continue using the pre-IPRR data model. They will only need to adopt the data model updated for IPRR if they wish to fully reconcile the cost recovery of VSR participation payments. • If there are changes to Portfolio Management System interfaces, then existing PMS users should assess the change impact to their systems. • If there are changes to AEMO's systems or processes arising from the VSR Guidelines zonal aggregation requirements, then participants should assess the flow-on change impacts to their own systems and processes. Please see Figure 6 for the VSR Guidelines consultation timeline.
Market generator		
Market customer		
Distribution / Transmission Network Service Providers	Medium impact	**Please see Table 15 for more detail on indicative IPRR impacts to DNSPs/TNSPs.** • VSRPs will be responsible for ensuring that their bids and any subsequent dispatch complies with applicable distribution/transmission connection agreements. – Any requirements for VSRPs to receive information regarding limits applicable to the NMIs that comprise their VSRs is out of scope for this rule change. – The IPRR rule requires DNSPs to consult with VSRPs when designing flexible export limits (Clauses 5A.B.3(6) and 5A.E.3(c)(9) of the final rule).. • Receive any new VSR-related reports or data feeds via MMS data model: – Visibility of NMIs that are part of a VSR – Aggregated scheduling information (pre-dispatch/dispatch timeframes)
Metering providers	No impact expected	• As part of the VSR guidelines development, AEMO must consult on and determine acceptable types of metering installations for participating connection points. • Revenue meters at the connection point must adhere to the requirements in Chapter 7 of the NER and to AEMO's procedures. For small customers, this would mean a type 4 meter that is capable of recording data in five-minute intervals, which is remotely read. • For secondary settlement points participating in VSR, the metering installation must meet the requirements in Chapter 7 of the NER and AEMO's procedures that set out the services for type 8A, type 8B and type 9 metering installations.
Metering data providers	No impact expected	• No change to current metering data processes for VSRs.
Embedded network managers	No impact expected	• VSRPs can nominate resources at embedded network child connection points, if they are an on-market connection point.
Market SAPs resource providers	No impact.	• MSRPs will not be able to nominate VSRs.

Table 15 provides a heat map view of indicative IPRR impacts to those market participants that choose to participate as VSRPs and to DNSPs/TNSPs.

Table 15 IPRR impacts to eligible market participants acting as VSRPs and to DNSPs/TNSPs

INDICATIVE FUNCTION OR CAPABILITY	RELATED AEMO FOCUS AREA	IMPACT	
		VSRP	DNSP/TNSP
Register as Generator, Market Customer or IRP	Registration	✓	
Nominate qualifying resources into a VSR	Portfolio management	✓	
Apply to aggregate two or more qualifying resources into a VSR • Includes initial VSR capability assessment • Potentially includes periodic VSR capability assessment (to be confirmed through VSR guideline development)	Portfolio management	✓	
Self-manage VSR connection points, including to: • Manage customer churn • Add, remove and update NMIs within a VSR • Apply to 'deactivate' VSRs • Apply to 'hibernate' VSRs	Portfolio management	✓	
• VSRPs must submit Available Capacity, PASA Avail, Recall Period, and energy constraints for their VSRs for ST PASA processes in accordance with the timetable and the ST PASA procedures. • VSR's that are comprised of one or more bidirectional units (batteries) must continually make available to AEMO, in real time, the state of charge of that battery.	PASA	✓	
Submit bids for active and inactive VSRs	Bidding	✓	
Ensure active VSRs' bids and any subsequent dispatch complies with applicable distribution/transmission connection agreements	Bidding	✓	
Always have operational contacts available to receive and act on dispatch instructions when VSRs are in active mode.	Pre-dispatch and dispatch	✓	
Receive dispatch instructions for VSRs.	Pre-dispatch and dispatch	✓	
For active VSRs, disaggregate dispatch instructions to individual VSR NMIs within the VSR.	n/a	✓	
Conform with dispatch instructions and applicable distribution/transmission connection agreements, including any applicable network limits (active VSRs).	Pre-dispatch and dispatch	✓	
Comply with applicable distribution/transmission connection agreements (active VSRs)	n/a	✓	✓
Provide aggregated telemetry for active and inactive VSRs in accordance with 'Power System Data Communications Standard'. It is expected this could include telemetry via: • SCADA through NSP • Direct 'SCADA-Lite' connection once available[30]	Telemetry	✓	✓
Receive any new VSR-related reports or data feeds: • Visibility of NMIs that are part of a VSR • Aggregated scheduling information (pre-dispatch/dispatch timeframes)	Data exchange	✓	✓
Updated settlement reconciliation processes to reflect that active VSRs are not subject to RERT or directions cost recovery	Settlements, billing and invoices	✓	
Updated settlement reconciliation processes to account for any 'VSR participation payments'	Settlements, billing and invoices	✓	
VSR activity will be incorporated into prudential estimation for VSRPs (including consideration of when VSRs are deactivated or temporarily hibernated)	Prudential assessment	✓	

[30] SCADA Lite will enable NEM non-NSP participants to establish a bi-directional connection to exchange operational information (telemetry and control) with AEMO. See SCADA Lite project page for more information: https://aemo.com.au/initiatives/trials-and-initiatives/scada-lite

INDICATIVE FUNCTION OR CAPABILITY	RELATED AEMO FOCUS AREA	IMPACT	
		VSRP	DNSP/TNSP
Provide Demand Side Participation Information via the DSP Information Portal to support long term planning processes.		✓	
Optional participation in VSR incentive mechanism (tender) from Apr 2026 to Dec 2031.	VSR incentive mechanism	✓	

Assumed impact level: ✓ High ✓ Medium ✓ Low

7 Implementation pathway

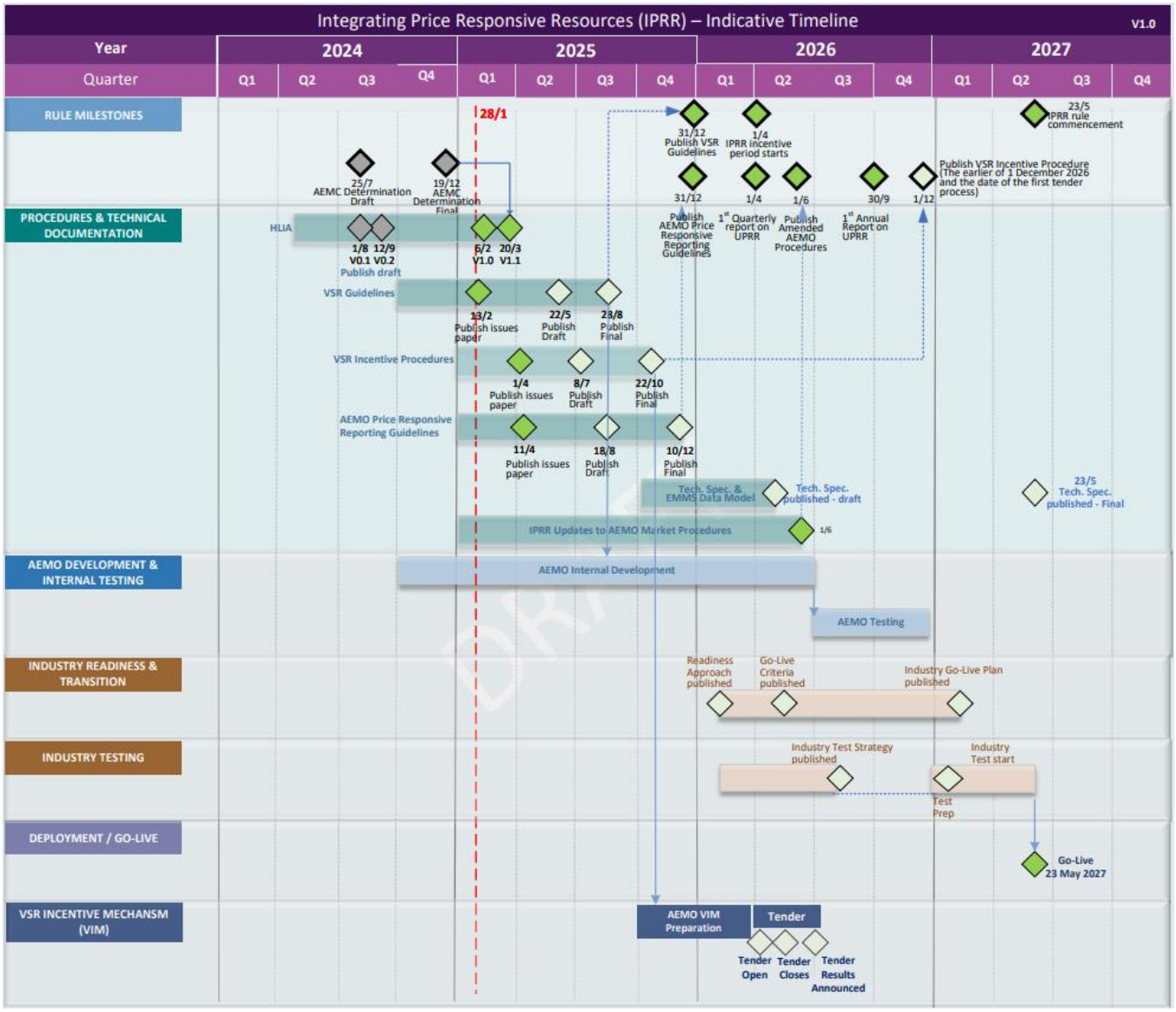
This section outlines the indicative implementation pathway, an early view of industry readiness and risks for the IPRR reform based on the IPRR final rule.

7.1 Indicative implementation timeline

Figure 6 shows an indicative implementation pathway for all three elements of the IPRR rule. Key implementation considerations include:

- Dispatch mode - to integrate presently unscheduled price-responsive energy resources into NEM scheduling and dispatch processes. Dispatch mode commences 23 May 2027. This is a Sunday to align with the start of the NEM settlement billing week. Commencing IPRR on any other day of the week would increase design and development complexity, leading to increased implementation costs. This is because there would need to be a 'settlement transition week' to accommodate the first part of that week being based on pre-IPRR settlement processes and the later part of that week being based on IPRR settlement processes.
- VSR Incentive Mechanism - operates during the 'incentive period' of 1 April 2026 to 31 December 2031.
- AEMO is proposing the incentive mechanism procedure development and first tender process be run well in advance of the dispatch mode commencement. This is because of dependency on Settlements build, and benefits from running the auction earlier to provide more certainty for participants, which supports earlier participation in dispatch mode.
- Monitoring and reporting framework for price-responsive resources. Reporting on unscheduled price responsive resources commences 1 January 2026.

Figure 6 Indicative IPRR implementation timeline



7.2 Indicative industry readiness approach

This section shows AEMO's early view of the IPRR readiness approach based on the IPRR final rule. The readiness approach and milestone dates will be confirmed in consultation with participants. Figure 7 provides the indicative view of the IPRR readiness approach, consistent with the NEM reform readiness strategy. Table 16 provides commentary on each of the readiness elements.

The indicative readiness approach assumes that AEMO and industry will prepare for IPRR based on the expected early volumes of coordinated CER. As described in section 5.3, AEMO will eventually need to adapt its systems for increased data growth as more VSRs look to participate in the NEM.

Figure 7 Indicative IPRR industry readiness approach

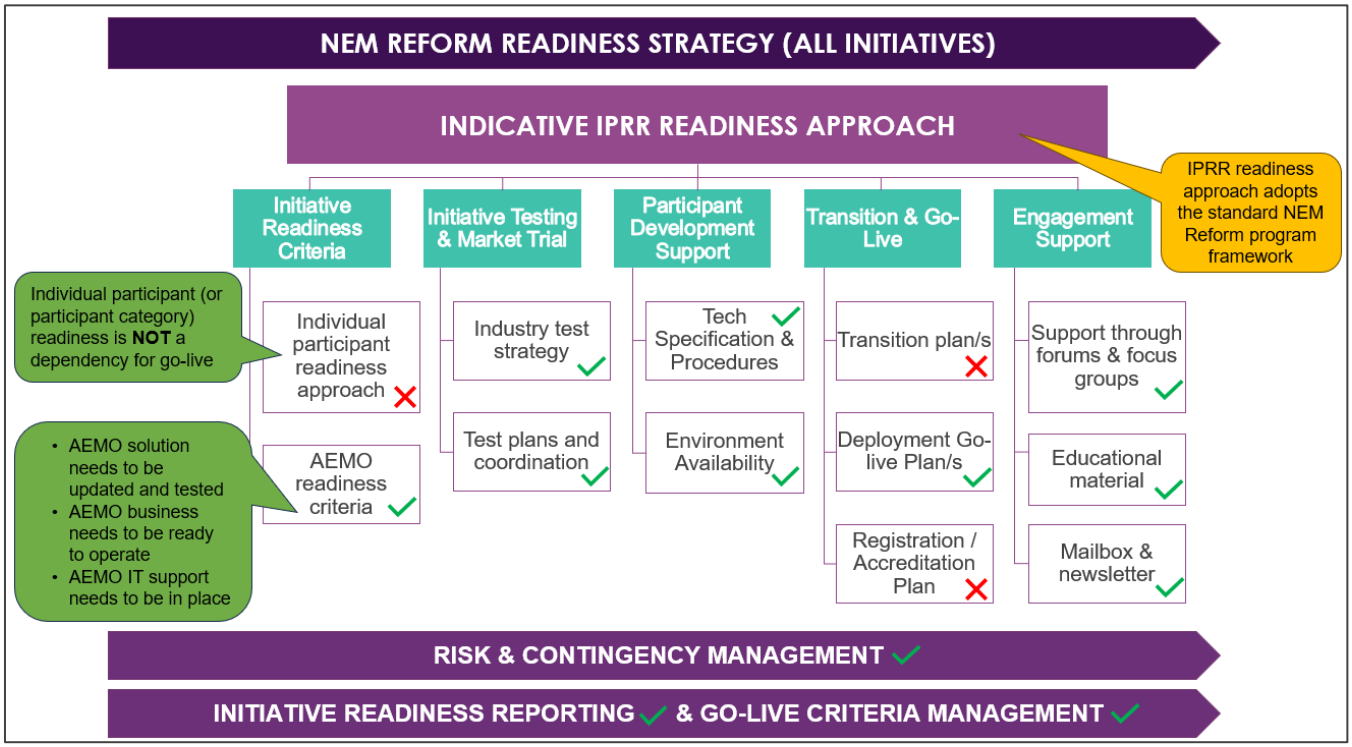


Table 16 AEMO's initial view of industry readiness for the final IPRR rule

READINESS AREA		INITIAL VIEW OF INDUSTRY READINESS
Initiative go-live criteria	Individual participant readiness approach	Individual participant (or participant category) readiness is not a dependency for go-live because IPRR participation is voluntary.
	AEMO readiness criteria	By the IPRR commencement date, AEMO's: • solution needs to be updated and tested • business needs to be ready to operate • IT support needs to be in place. Final criteria will be defined and agreed with industry as part of AEMO's readiness checkpoints for implementation.
Industry testing and market trial	Industry test strategy	• Industry test strategy will be developed in collaboration with industry. • Based on its current understanding of likely IPRR uptake, AEMO is planning for an industry test period to conduct either a market trial or industry testing prior to the IPRR commencement date. The May 2027 commencement date enables a three-month period for industry testing allowing for a broad range of trial scenarios. • AEMO will engage with participants to establish whether a market trial (end-to-end testing) will be required. • At this early stage, AEMO expects it more likely that it would run 'industry testing' i.e. non-coordinated testing of business process scenarios with participants who have their systems ready for testing. • HLIA indicates that industry testing: – Will be needed for VSRPs to test new functionality (likely including VSR portfolio management, telemetry, bidding, dispatch, data exchange, and settlement) – May be needed for NSPs to test any new VSR-related reports or data feeds – May be needed for changes to settlement processes and customer churn processes. • Eligibility for industry testing: – Participants wishing to test VSRP functionality can only do so for NMIs for which they are the registered Financially Responsible Market Participant – Market participants in registration process may contact AEMO for advice on eligibility for industry testing – Not yet registered organisations are not eligible for industry testing, but once registered will be able to conduct self-testing in the standard pre-production environment.
	Test plans and coordination	• Will be developed in consultation with industry and in alignment with the industry test strategy. • AEMO will develop test plans that support: – Test scenarios and timings – Identification of required test data e.g. pre-production refreshes etc.
Participant development support	Procedures	• IPRR rule indicates that new procedures and guidelines will need to be developed, consulted on and published by the timeframes set in the IPRR rule. • Where relevant, existing procedures will need to be updated by the IPRR rule required date of 1 June 2026. • Where relevant, AEMO will allow sufficient time for consultation with participants for new and existing procedures. • For all new and existing procedures, AEMO will look for opportunities to prioritise and/or bundle procedure consultations, likely via the Electricity Wholesale Consultative Forum or the Electricity Retail Consultative Forum. This includes discussion of critical path consultations that may have dependencies with AEMO's and industry's development and testing. Publishing critical path procedures sooner means that data model and technical specifications can be released to participants sooner.
	Technical specifications	• AEMO will plan to publish technical documentation, such as draft technical specifications and the EMMS Data Model, with sufficient time before the commencement of Industry testing to support participant development.
	Environment availability	• AEMO's pre-production will be available to support industry testing (and potentially a market trial) prior to the IPRR rule commencement. • Initial assessment is that a Participant development support environment would not be needed as changes to participant interfaces are not expected to be significant. However, AEMO will

READINESS AREA		INITIAL VIEW OF INDUSTRY READINESS
		engage on the need for development support for new/intending participants who seek to become VSRPs, ahead of their registration. • Existing IRPs, generators and market customers who become VSRPs will already have access to pre-production for testing.
Transition and go-live	Transition plans	• No transitional requirements for industry are indicated in the IPRR rule. • If AEMO confirms that changes will occur to Portfolio Management System interfaces that affect existing PMS users, then AEMO will develop any transition arrangements in consultation with industry. • IPRR rule transitional requirements relate to AEMO and AER developing or updating guidelines and procedures (see above).
	Go-live plan	• Will be developed in consultation with industry to confirm detailed deployment and capability availability timeframes in the lead up to rule commencement.
	Registration or accreditation plans	• IPRR rule does not indicate changes to registration or accreditation frameworks.
Engagement support	Forums and Focus groups	• The NEM Reform Program will support affected market participants in each reform phase from implementation design, procedures development, solution delivery and through to industry testing. • Support will be provided as required via NEM Reform forums, information sessions, focus groups, 1:1s and daily stand-ups. • At the time of writing this HLIA, engagement has commenced on major new IPRR documents. Affected participants may wish to attend the following sessions: – Thursday 13 February 2025: IPRR Final HLIA Forum – Friday 28 February 2025: VSR Guidelines Forum – Tuesday 4 March 2025: VSR Incentive Procedures Focus Group – Monthly Wholesale Electricity Consultative Forum.
	Educational material	• AEMO will make available educational material to support awareness, assessment and preparation for affected participants. Made available through the project's dedicated webpage, this may include, but is not limited to, guides and factsheets, FAQs and industry presentations.
	Mailbox and newsletter	• Participants support provided via monitored mailbox • Regular communications around project milestones
Risk & contingency management		• Indicative risks have been identified in section 7.3 and will be further developed in consultation with industry.
Initiative readiness reporting & go-live criteria management		• Will be developed in consultation with industry. • Readiness reporting will be consistent with the go-live criteria. • Readiness checkpoints will be scheduled for 6, 3 and 1-month prior to rule commencement. • Progress reporting against established milestones will be provided on a regular basis though NEM Reform forums.

7.3 Risks

There are a range of risks associated with the proposed IPRR implementation timeframes, given the extensive impacts for AEMO systems and procedures, as well as industry impacts. Table 17 outlines the initial risk assessment associated with the proposed IPRR implementation approach.

Table 17 Initial assessment of the IPRR implementation risks

IDENTIFIED RISK	CURRENT RATING	MITIGATION STRATEGIES	RESIDUAL RATING (AFTER MITIGATION)
Contention and priority of IPRR amongst other reform initiatives affecting common capability areas.	Medium	• AEMO's NEM Reform program governance to manage priority and contention.	Low
Any change and potential instability (particularly across summer periods) requires focus on operations rather than reform change.	Medium	• Timeframes consider summer operations to support successful delivery.	Low
AEMO support for participant development timeframes.	Medium	• AEMO to publish comprehensive specifications in a timeframe that supports participant development being ready for industry testing.	Low
Insufficient participant involvement during procedure development, implementation design and industry testing could affect value of technical solution to industry.	Medium	• Engagement and clear communication of timeframes and approach to procedure development with intending and existing Participants to drive awareness, assess interest in participation and understand requirements, support, and impact.	Low
Project activities affecting stakeholder resourcing over Christmas owing to organisational shutdown periods.	Low	• Timeframes consider holiday closure periods to support successful delivery.	No impact
The increase in data growth, may lead to necessary and material changes to existing AEMO systems such as PMS. This may require further development activities and participant change impacts for existing functionality.	Medium	• AEMO to review systems as part of solution design. If any material changes are required to AEMO Systems, AEMO NEM Reform program to access, review and prioritise such changes	Low

8 Related reforms

Table 18 sets out the interrelationship between the IPRR reform and key, select NEM reform initiatives.[31]

Table 18 IPRR project's relationship with other key initiatives

NEM REFORMS	RELATIONSHIP TO IPRR
SCADA Lite	The SCADA Lite reform will enable NEM non-NSP participants (such as VSRPs) to establish a bi-directional connection to exchange operational information (telemetry and control) with AEMO. **SCADA Lite is a pre-requisite for IPRR** and is expected to be available to participants from late June 2025.
Unlocking benefits of CER through flexible trading	The final rule creates a mechanism that facilitates consumers and their agents (i.e. retailers, FRMPs and aggregators) to identify and manage flexible CER separately from inflexible or passive energy use and for that flexible CER to be better recognised in the energy market and used in the power system. 'Flexible trading' is not a dependency for the IPRR reform. However **the 'flexible trading' reform is complementary to IPRR** as it enables end users to establish a secondary settlement point(s) for controllable resource(s) within their electrical installation. The reform allows large customers the ability to choose different market participants for the connection point and secondary settlement point. Whilst small customers can participate in the reform, it requires the same FRMP for the connection point and secondary settlement point. The reform provides a framework for new products and services to be available for CER assets. The final rule for Unlocking CER benefits through flexible trading staggers the implementation into two key dates: • Arrangements related to Type 9 metering installations at primary connection points beginning 31 May 2026 • Arrangements related to the remaining substantive matter of the rule beginning 1 November 2026.
Frequency performance payments	The FPP reform is intended to promote the provision of good frequency control in the NEM at the lowest cost to consumers. This is achieved by clearly pricing the impact of helpful and unhelpful behaviour by facilities and providing information about performance in a timeframe that allows for plant operators to respond to these price signals. The new FPP allocation method will also be used to apportion the recovery of regulation FCAS, replacing the current 'causer pays' framework. All generators and loads, including households, are captured by FPP, and **VSRPs would be eligible for frequency performance payments**. Facilities capable of providing four-second performance data (SCADA) will receive individual contribution factors calculated accordingly, while those without SCADA are part of the 'residual' and receive and allocation of incentives/penalties based on their metered energy. FPP will go live on 8 June 2025 after a period of 'non-financial operation' of the new FPP systems.
Enhancing Reserve Information	The ERI reform aims to improve the transparency of the available energy from scheduled generators and grid-scale batteries across the NEM. The additional information will enable market participants to make more informed decisions about their own behaviour, including when periods of tighter supply-demand balance in the wholesale electricity market are anticipated. Three new measures will be introduced: • Publication of previous day's 5-min data for batteries • Publication of daily energy limits (total availability) of scheduled generators • Publication of aggregated state of charge of batteries in near-real time by region Scheduled BDUs will also need to provide Maximum Storage Capacity (MWh) to AEMO in their annual Schedule 3.1 data confirmation process. Information relating to a battery's aggregated state of charge (SOC) will need to be provided for **VSR assets to help signal to the market the aggregated levels of storage available in operational time frames, and to constrain VSR assets in pre-dispatch forecasts when their batteries are exhausted.** Go live for the ERI reforms is 1 July 2025 (except for near real-time SOC in Tasmania, which will commence as soon as sufficient diversity in battery operators exists in that region, or no later than 1 July 2027).
CER data exchange	Identifies use cases and data exchange model to support CER coordination.
Market interface technology enhancements (MITE)	The MITE initiative will provide enhanced identity and data exchange capabilities to support service providers & new CER use cases. IPPR project will use the existing data exchange channels and potentially newer capabilities developed by the MITE initiative (IDX and IDAM), if available.
Accelerating smart meter deployment	The Accelerating Smart Meter Deployment rule's goal is for universal installation of smart meters in the NEM by 2030. Smart meters provide a platform to: • integrate CER into the energy market

[31] The NEM reform implementation roadmap provides stakeholders with the complete list of reform initiatives.

NEM REFORMS	RELATIONSHIP TO IPRR
	• provide consumers with visibility and control of their electricity consumption • allow DNSPs to improve management of their network. Under the rule, DNSPs will progressively retire their legacy meters (type 5 and type 6 meters) from 2025 to 2030 in accordance with an approved plan. Retailers, in conjunction with their metering coordinators, must attempt to replace legacy meters in accordance with the plan. The rule change impacts QLD, SA, NSW and the ACT. Tasmania already has an acceleration program in place; Victoria completed their deployment as part of the Victorian Advanced Metering Infrastructure program. Smart meters deployed as part of the rule change are required to read 5-minute intervals, a pre-requisite for a VSR.
ARENA capacity building	Community battery investments are good VSR candidates.

A1. Impact ratings

Description of AEMO's reform impact ratings for industry systems, processes and documentation

Impact rating	Description	Comments
No impact	• No change's to AEMO or industry systems, processes, guidelines, or procedures. • Stakeholder consultation not required.	• No changes
Immaterial	• Immaterial impact to AEMO or industry systems, process, guidelines, or procedures • Stakeholder feedback sought	• Immaterial administrative changes to AEMO procedures and/or guidelines, purposes of consistency • Immaterial changes or additions to existing business processes and/or technology systems • Stakeholder consultation not required.
Low	• Low impact to AEMO or industry systems, processes, guidelines, or procedures • Stakeholder consultation may be required, or feedback sought.	• Minor changes, additions, or updates to AEMO procedures and/or guidelines, purposes of consistency • Minor changes, additions, or updates to existing business processes and/or technology systems • Stakeholder consultation not anticipated but may be required.
Medium	• Medium impact to AEMO or industry systems, processes, guidelines, or procedures • Stakeholder consultation required.	• Material changes or additions to AEMO procedures and/or guidelines • Significant changes or additions to existing business processes and/or technology systems • Stakeholder consultation required.
High	• High impact to AEMO or industry systems, processes, guidelines, or procedures • Stakeholder consultation required.	• Significant changes, additions, or creation of new AEMO procedures, and/or guidelines • Significant changes, additions, or the creation of new business processes and/or technology systems • Stakeholder consultation required.
Very High	• Large impacts to AEMO or industry systems, processes, guidelines or procedures • Stakeholder consultation required	• Large changes, additions or creation of new AEMO procedures and/pr guidelines • Major changes, additions or creation of new business processes and/or technology systems • Stakeholder consultation required

A2. Glossary

This document uses many terms that have meanings defined in the National Electricity Rules (NER). The NER meanings are adopted unless otherwise specified.

Please also see AEMO's industry terminology web page to complement the table below.

TERM	DEFINITION
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
API	Application programming interface
ARENA	Australian Renewable Energy Agency
ASEFS	Australian Solar Energy Forecasting System
B2B	Business-to-business
B2M	Business-to-market
BDU	Bidirectional Unit
CER	Consumer Energy Resources
COAG	Council of Australian Governments
CP	Connection point
CRMP	Cost recovery market participant
DER	Distributed Energy Resources
DNSP	Distribution Network Service Provider
DRSP	Demand Response Service Provider
DSP	Demand side participant
DUID	Dispatchable unit identifier
EDP	Enterprise Data Platform (interchangeable with EDW)
EDW	Enterprise Data Warehouse (interchangeable with EDP)
ESB	Energy Security Board
EMS	Energy Management System
EMMS	Electricity Market Management System
EV	Electric Vehicle
FCAS	Frequency control ancillary services
FEL	Flexible Export Limit
FPP	Frequency Performance Payments
FRMP	Financially Responsible Market Participant
GW	Gigawatt
HLIA	High-level Implementation Assessment
IDAM	Identity Access and Management
IDX	Industry Data eXchange
IPRR	Integrating price responsive resources into the NEM – rule change

TERM	DEFINITION
IRP	Integrated Resource Provider
LNSP	Local network service provider
LSU	Light Scheduling Unit (now termed as Voluntarily Scheduled Resource)
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
NER	National Electricity Rules
NMI	National Metering Identifier
NSP	Network service provider
PASA	Projected Assessment of System Adequacy
PD / Pre-Processing	Pre-dispatch or other known as 'Pre-Processing' feeds into 'NEMDE'
PMS	Portfolio Management System
PoL	Predictability of load
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).
PV	Photovoltaic
RERT	Reliability and Emergency Reserve Trader
RMC	Registration Manager Client
SCADA	Supervisory Control and Data Acquisition
SOC	State of charge
ST PASA	Short Term Projected Assessment of System Adequacy
TI	Trading Interval
Trading Interval (TI)	A period for which AEMO settles trading amounts in the NEM. A trading interval is defined in the Rules as a 5-minute period.
V2G	Vehicle to Grid
VIM	VSR incentive mechanism
VPP	Virtual Power Plants
VSR	Voluntarily Scheduled Resource
VSRP	Voluntarily Scheduled Resource Provider
WDR	Wholesale Demand Response Mechanism