Australian Energy Market Commission

AEMC
Australian Energy Market Commission

RULE

Consultation paper

National Electricity Amendment (Operational integration and visibility of large inverter based loads) Rule 2027

Proponent

Australian Energy Market Operator (AEMO)

12 November 2026

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About the AEMC

The AEMC reports to the energy ministers. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the energy ministers.

Acknowledgement of Country

The AEMC acknowledges and shows respect for the Traditional Custodians of the many different lands across Australia on which we live and work. The AEMC office is located on the land of the Gadigal people of the Eora nation. We pay respect to all Elders past and present, and to the enduring connection of Aboriginal and Torres Strait Islander peoples to Country.



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Summary

1 Large inverter based loads (IBLs), including data centres, hydrogen electrolysers and other power-electronic driven facilities, are expected to become an increasingly significant source of electricity demand in the National Electricity Market (NEM). Large IBLs can have technical and operational characteristics that differ from more traditional forms of electricity demand. A key difference is that large IBLs can rapidly change their electricity demand, which, if not appropriately managed, can create challenges for frequency control, voltage management and broader power system operation. They can also involve very large amounts of electricity demand concentrated in particular locations, creating more significant localised impacts on the power system.

2 Data centres are a particularly important example of this emerging class of large load. They rapidly increase or decrease their demand in real time and because of their modular design, can also scale much more quickly than traditional sources of load. AEMO's 2026 Electricity Statement of Opportunities forecasts data centre electricity consumption to increase from around 5 TWh today to around 34 TWh over the next decade, increasing their share of operational demand from around 3 per cent to approximately 13 per cent of operational demand.[1]

AEMO's rule change request seeks to improve the integration and visibility of large IBLs

3 Against this backdrop, the Australian Energy Market Operator (AEMO) submitted the *Operational integration and visibility of large inverter-based loads* rule change request on 21 July 2026. The rule change request identifies gaps in the existing arrangements for integrating large IBLs into the NEM. In particular, AEMO considers that the NER does not currently provide AEMO and network service providers (NSPs) with consistent visibility of large IBL behaviour or an appropriate framework for managing significant and rapid changes in demand.

4 AEMO's rule change request identified four issues that existing arrangements may not adequately address:

- **Rapid demand shifts:** existing arrangements may not adequately manage the power system impacts associated with rapid changes in large IBL demand.
- **Real-time operational visibility:** Existing arrangements may not provide AEMO and NSPs with real-time visibility of large IBLs, while there may also be a need for greater clarity on the mechanisms available to coordinate their operation when required, including the use of directions.
- **Operational forecasting and planning visibility:** existing arrangements may not provide sufficient information about how large IBL demand is expected to change across operational and planning horizons.
- **Consistency of requirements:** bespoke and inconsistent requirements across projects, networks and jurisdictions may increase regulatory burden for industry.

5 These issues do not mean that the characteristics of large IBLs are inherently problematic. Rather, as these loads become a more material part of NEM demand, improved visibility and more consistent arrangements may help manage their potential impacts while enabling the operational flexibility and other services they may be able to provide to the power system.

6 AEMO identified several potential regulatory pathways, including potential new registration

1 AEMO, 2026 Electricity Statement of Opportunities for the National Electricity Market, August 2026.

requirements for large IBLs, new or amended access standards, obligations on NSPs or large IBLs and supporting guidelines and procedures. AEMO did not present these pathways as mutually exclusive and envisaged that a combination of these measures would be considered and developed through the rule change process.

This rule change project builds on and will contribute to a broader program of work to support the integration of data centres and large IBLs

7 This rule change project builds on a body of work undertaken by the Commission, governments and AEMO on the integration of data centres and other large IBLs into the NEM.

8 In July 2026, the Commission provided advice to the Energy and Climate Change Ministerial Council (ECMC) on regulatory reforms that would require data centres to offset their demand. The advice was supported by the ECMC (with the exception of the Northern Territory and Queensland). Recommendation 3 of this advice identified mandatory registration for data centres as a means of improving operational visibility of large data centres. It suggested that this would also provide a regulatory foundation for broader requirements should they be introduced in the future, such as our recommendation for a new data centre contracting obligation (recommendation 2).

9 Following the acceptance of this advice, Minister Bowen wrote to the AEMC encouraging the Commission to consider mandatory registration requirements for data centres through this rule change and to progress the reform as a priority. The Minister has also asked AEMO to work closely with the Commission to support timely implementation of any registration framework.

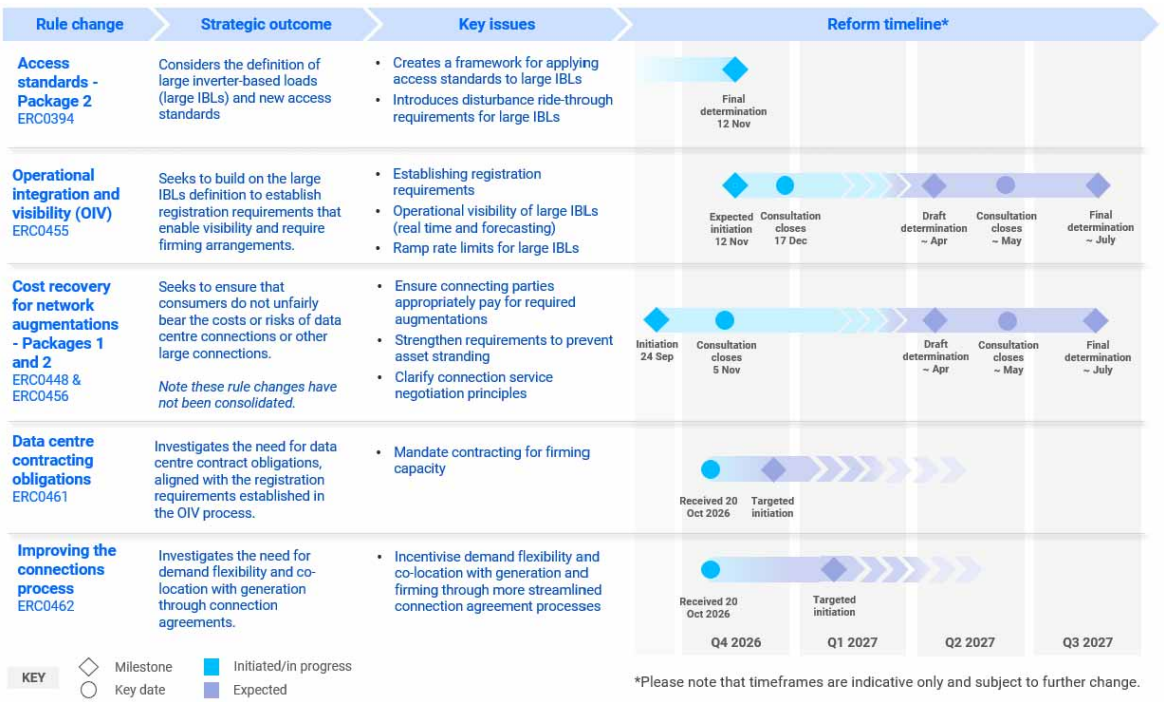
10 The final determination and final rule for *Improving the NEM access standards – Package 2* provides an important technical foundation for this rule change. The final rule establishes a definition and threshold for large IBLs for the purposes of applying technical access standards to large IBL at the point of connection. These new access standards include disturbance ride-through and instability monitoring requirements. These arrangements provide a useful starting point for considering how any new registration and/or access standards requirements could be applied through this rule change.

11 It is also important to note that this rule change project is part of a broader program of work the Commission is undertaking to address different aspects of growing data centre demand. In particular:

- **Cost recovery for network augmentations:** the Commission is currently considering whether existing arrangements appropriately allocate the network costs and risks associated with connecting data centres and other large loads, including upstream augmentation costs and the risk of stranded network investment. Stakeholder submissions to this process closed 5 November 2026.
- **Data centre contracting obligation for use of firmed energy:** the Commission received a rule change request from Minister Bowen on 20 October 2026 seeking to introduce a contracting obligation for firmed energy for data centres. The request is planned for initiation in the near future. The registration considerations in this rule change are particularly relevant to that reform because registration could provide the regulatory foundation through which requirements specific to large data centres can be applied. This dependency is also consistent with the Commission's earlier ECMC advice, which identified registration as a regulatory mechanism for broader obligations.
- **Supporting demand flexibility and co-location through connection agreements:** the Commonwealth has also submitted a related rule change request seeking a clearer

connection pathway for large energy users, including data centres, where they co-locate with renewable generation and storage or offer demand flexibility to the grid.

Figure 1: AEMC data centre work program



The Commission has further considered the issues and has developed initial policy considerations for stakeholder feedback

12 The Commission has used the period leading up to publication of this consultation paper to build on the proposals AEMO set out in their rule change request, to provide stakeholders with more detailed policy pathways.

13 We are sharing our initial thoughts and ideas in this consultation paper so that stakeholders have more details to respond to. Setting out our preliminary thoughts at this stage should support more focussed stakeholder submissions and allow the Commission to test with stakeholders the benefits, costs and implementation implications of concrete options earlier in the process. The intended outcome is to support timely development of the reform.

14 Importantly, we emphasise that these preliminary views are not settled Commission positions and should not be considered as such. They represent our current working hypotheses about the nature of the issues and regulatory approaches that may best address them. Stakeholder evidence and views will likely lead the Commission to refine the proposed approaches, pursue different avenues, conclude that particular measures are unnecessary or reconsider aspects of the underlying problem. The Commission will assess any proposed rule against the National Electricity Objective (NEO) before reaching a draft determination.

15 This consultation paper includes detailed consideration of the reform proposals in AEMO's rule change request that can be divided into two main categories:

- **A registration framework for large IBLs**: Chapter 3 of this paper discusses the benefits of requiring registration of data centres compared to the status quo. It considers how the current

framework could be adapted to provide for mandatory registration and describes how registration would provide a mechanism for:

- requiring information through the projected assessment of system adequacy (PASA) framework, and
- providing greater clarity regarding the application of AEMO's directions and instructions framework.

- **Additional access standards for large IBLs:** Chapter 4 of this paper considers new requirements for communications, telemetry, remote monitoring and control, and management of the rate of change of active power. These would build on the framework established through *Improving the NEM access standards – Package 2 final rule*, and are intended to improve real-time operational visibility and provide capabilities to manage rapid and material changes in large IBL demand.

16 As noted above, we have worked with AEMO to provide more detailed policy designs. We are interested in your feedback on whether these reforms would respond directly to the issues identified above by:

- providing more consistent real-time and forward-looking visibility of large IBLs
- improving the ability to manage rapid changes in demand
- establishing a clearer and more consistent NEM-wide framework as these loads grow in scale and number.

The Commission is seeking stakeholder feedback on an approach to new registration requirements for large IBLs

17 Chapter 2 of the National Electricity Rules (NER) sets out the framework for registrations in the NEM. It distinguishes between the Registered Participant, which is the legal entity responsible for relevant rights and obligations under the NER, and the classification of individual units or assets, which supports the application of requirements associated with how those assets participate in the NEM.

18 Large IBLs already sit within the registration framework, for example operating as non-scheduled or scheduled loads and (typically) with a retailer who acts as the Registered Participant. However, large IBL are not currently recognised as a specific classification or asset class.

19 Therefore, it can be difficult to apply requirements directly and consistently to these assets. AEMO's rule change request therefore proposes registration as a means of establishing a regulatory pathway through which specific requirements can be set out for large IBLs to address specific issues raised in the rule change request. As noted, this is consistent with the Commission's earlier advice to ECMC and Minister Bowen's request for the Commission to consider mandatory registration of data centres through this rule change.

We are seeking stakeholder feedback on the objectives of registering large IBL

20 We are seeking stakeholder views on benefits of new and explicit registration requirements specifically for large IBLs, as well as objectives for any new registration requirements:

- **provide an explicit regulatory hook in the NER** through which relevant obligations and rights can be applied to large IBL in a targeted and consistent manner
- **establish information provision requirements that support operational visibility and planning**, including requirements such as through Projected Assessment of System Adequacy (PASA) information that can be applied directly through registration

- **provide greater regulatory clarity and certainty** about how large IBLs participate in and interact with the NEM framework, including which facilities are subject to various rights and obligations (such as directions and compensation)
- **provide a foundation for future reforms** by establishing a defined class of large IBL to which additional requirements or rights could be applied in future, rather than requiring bespoke regulatory approaches to be developed in future reforms
- **support proportionate and flexible regulation** by allowing targeted requirements to be placed on large IBL, while avoiding unnecessary duplication, avoiding unnecessary impacts on other assets and participants, and recognising differences in facility types, configurations and operating arrangements
- **provide an enduring framework** that can accommodate evolving large IBL technologies and operating models as their role in the NEM develops
- **support timely implementation of reforms** by having regard to the scale and pace at which large IBLs are connecting to the NEM and implementation considerations.

We are seeking feedback on adapting the registration framework rather than introducing a permanent Registered Participant category

21 In line with the above objectives, we consider it would be preferable to adapt the existing registration framework to accommodate large IBL. While changes will be required to explicitly incorporate large IBL, we do not intend to make broader structural or permanent changes to the registration framework where these are not necessary and could affect other participants and assets in the NEM.

22 This means we are not in favour of introducing a permanent new Registered Participant category for large IBLs that would sit alongside the other Registered Participant categories of Customer, Generator or Integrated Resource Provider. Creating new technology-based participant categories would run counter to the philosophy of the registration framework that is based on the services provided. In addition, we do not think this is necessary to achieve the objective of explicitly recognising large IBL in the registration framework. This is because we consider that there are other approaches that would be more consistent with the existing framework. We are seeking feedback on these approaches which are described below.

We are interested in views on whether participation as a Voluntarily Scheduled Resource (VSR) supports the long-term operational integration and visibility of large IBL

23 The Commission recognises that active participation in central dispatch could provide a higher level of operational integration by incorporating the intended behaviour of large IBLs into the dispatch process. However, the Commission's preliminary view is that the existing participation pathways are not necessarily suitable for all large IBLs and that scheduled participation should not be mandated at this time. The diversity of large IBL operating models, including data centres providing critical or less flexible computing services, means that mandatory scheduling could impose material costs or constrain operating models.

24 Over time, the Commission considers that the Voluntarily Scheduled Resource (VSR) framework, which is yet to commence, could provide a stronger pathway for integrating large IBLs into the NEM. This is consistent with the Commission's earlier data centre advice to ECMC, which recognised the potential for the VSR framework to support the participation of large flexible loads. The VSR framework has been designed to support flexible participation by unscheduled, price-responsive resources and could therefore provide a better fit for the diversity of large IBL operating models than existing participation pathways.

25 Requiring large IBL to be classified as a VSR could achieve the objective of improving operational integration and visibility and would provide for additional benefits through enabling greater levels of market participation by large IBLs. Building towards VSR participation would also preserve the technology-neutral and service-based philosophy underpinning that framework.

26 Therefore, we are considering whether it would be appropriate to require large IBL to participate as a VSR at a minimum, or alternatively as a scheduled load. Operation as a VSR could effectively be a minimum requirement due to the voluntary market participation design of the VSR framework, however operation as a scheduled load should also be allowed if desired.

27 The Commission is currently considering a rule change request from AEMO seeking to delay full implementation of the IPRR framework to no later than 30 November 2029. The Commission is therefore seeking stakeholder views on whether, following implementation of the VSR framework, it would be appropriate for large IBLs to participate as VSRs. The policy objective is that operation as a VSR could effectively be a minimum requirement due to the voluntary and flexible design of the VSR framework, however operation as a scheduled load should also be allowed, if desired, by large IBL.

A new unit classification may be needed to integrate large IBLs as a VSR or scheduled load and apply targeted regulations

28 As discussed above, requiring participation as a VSR or, on a voluntary basis, as a scheduled load could support the operational integration and visibility of large IBL. While this approach is attractive because it leverages the existing registration framework, it may still require amendments to the registration framework as large IBL are not currently recognised as a distinct asset class.

29 Therefore, we are considering options to recognise large IBLs in the registration framework to support the objectives of registration. In addition to enabling the participation of large IBL as a VSR or scheduled load, we consider that it is also important for large IBL to be explicitly recognised within the registration framework to support future reforms applying targeted regulations on large IBL.

30 We have designed an initial approach for consultation that would introduce a new unit classification for large IBL. We consider that this approach would preserve the broader structure of the existing registration framework, and would not impact other existing registered participant categories or unit classifications. A large IBL could retain its existing unit classification and Registered Participant arrangements, while also being identified as a large IBL for the purposes of targeted obligations.

As the VSR framework has not been implemented yet, we are seeking feedback on options for interim approaches

31 As noted earlier, the Commission is currently considering a rule change request from AEMO seeking to delay full implementation of the IPRR framework to no later than 30 November 2029. This means that a requirement for large IBLs to register as a VSR may not be operational until 30 November 2029. Given the urgency of the issues raised by AEMO around the need to ensure visibility and the provision of a regulatory hook for other reforms, we consider that an interim registration approach will be needed.

32 We have considered two options for the interim requirements:

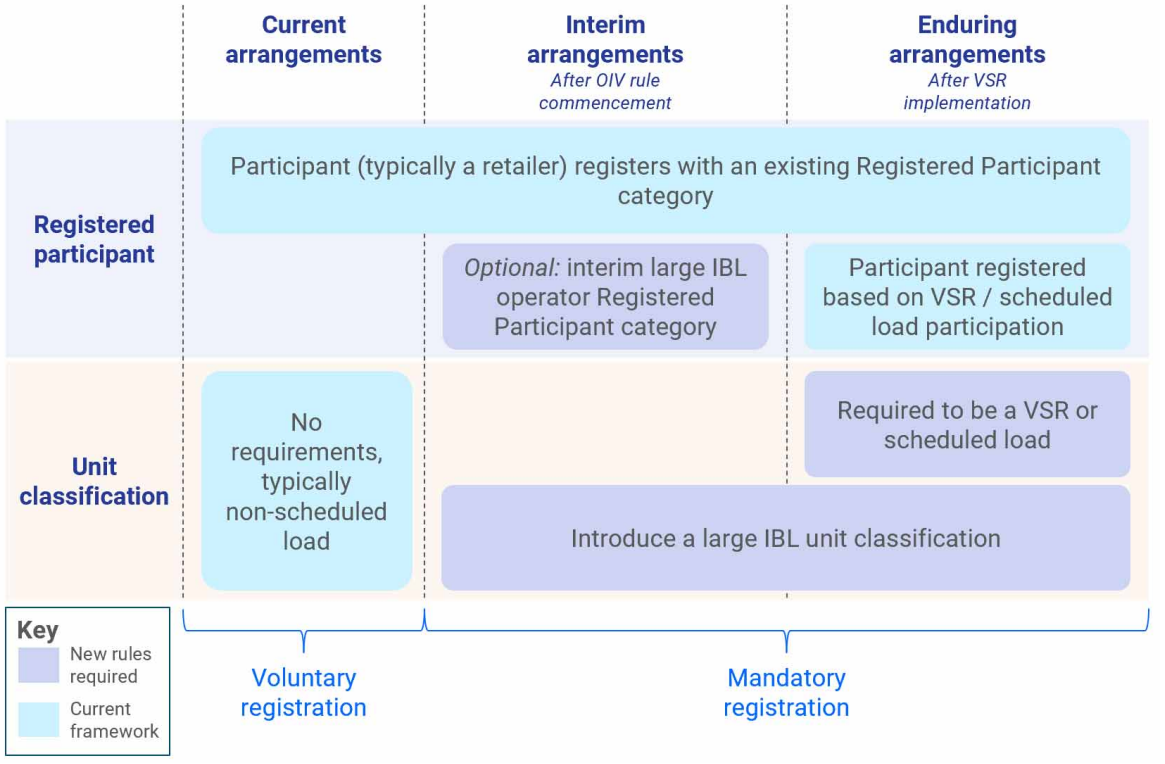
1. **Rely on the unit classification to attach obligations** to large IBL. Under this option, there would be no requirement for the large IBL operators to register under a Registered Participant

category, however the large IBL unit classification would be still connected to a Registered Participant (most likely its retailer). This option would enable obligations for information provision or directions to be applied to large IBL via the unit classification. However, should AEMO want to issue a direction to the large IBL, it would need to do this via Registered Participant (likely the retailer) because directions need to be issued to the Registered Participant. This may not be optimal from an operations perspective.

2. **Interim Registered Participant category:** We are considering an alternative approach for an interim Registered Participant category for large IBL operators. This could be designed for the purpose of allowing directions to be applied directly to the large IBL operator. This interim Registered Participant category could work in parallel to the large IBL unit classification and place specific obligations on the large IBL operator (such as directions), while retaining other regulations and requirements with the main Registered Participant (typically a retailer), such as prudential and settlement requirements. It would likely only be required prior to the implementation of the VSR framework, meaning that it could sunset once the IPRR framework has commenced with sufficient time to allow for a transition to the enduring framework.

33 The diagram below illustrates the current, interim and enduring arrangements under the registration pathway we are considering.

Figure 2: Initial approach for registration of large IBL



34 We are seeking stakeholder feedback on the new registration approach we are considering to recognise and register large IBL. We are interested in views on potential benefits and costs with options, in particular for the interim Registered Participant category which may only be in place for a short period prior to the implementation of VSRs.

35 Additionally, we are seeking input on which assets should be subject to registration requirements and consequential obligations, including whether the:

- 30 MW threshold for large IBL introduced in the *Improving the NEM access standards – Package 2* final rule provides an appropriate basis for registration or whether a different threshold may be more appropriate in the context of registration (as opposed to applying technical standards).
- the registration requirement and any associated obligations should apply to existing large IBL as well as new large IBL that are yet to connect. We are considering applying the registration requirement to existing large IBLs, given that the material contribution of existing data centres to NEM demand, currently 3 per cent. Extending the registration framework to existing large IBLs could provide greater visibility of these loads and support their more effective integration into the NEM, potentially delivering more efficient outcomes in the long term interests of consumers.

36 Applying a different threshold or new requirements to existing large IBLs would likely impose additional costs, which would need to be weighed against the expected benefits. For example, if the requirements were instead limited to new large IBLs, we would also need to consider appropriate transitional arrangements, including how to determine which projects are captured by the new arrangements. We are seeking stakeholder views on the appropriate approach.

We are consulting on additional operational requirements that build on the Access Standards Package 2 final rule

37 We have developed an initial design for new access standards for large IBLs to improve real-time operational visibility and support the management of rapid and material changes in active power demand. While AEMO's rule change request suggested access standards could be a mechanism to provide further operational visibility, the rule change request did not set out what such standards could look like. Therefore, we have developed the initial design for consultation with stakeholders.

38 The access standards in Chapter 5 of the NER establish technical performance requirements for connecting plant and provide an existing framework through which the capabilities of large IBLs can be considered as part of the connection process. The existing connection process could continue to allow NSPs to negotiate project-specific requirements where necessary. However, AEMO's request identifies greater consistency across large IBL connections as an important objective of the reform. Reliance on project-specific arrangements alone could result in similar facilities being subject to different requirements across networks. We consider that the access standards framework provides an appropriate starting point for consultation because it can establish a consistent NEM-wide baseline while retaining flexibility through the negotiated access standard process to reflect the circumstances and power system impacts of individual connections.

39 As starting points for consultation, we are considering new access standards relating to[2]:

- **Communications, telemetry and remote monitoring and control,** such as requirements that would provide AEMO and NSPs with more consistent real-time visibility of large IBL operation. The initial approach would build on communication and monitoring concepts that already apply to generation plant and adapt them for large IBLs.

2 The Commission notes that any load shedding obligations would take precedence over the proposed standards for communication and remote monitoring, and active power management.

- **Active power management** through limits on the rate of change of active power to manage rapid and material changes in large IBL demand. The framework we are testing with stakeholders, is intended to establish an appropriate baseline while retaining scope for a large IBL to negotiate different performance where appropriate monitoring, visibility and control capabilities can demonstrate that this can be accommodated without adversely affecting power system security.

40 We are interested in stakeholder views on the merits or not of introducing new standards, and if they are to be introduced, what form they should take.

Communications, telemetry and remote monitoring and control

41 As a starting point, the Commission is consulting on:

- **Minimum access standard focused on real-time visibility:** large IBLs would provide real-time SCADA/telemetry to AEMO, including active power and, for transmission-connected facilities, reactive power. The minimum standard would provide information from the large IBL to AEMO, but would not require the facility to receive information or remote-control signals from AEMO. It would also require an operational telephone facility and backup electricity supply for remote monitoring and control equipment for at least one hour following a total loss of supply at the connection point.
- **Automatic access standard providing more comprehensive visibility and control:** large IBLs would have equipment capable of transmitting information to, and receiving information from, AEMO's control centres in real time. The information available could include connection-point voltage and frequency, circuit-breaker status, transformer tap positions and voltages, and relevant plant operating status. The proposed standard would also provide remote-control capabilities over voltage-control settings where applicable, active-power limits and ramp limits. Two operational telephone facilities and backup supply for monitoring and control equipment for at least three hours would also be required.
- **Negotiated access standard between the minimum and automatic standards:** where the automatic standard cannot be met or is not appropriate for a particular connection, the connecting party and NSP could negotiate a performance standard between the minimum and automatic levels, with AEMO providing advice on relevant matters. This could allow requirements to reflect the characteristics and system impacts of an individual connection while preserving a consistent minimum level of operational visibility.

42 The *Improving the NEM access standards package 2* final rule established monitoring requirements for large IBLs that provide a foundation for sharing operational information. The access standards set out in this consultation paper would build on this foundation and establish a consistent framework for the ongoing communication of operational information and, at higher performance levels, remote-control capabilities.

Management of rate of change of active power

43 As a starting point, the Commission is consulting on:

- a minimum rate of change of active power limit of ±40 MW/min for the mainland NEM and ±10 MW/min for Tasmania
- a negotiated access standard that could allow a large IBL to ramp faster where the connecting party can demonstrate that the proposed rate can be accommodated without adversely affecting power system security.

44 These values have been proposed to broadly align with a number of international approaches. At

this stage, we are considering an automatic access standard. The Commission has considered approaches adopted in international jurisdictions but has not identified a clear basis for establishing a range between a minimum and automatic standard. Instead, the proposed framework considers a minimum baseline and allows faster rates to be negotiated where appropriate. The Commission has also engaged with AEMO staff in ascertaining a specific limit as a starting point for consultation.

45 The Commission notes that determining an appropriate maximum ramping limit will require further consideration of both local and system-wide impacts. At an individual connection, rapid demand changes can affect local voltage conditions and power quality. At a power system level, large changes in demand can affect frequency, particularly where multiple large IBLs ramp in the same direction at or around the same time. Different forms of demand variability may also require different responses. Large movements in demand over minutes can create different power system impacts from second or sub-second variations or repetitive changes associated with computing workloads. A single MW/min ramp-rate requirement may therefore not address every form of active power variability.

46 Any appropriate standard will also need to balance power system security with the capabilities and costs of large IBLs. The Commission is aware that technologies and operational practices are emerging that can shape the demand profile presented to the grid, including workload management, power capping, rack-level controls and energy storage. These may support controlled ramp-up and ramp-down and smooth shorter-duration variability, but their availability, maturity, energy use and cost can differ.

We consider that there are four assessment criteria that are most relevant to this rule change request

47 Considering the NEO[3] and the issues raised in the rule change request, the Commission proposes to assess the rule change request against four assessment criteria.

48 Please provide feedback on our proposal to assess the request against:

- **Safety, security and reliability:** whether potential reforms support the safe, secure and reliable operation of the power system at least cost to consumers over the long term.
- **Principles of market efficiency:** whether potential reforms improve information transparency and support efficient operational, planning and investment decisions while preserving efficient commercial arrangements and opportunities for market participation.
- **Implementation considerations:** whether potential reforms can be implemented practically and in a timely and proportionate way, having regard to their costs, complexity and interactions with related reforms.
- **Principles of good regulatory practice:** whether potential reforms support a clear, proportionate, predictable and consistent regulatory framework that can accommodate different large IBL configurations and uncertainty in the scale and pace of future impacts.

Submissions are due by 17 December 2026 with other engagement opportunities to follow

49 There are multiple options to provide your feedback throughout the rule change process.

50 Written submissions responding to this consultation paper must be lodged with Commission by

3 Section 7 of the NEL

17 December 2026 via the Commission's website, www.aemc.gov.au.

51 There are other opportunities for you to engage with us, such as one-on-one discussions or industry briefing sessions. We have an information session planned for **1 pm to 3 pm (AEDT) on Friday 27 November** to discuss the AEMC's data centre work program, including this rule change proposal. The session will involve presentations on five complementary rule changes regarding data centres in the National Electricity Market. Please see our events calendar on our website to register. See also, the section of this paper about "How to engage with us" for further instructions and contact details for the project leader.

Full list of consultation questions

Box 1: What are your views on the issues and options presented in this consultation paper?

We are seeking stakeholder views and feedback on the matters discussed in this consultation paper, including:

1. What are your views on the identified visibility and operational integration issues for large IBL?
2. What are the benefits of, and key objectives for, new and explicit registration requirements for large IBL?
3. Should large IBL operate as VSRs or scheduled loads in future?
4. How should large IBL be recognised in the NER? What are your views on a new large IBL unit classification and/or an interim Registered Participant category?
5. Which large IBL should be subject to registration requirements?
6. What information requirements would provide AEMO with improved operational visibility of large IBL?
7. Should back-up generation for large IBL be exempted from registration under the NER?
8. What communications, telemetry and remote-control requirements are appropriate for large IBL?
9. How should rate of change of active power from large IBL be managed?
10. What are key implementation considerations, including timeframes, changes and costs for parties, and implementation pathways?
11. What assessment criteria should the Commission consider for this rule change process?

More detailed questions for stakeholders are included throughout the consultation paper.

How to make a submission

We encourage you to make a submission

Stakeholders can help shape the solutions by participating in the rule change process. Engaging with stakeholders helps us understand the potential impacts of our decisions and, in so doing, contributes to well-informed, high quality rule changes.

We have included questions in each chapter to guide feedback, and the full list of questions is above. However, you are welcome to provide feedback on any additional matters that may assist the Commission in making its decision.

How to make a written submission

Due date: Written submissions responding to this consultation paper must be lodged with Commission by 17 December 2026.

How to make a submission: Go to the Commission's website, www.aemc.gov.au, find the "lodge a submission" function under the "Contact Us" tab, and select the project reference code **ERC0455**.[4]

You may, but are not required to, use the stakeholder submission form published with this consultation paper. Tips for making submissions are available on our website.[5]

Publication: The Commission publishes submissions on its website. However, we will not publish parts of a submission that we agree are confidential, or that we consider inappropriate (for example offensive, defamatory, vexatious or irrelevant content, or content that is likely to infringe intellectual property rights).[6]

Other opportunities for engagement

The AEMC is hosting an online information session on the Commission's current data centre work program on Friday 27 November 2026, from 1:00pm to 3:00pm (AEDT).

The session will provide attendees with an overview of the policy issues currently under consideration across the following rule change processes within the work program:

- A summary of the final determination of Improving the NEM access standards package 2 (ERC0394)
- Operational visibility and integration (ERC0455)
- Cost recovery for network augmentations (ERC0448 and ERC0456)
- Data centre contracting obligation for firmed energy (ERC0461)
- Connections framework enhancements for integrated facilities, co-located plant and flexible loads (ERC0462)

There are also other opportunities for you to engage with us, such as one-on-one discussions or industry briefing sessions.

For more information, you can contact us

Please contact us with questions or feedback at any stage, noting the project code.

Email:	aemc@aemc.gov.au
Telephone:	(02) 8296 7800

4 If you are not able to lodge a submission online, please contact us and we will provide instructions for alternative methods to lodge the submission.
5 See: https://www.aemc.gov.au/our-work/changing-energy-rules-unique-process/making-rule-change-request/submission-tips
6 Further information is available here: https://www.aemc.gov.au/contact-us/lodge-submission

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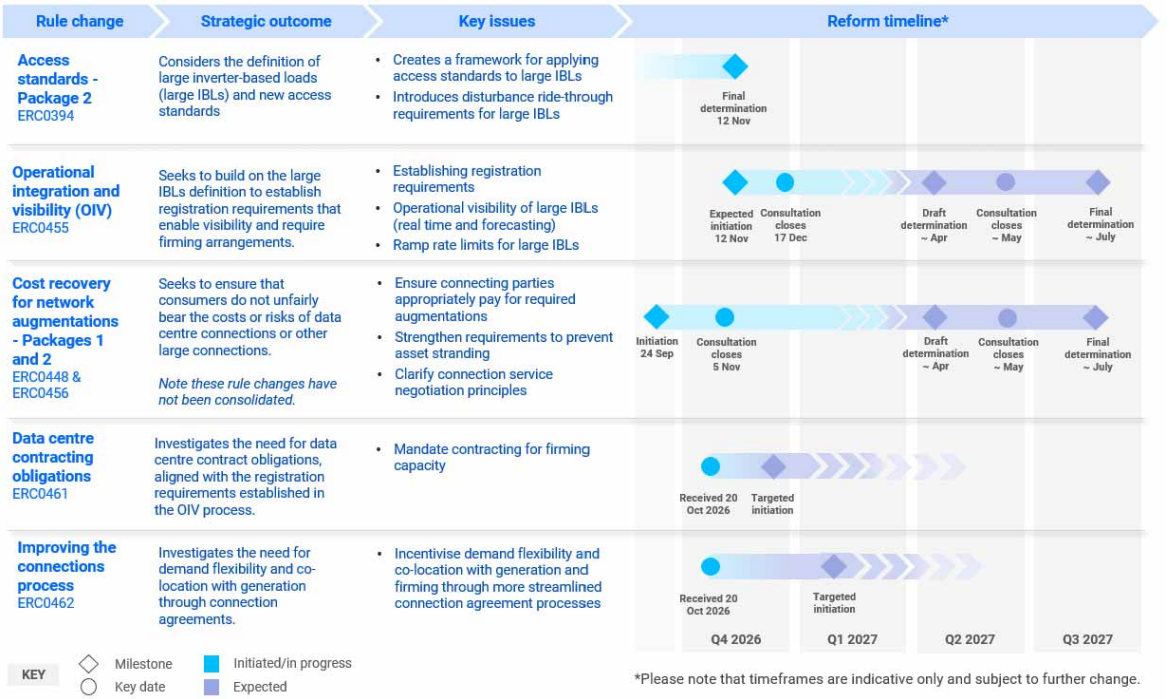
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1 The context for this rule change request

This consultation paper is seeking stakeholder feedback on the rule change request submitted by the Australian Energy Market Operator (AEMO, the proponent), which aims to improve both operational and long-term visibility of large inverter-based loads (IBLs), including data centres, as they connect into the NEM. AEMO suggests that the improved transparency would better support improved market efficiency and system security outcomes. As part of this request, AEMO proposes that improved visibility could be established through formal registration requirements for large IBLs.

The AEMC is progressing this rule change as part of a suite of parallel reforms addressing a range of issues introduced by a growth in large IBL connections, such as data centres, as set out in the diagram below. We are undertaking this work program as a priority, reflecting the pace and scale of growth in large loads. We also want to put in place arrangements proactively to avoid perverse outcomes on the power system.

Figure 1.1: AEMC data centre work program



Our work program follows us providing targeted advice to Energy Ministers in July 2026 on regulatory pathways to require data centres to fully offset their demand by investing in renewable generation and firming, and by providing demand flexibility. This advice was adopted by Energy Ministers, with the exception of Queensland and the Northern Territory.[7]

7 AEMC, advice on data centre regulatory pathways - Detailed Policy assessment, July 2026

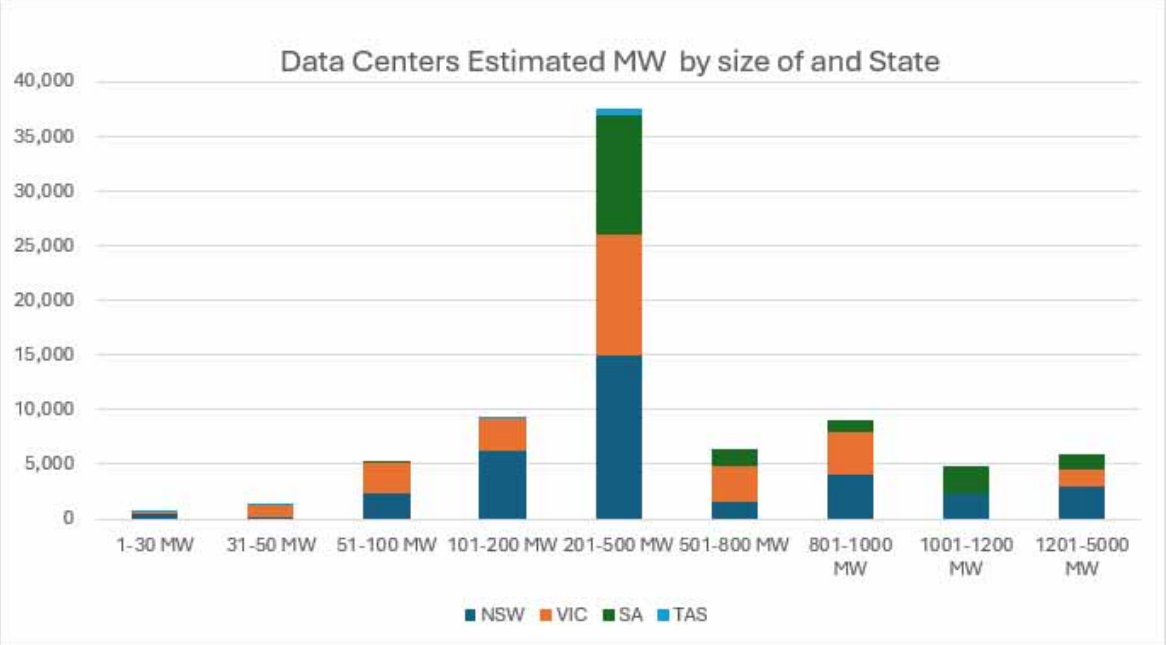
1.1 AEMO seeks improvements in the visibility of large inverter based loads

The rule change request, submitted on 21 July 2026, responds to the rapid growth of large IBLs, including data centres, hydrogen electrolysers and other power electronic driven facilities. It raises concerns that the National Electricity Rules (NER) do not currently provide AEMO and network service providers (NSPs) with consistent operational visibility of large IBL behaviour, nor a clear framework for managing significant and rapid changes in demand.

This request comes at a time of significant growth in large IBL demand in the form of data centres. AEMO projects data centre electricity consumption to increase over the next decade from about 5 TWh currently to around 34 TWh, increasing their share of operational demand from around 3 per cent to approximately 13 per cent.[8]

The connection pipeline for large IBL is already substantial. In Q3 2026, 22 data centres totalling 10.1 GW of maximum load capacity were progressing through the transmission network connection process.[9]

Figure 1.2: Data centre connection queue



Source: AEMO, 2026.

The Commission recognises that data centre growth can deliver economic benefits, including in investment, innovation and Australia's digital sovereignty.[10] With appropriate technical capabilities, operational visibility and flexibility, large loads can also support power system security and operation.[11]

The NEM has successfully accommodated inverter based generation, large loads and periods of significant demand growth in the past. However, the speed, scale and concentration of new large

8 AEMO, 2026 Electricity Statement of Opportunities for the National Electricity Market, p.6.
9 AEMO, Q3 2026 Quarterly Energy Dynamics report, pp.42-43.
10 See Department of Industry, Science and Resources, National AI Plan, 2 December 2025.
11 AEMO, rule change request, p.5.

IBL present a distinct challenge. While traditional demand growth has been relatively gradual and dispersed, data centres differ as a single facility or precinct can add hundreds of megawatts of new load at one location.

Large IBL can also behave differently from existing industrial loads. Demands from facilities such as mines, processing plants, water treatment facilities and manufacturing hubs are generally constrained by slower physical processes resulting in predictable and gradual changes in active power consumption. In contrast, large IBL demand can change rapidly as underlying workloads start, stop or shift and power-electronic interfaces enable large, coordinated demand changes within seconds or even sub-seconds. This creates new challenges for power system operation.

In addition to their operational impacts, large IBL can scale in capacity rapidly over time. Significant expansions in connected load requirements may occur over relatively short periods, potentially creating uncertainty about the timing, location and magnitude of future electricity demand. This uncertainty can make it more difficult for effective operational planning and investment decisions. Without adequate forecasting and appropriate regulation, large IBL have the potential to introduce additional challenges for generation dispatch, frequency regulation, voltage control as well as broader system planning.

Changes in this space are occurring quickly. The transition towards inverter-based technologies is converging with broader electrification across transport, industry and households. The growing scale, diversity and pace of inverter-based demand makes it increasingly important to address visibility gaps before they materially affect forecasting, planning and power system operation.

AEMO's rule change request seeks proportionate, flexible and technology-neutral arrangements focused on four broad outcomes:

- **streamlined market integration:** including more consistent monitoring and communication requirements and arrangements for back-up generation
- **efficient investment and asset utilisation:** supported by improved information about demand characteristics, significant demand changes and the expected ramp-up of large IBL facilities
- **near real-time demand management:** including consideration of requirements to manage rapid changes in electricity consumption where they could adversely affect network or wholesale market operation or power system security
- **improved management of power system events:** supported by operational communication arrangements and the ability to respond to instructions or directions where necessary to maintain power system security and reliability.

AEMO identifies several potential regulatory pathways through which these outcomes could be achieved. These include a potential new registration requirement for large IBL, new or amended access standards, obligations on NSPs or large IBL, and supporting guidelines and procedures. AEMO does not present these pathways as mutually exclusive and envisages that the appropriate combination of measures would be considered, and developed, through the rule change process.

1.2 This consultation paper takes a more directional approach to enable timely reform

The Commission is taking a more directional approach to this consultation paper than is typical at the commencement of a rule change process. Rather than presenting AEMO's request and seeking open-ended views on the problem and possible solutions, we have built on our data centre

advice to Energy Ministers with additional analysis and engagement to develop preliminary views on the issues raised by the request and potential solutions.[12] We are sharing our initial thoughts and ideas in this consultation paper so stakeholders can test them, ask questions and provide us with evidence on the appropriate solutions or alternatives for us to consider ahead of developing our draft determination.

The Commission considers that setting out preliminary thoughts at this stage should support more focused stakeholder submissions and allow the benefits, costs and implementation implications of concrete options to be tested earlier in the process. The intended outcome is to support timely development of the reform. On 10 September 2026, we received a letter from the Honourable Chris Bowen MP, the Federal Minister for Climate Change and Energy, requesting that we consider mandatory registration requirements for data centres as part of this rule change, as well as progressing this request as a priority. We consider this more directional approach in the consultation paper will help us progress this rule change request in a timely manner.

Importantly, we emphasise that these preliminary views are not settled Commission positions and should not be considered as such. They represent our current working hypotheses about the nature of the issues and the regulatory approaches that may best address them. The purpose of this consultation is to test both. Stakeholder evidence and views will likely lead the Commission to refine the proposed approaches, pursue different approaches, conclude that particular measures are unnecessary, or reconsider aspects of its understanding of the underlying problem. The Commission will assess any proposed rule against the National Electricity Objective (NEO) before reaching a draft determination.

This, consultation paper includes detailed consideration of the following issues:

- a registration pathway for large IBL
- potential new access standards to respond to the issues raised in the rule change request that are related to operational communications, monitoring and the rate of change of active power.

We also note that there have been a range of other reforms relating to large IBL that have progressed since the rule change was lodged:

- The *Improving the NEM access standards - Package 2* final determination and rule, published alongside this consultation paper, establishes a clearer technical framework for large IBLs, including defining a large IBL as an IBL with a combined nameplate rating of 30 MW or more and automatically applying the Schedule 5.3 access standards to large IBLs. It also introduces new disturbance ride-through and instability monitoring requirements and requires consideration of the potential aggregate impact of IBL connections.
- The AEMC's data centre advice to the Energy and Climate Change Ministerial Council (ECMC), provided on 28 July 2026, recommended a package of reforms to support the integration of data centres into the NEM to support government objectives relating to renewable generation, firming, demand flexibility and the geographic location of data centres. This included recommending registration requirements for data centres to improve visibility, enable voluntary market participation and provide a regulatory mechanism for related obligations.
- The *Improving cost recovery arrangements in the National Electricity Market* rule change request, initiated for consultation on 24 September 2026, is considering whether existing arrangements appropriately allocate the network costs and risks associated with large new connections, including data centres, and whether changes are needed to reduce the risk that these costs are borne by existing consumers

12 AEMC, Advice on data centre regulatory pathways - Detailed Policy assessment, July 2026.

The Commission intends to build on the above work and decisions throughout this rule change request. Particularly relevant to considering registration pathways for large IBL is the regulatory foundations established through the *Improving the NEM access standards Package 2* final rule. The final rule defines a large IBL as an IBL with a combined nameplate rating of 30 MW or more, which provides a clear and consistent threshold for determining automatic application of the Schedule 5.3 access standards to large IBL, which are more likely to materially impact the power system. This provides a useful starting point for considering the registration framework discussed in Chapter 3. We recognise that establishing a threshold for the physical impacts of large IBL on the power system may have different considerations to establishing a threshold for visibility and operational integration. We will consider these matters further through this rule change request, as discussed later in this consultation paper.

Box 2: The Commission published the *Improving the NEM access standards Package 2* final determination and final rule alongside this consultation paper on 12 November 2026

The final rule establishes a clearer and more comprehensive technical framework for large IBL connecting to the NEM. In particular, the final rule:

- defines a large IBL as an inverter-based load with a combined nameplate rating of 30 MW or more
- applies the Schedule 5.3 access standards automatically to large IBLs, providing a consistent framework for their application
- harmonises the treatment of large IBLs across transmission and distribution networks
- requires NSPs to consider the potential aggregate impact of IBL connections where their electrical configuration, proposed connection arrangements and intended operation indicate that they should reasonably be assessed together
- introduces new technical requirements for large IBLs, including disturbance ride-through and instability monitoring access standards.

These reforms provide the foundation for the additional access standards considered in chapter 4 of this consultation paper. In particular, the large IBL definition and 30 MW threshold provide a starting point for determining which loads would be subject to the proposed requirements for real-time communications and monitoring and the rate of change of active power.

1.3 There is a wide range of related reform work underway

This rule change request follows the AEMC's advice to Energy Ministers earlier this year on data centres. There is a range of work underway on the integration of large IBL, such as data centres, across market bodies and jurisdictions. The AEMC is closely working with these other parties and seeking to coordinate our work as much as possible.

The Commission aims to ensure that any reform that is established through this rule change process forms a nationally consistent baseline for the integration and visibility of large IBL into the NEM. In doing so, we will have regard to related reforms and seek to avoid unnecessary duplication or inconsistency.

The following sub-sections set out related reform work underway through AEMO and various jurisdictions.

1.3.1 AEMC advice to the ECMC on data centres is intended to work together

The Commission's advice to ECMC was informed by stakeholder engagement and guided by the NEO, with a focus on promoting the long-term interests of electricity consumers across price, quality, safety, reliability, security and emissions reduction. The advice recommended four complementary measures to support the efficient integration of growing data centre demand:

- **Renewable investment:** require data centres to offset consumption using certificates linked to new renewable generation through the Renewable Electricity Guarantee of Origin (REGO) scheme.
- **Firming:** require data centres to contract for firming capacity, broadly aligned with the Retailer Reliability Obligation.
- **Registration:** require data centres to register with AEMO to improve visibility, enable voluntary market participation and provide a basis for applying other obligations.
- **Flexibility and co-location:** support flexible demand and co-location with generation and firming through more streamlined connection arrangements.

The recommendations are intended to work together as a cost-effective package that minimises unintended consequences, with further work required to refine the measures ahead of implementation. The advice focused primarily on reforms that could be implemented through the NEL and NER, while recognising an important role for complementary jurisdictional measures. It did not examine jurisdictional planning, environmental approvals or other state and territory policy measures in detail.

1.3.2 AEMO is developing a broader framework for visibility of price-responsive resources

AEMO is currently developing its Market Visibility Framework (MVF) following recommendations from the NEM Wholesale Market Settings Review.[13] The MVF is considering a mandatory framework for improving the visibility of price-responsive resources, including consumer energy resources, aggregated storage and large flexible loads. AEMO established a stakeholder advisory group in May 2026 to support the framework's design and intends to provide recommendations to Energy Ministers in December 2026.

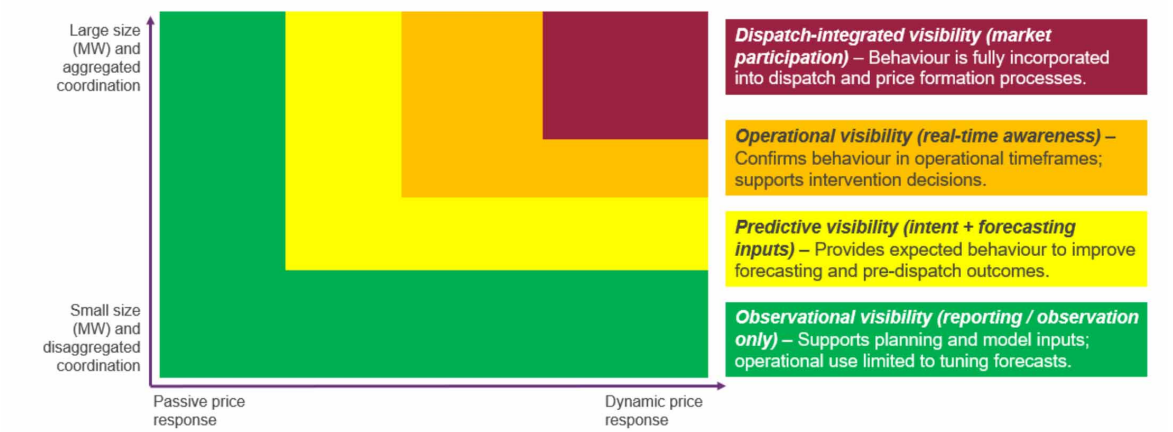
AEMO's consultation paper on this reform proposes a continuum of four visibility and participation modes that could be used for price-responsive resources. These modes represent tools available to AEMO, rather than a mandatory sequence. The appropriate mode would depend primarily on resource size and the level of coordination, with data requirements tailored to the characteristics of each resource. The four proposed modes are:[14]

- **observational visibility:** using existing and historical information to improve understanding and forecasting of price-responsive behaviour
- **predictive visibility:** providing forward-looking information for coordinated and material resources
- **operational visibility:** providing near-real-time information where resources are sufficiently large, flexible or operationally significant
- **dispatch-integrated visibility:** where visibility alone may no longer be sufficient and participation through scheduling, dispatch or registration mechanisms may be required.

13 AEMO, A market visibility framework for price responsive resources, *Consultation paper on draft policy framework,* September 2026.

14 AEMO, A market visibility framework for price responsive resources, consultation paper on draft policy framework, pp.6-7.

Figure 1.3: MVF proposed visibility and participation modes



Source: AEMO, 2026. Market visibility framework consultation paper on draft framework. p.7.

We recognise there is a strong interaction between the proposed MVF and this rule change. For example, this rule change request is exploring requirements for large IBL on telemetry, communications, advance notice of significant demand shift and other operational information. AEMO considers that, if made, these requirements could provide the main pathway for large IBL under operational visibility mode 3, reducing the need for separate or overlapping MVF obligations.[15]

If this were the case, then AEMO considers that the MVF could build on information provided through this rule change process for market and operational purposes and address any residual visibility gaps for other large or price-responsive loads.

Consistent with this approach, AEMO proposes to assess whether this rule change process and other reforms sufficiently address operational visibility needs before introducing additional mode 3 obligations.[16] The Commission will therefore consider the development of the MVF through this rule change to support complementary arrangements and avoid unnecessary duplication.

1.3.3 Commonwealth reforms are considering the broader roles and responsibilities of market bodies and networks

Several Commonwealth reforms are progressing alongside this rule change. These reforms are relevant in two areas: the roles of market bodies and networks in managing operational information, and the broader policy framework for data centres.

Future roles of AEMO and networks

The Consumer Energy Resources Taskforce is progressing work on how the roles and responsibilities of market bodies and networks may need to evolve as the power system becomes more decentralised.[17] This includes consideration of distribution system operator functions and how operational information should flow between different parties.

This work is relevant to this rule change process because improving visibility of large IBLs requires clarity about who receives, processes and shares information, as well as what information large

15 AEMO, A market visibility framework for price responsive resources, consultation paper on draft policy framework, p.8.
16 AEMO, A market visibility framework for price responsive resources, consultation paper on draft policy framework, p.23.
17 Consumer Energy Resources Taskforce, Redefining roles for market and power systems operations (M3/P5) final report.

IBLs must provide. While the broader reform is not specific to large IBLs, it may inform the respective roles of AEMO and DNSPs.

The Commission will therefore have regard to the development of this work, when designing information-sharing and operational arrangements for large IBLs.

National policy framework for data centres

The Commission also notes the Australian Government through the National Artificial Intelligence (AI) plan is developing a broader policy framework for data centres. The plan recognises building smart infrastructure as important to attracting investment and innovation in AI.[18]

The proposed standards for large data centres would establish minimum requirements across matters including energy and water use, costs, community engagement, location and workforce impacts. These initiatives reflect a broader policy focus on enabling data centre growth while ensuring that development is sustainable and its impacts are appropriately managed.[19]

These broader reforms may interact with this rule change where they relate to energy use and participation in the NEM. This rule change focuses specifically on how the NER should support the integration and operation of large IBLs, including through registration, information provision and operational visibility. The Commission will consider how these requirements can complement broader Commonwealth and jurisdictional measures without unnecessary duplication.

1.3.4 States and territories are also developing data centre frameworks

Through this rule change, the Commission is seeking to establish a nationally consistent baseline for matters directly relevant to the operation of the NEM, including the registration, operational visibility and technical performance of large IBLs. The Commission recognises that jurisdictions may wish to build on this, where additional requirements are needed to reflect their particular policy objectives and circumstances.

As such the Commission is working closely with jurisdictions as they develop a range of complementary measures responding to the growth of data centres.

NSW Reforming electricity network connection and cost recovery arrangements for data centres in NSW

The New South Wales Government has progressed reforms for large load connections through the Electricity Infrastructure Investment Amendment Act 2026, which received assent on 23 October 2026.[20]

The reforms support new access arrangements for large loads and broader changes to network connections, planning and cost recovery. A number of the proposals intersect with matters being considered through the OIV rule change, particularly:[21]

- Proposal 2, which would strengthen requirements for NSPs to collect and share information about prospective and existing data centre connections, including information on capacity, connection status and expected and observed ramping.
- Proposal 3, which would strengthen requirements for NSPs to develop and share load forecasts and transfer-capacity information, and undertake joint planning for data centres.

18 Australian Government, National AI plan, 2025.

19 Australian Government, Getting it right: Building AI infrastructure that works for Australia - Consultation paper, September 2026

20 *New South Wales, Electricity Infrastructure investment Amendment Act 2026.*

21 NSW Government, Reforming electricity network connection and cost recovery arrangements for data centres in NSW, pp.vi-vii.

- Proposal 4, which would require data centre connection agreements to specify demand and capacity profiles, including expected demand over time and arrangements where actual demand differs materially from those profiles.
- Proposal 10, which would require connection agreements to provide for data centres to reduce demand during periods of grid stress, including in response to signals from NSPs or AEMO.

These proposals have potential interactions with the matters being considered within this rule change.[22] This includes proposed requirements relating to registration, forecasting information, real-time communications and monitoring, and the management of the rate of change of active power for large IBLs. The Commission will therefore continue to collaborate with NSW as this rule change request progresses.

We consider that the two processes can complement each other in supporting the safe integration and operation of data centres into the energy system and, where possible, avoid unnecessary duplication of information, communications and technical requirements.

Victoria's Sustainable Data Centre Action Plan

Victoria published its *Sustainable Data Centre Action Plan* in September 2026. The plan coordinates policy across land use and planning, energy and grid readiness, water, transport, skills and investment, with the aim of supporting data centre growth while managing its infrastructure and community impacts..[23]

The energy and grid-readiness elements are most relevant to this rule change. The plan includes expectations relating to new energy supply, network connections and demand flexibility. These matters may interact with this rule change process where they affect how large IBLs connect to the grid, provide information and manage their demand. The Commission will consider these interactions to support consistency between the NER and Victorian arrangements and avoid unnecessary duplication

South Australia Data Centre Strategy

South Australia has published a *Data Centre Strategy* and is developing a new Data Centre and AI Infrastructure Act. The strategy identifies energy-related objectives including matching demand growth with new firmed supply, operational adjustments for network stability, increased transparency of energy use, technical standards for reliability and fair allocation of network costs.[24]

South Australia's focus on operational adjustments for grid stability and greater transparency of energy use overlaps with this rule change process on operational visibility, information provision and the management of significant demand changes by large IBLs. The Commission will consider these interactions to support consistency between national and South Australian arrangements and avoid unnecessary duplication.

Tasmanian Expectations for Data Centres and AI Infrastructure Developers

Tasmania released draft *Expectations for Data Centres and AI Infrastructure Developers* in September 2026, with consultation closing on 12 October 2026. The draft expectations include

22 Other elements of the NSW proposals are relevant to our current rule changes on *Cost recovery for network augmentation*. Further discussion of these interactions is set out in section 1.7 of the consultation paper for these rule changes.

23 Victorian Government, The sustainable data centre action plan.

24 Government of SA, Data centre strategy, 2026.

that new projects support additional renewable generation, meet their share of network and connection costs and operate in a way that protects energy security and grid stability.[25]

Tasmania's expectations primarily address broader development and energy-system outcomes, rather than detailed operational visibility requirements. However, the expectations relating to energy security and grid stability may interact with this rule change process where they influence how large IBLs operate or provide information to AEMO and networks. The Commission will consider any such interactions as the Tasmanian framework develops.

ACT Data Centre Framework

The ACT announced in August 2026 that it would develop an ACT Data Centre Framework covering the location, assessment, sustainability and infrastructure expectations applying to future developments. The ACT Government intends to release a draft framework in early 2027 and has indicated its support for national requirements for data centres to offset additional electricity demand through investment in new renewable generation.[26]

The ACT framework is primarily concerned with planning, sustainability and infrastructure requirements, while this rule change process focuses on the operational integration and visibility of large IBLs under the NER. The Commission will nevertheless monitor the framework as it develops, particularly where future requirements relate to electricity-system operation or information provision.

1.4 We have started the rule change process

This paper is the first stage of our consultation process. A standard rule change request includes the following formal stages:

- a proponent submits a rule change request
- the Commission commences the rule change process by publishing a consultation paper and seeking stakeholder feedback as mentioned earlier, this consultation paper takes a more directional approach than our standard processes
- stakeholders lodge submissions on the consultation paper and engage through other channels to make their views known to the AEMC project team
- the Commission publishes a draft determination and draft rule (if relevant)
- stakeholders lodge submissions on the draft determination and engage through other channels to make their views known to the AEMC project team
- the Commission publishes a final determination and final rule (if relevant).

Rather than seeking open-ended views on AEMO's request, we have built on our data centre advice to Energy Ministers, supported by further analysis and stakeholder engagement, to develop preliminary views on the issues and potential regulatory pathways. We are sharing these views now so that stakeholders can test our thinking and provide targeted evidence on the proposed approaches and alternatives before we develop the draft determination.

- Chapter 2 describes the issues raised in the rule change request
- Chapter 3 sets out considerations for a mandatory registration pathway, for stakeholder feedback

25 Tasmanian Government, Draft expectations for data centres and AI infrastructure developers, September 2026.
26 Minister Andrew Barr, 2026. Providing a clear framework for Data Centres in the ACT.

- Chapter 4 sets out considerations for two new access standards to improve real time communication and limitations on the rate of change of active power
- Chapter 5 seeks stakeholder feedback on implementation considerations in relation to both proposals
- Chapter 6 discusses the Commission's legal considerations when making our decision on a rule change request and our proposed assessment criteria.

Following receipt of stakeholder submissions, the Commission is required to make a draft determination on the rule change request by 1 April 2027[27], subject to any further extensions made by the Commission pursuant to section 107 of the NEL. The Commission may only make an extension if the rule change request raises issues of sufficient complexity or difficulty, or there is a material change in circumstances that necessitates the extension.[28] If the Commission determines that an extension is necessary, we will communicate the new timeline to stakeholders through our website, our newsletter and through the SA Gazette. Information on how to provide your submission and other opportunities for engagement is set out at the front of this document.

You can find more information on the rule change process on our website.[29]

27 We published a s107 notice alongside this consultation paper to extend the period for the draft determination until 1 April 2027.

28 Section 107 of the NEL.

29 See our website: https://www.aemc.gov.au/our-work/changing-energy-rules

2 We are seeking feedback on the risks and challenges with the increase in large IBL connections

As set out in chapter 1, the growing number and scale of large inverter-based loads (large IBLs), particularly data centres, is creating new challenges for the operation and planning of the NEM.

Large IBLs can differ from traditional large loads in their technical characteristics and operational behaviour, they have the ability to change demand rapidly and materially. These types of plant also typically scale their electricity demand progressively following connection to the grid, rather than starting at their full capacity. These factors mean that both their individual and aggregate behaviour is likely to become increasingly relevant to power system operation and planning. This raises questions about whether or not the existing visibility and operational arrangements in the NEM remain sufficient to support the efficient integration of large IBLs.

This chapter considers these characteristics, the issues they may create and the extent to which existing arrangements address them. It then identifies the potential gaps that inform the reform pathways considered in chapter 3 and chapter 4.

2.1 AEMO has identified gaps in the operational integration and visibility of large IBLs

AEMO's rule change request identifies a number of gaps in the existing arrangements for integrating large IBLs into the NEM, with these becoming more important as the number and size of large IBLs increase. AEMO noted that the current regulatory framework for the connection and management of loads was not designed with the nature and operational capabilities of large IBLs in mind. Large IBLs are highly sophisticated and dynamic loads that can be sensitive and responsive to power system conditions. Currently, many large IBLs are connecting to both distribution and transmission networks with implications for their secure and efficient operation. Reform will enable the NEM to better service both large IBLs and consumers more broadly. Broadly, these relate to the:

- information available to AEMO and network service providers (NSPs) about the real-time and expected operation of large IBLs
- ability to manage rapid changes in their demand, and
- consistency of arrangements across different connections and networks.

AEMO's rule change request identified four issues that existing arrangements may not adequately address:[30]

- **Rapid demand shifts:** existing arrangements may not adequately manage the power system impacts associated with rapid changes in large IBL demand.
- **Real-time operational visibility:** Existing arrangements may not provide AEMO and NSPs with real-time visibility of large IBLs, while there may also be a need for greater clarity on the mechanisms available to coordinate their operation when required, including the use of directions.
- **Operational forecasting and planning visibility:** existing arrangements may not provide sufficient information about how large IBL demand is expected to change across operational and planning horizons.

30 AEMO, rule change request, pp.13-17.

- **Consistency of requirements:** bespoke and inconsistent requirements across projects, networks and jurisdictions may increase regulatory burden for industry.

The following sub-sections explore each issue further.

2.1.1 Rapid demand changes may create operational challenges

AEMO's rule change request identifies that the ability of large IBLs to rapidly change their electricity consumption is both an opportunity and a potential operational challenge. Large IBLs active power demand may change very quickly over short periods, including within seconds. While rapid changes in demand can support power system operation in some circumstances (e.g. riding through frequency and voltage disturbances), unanticipated demand changes may adversely affect network operation, the wholesale market and power system security. [31]

AEMO considers that rapid demand ramping within a dispatch interval can make it difficult to balance demand and supply in real time. If these changes are not anticipated, AEMO may over or under procure energy and ancillary services which would increase costs to consumers. As an additional consequence, large unexpected increase or decrease in demand in one region may also result in interconnector flows nearing secure limits as they adjust to balance supply and demand across regions.[32]

AEMO identifies different challenges depending on the timeframe over which a demand change occurs as set out in Table 2.1 below.

Table 2.1: Challenges and opportunities created by fast shifting demand

Timeframes	Challenges and opportunities
Short term forecasting	Minutes to hours ahead – can affect accuracy of ST forecasts and Pre-dispatch. Forewarning of significant demand shifts will mitigate this issue.
Shifts across dispatch intervals	Matching ramp-rate capability in dispatch, so supply can ramp at an equivalent rate to load. Frequency excursions may result if there is a significant mismatch.
Within dispatch interval	Significant swings within seconds, can create frequency, voltage and power quality concerns. This can also affect the adequacy of frequency control ancillary services with the potential for consequential impacts on power system security.
Automatic response to disturbances	Fast demand responses are necessary for ride through and recovery following voltage and frequency disturbances. This is also desirable for the provision of fast frequency performance and some ancillary services – if tuned to meet the requirements of the local network.

Source: AEMO, Operational integration and visibility of large IBL rule change request, pp.17-18.

31 AEMO, rule change request, p.5.
32 AEMO, rule change request, p.17.

AEMO identifies that rapid changes in large IBL demand can create operational risks where AEMO and networks do not have sufficient visibility of those changes or their potential impact. These risks may increase where several large IBLs change demand at the same time, as their combined impact can affect transmission limits, network constraints, contingency management, forecasting and dispatch.

The significance of these impacts will depend on the size, speed, location and combined effect of demand changes. What constitutes a significant demand shift is not yet settled. We are interested in stakeholder views how a significant demand shift should be defined, alongside potential responses discussed in this consultation paper such as technical standards, telemetry and information requirements, and measures to manage significant demand changes.

These considerations are explored further in the sections below.

2.1.2 AEMO considers there are gaps in real-time visibility and operational coordination of large IBLs

AEMO considers that existing arrangements do not provide it and NSPs with consistent real-time monitoring and operational coordination of large IBLs. The information available varies depending on how and where a large IBL is connected, which can limit AEMO's and networks' ability to understand how these loads are affecting the power system at a given time.[33]

AEMO also identifies a gap in how operational information is shared between large IBLs, NSPs and AEMO. There is no consistent arrangements defining what operational information should be available, who should receive it, or how it should be communicated between parties. This may become more important where several large IBLs in the same area have a significant combined impact.[34] For relevant large IBLs, this could include real-time information on active and reactive power consumption and connection point voltage and frequency. AEMO proposes that all transmission-connected large IBLs provide this information because of their more direct potential impact on the power system.[35]

A related issue is the lack of consistent communication arrangements with large IBLs during rapidly changing conditions or power system events. This can make it harder for AEMO and NSPs to understand and coordinate a large IBL's response and, where necessary, ensure it can receive, acknowledge and respond to AEMO instructions or directions to maintain power system security or reliability.[36]

Together, these gaps may limit AEMO's and NSPs' situational awareness and their ability to respond effectively to significant changes in large IBL demand.

2.1.3 AEMO has limited forward visibility of when and how large IBL demand will change

AEMO's rule change request identifies that it does not have sufficient forward visibility of when, where and by how much large IBL demand may change. This it considers can reduce the accuracy of its demand forecasts and make it harder to plan and operate the power system efficiently.

In operational timeframes, AEMO identifies forewarning of significant demand shifts as an important information need. Large IBL demand can change quickly and may not always be predictable, particularly where changes are driven by customer computing workloads. Without advance visibility of significant demand changes, AEMO may not reflect these changes accurately

33 AEMO, rule change request, July 2026, p.9.
34 AEMO, rule change request, p.15.
35 AEMO, rule change request, p.15.
36 AEMO, rule change request, pp.18-19.

in its forecasts. This can lead to less efficient generation dispatch and make balancing supply and demand more difficult, increasing costs to consumers.[37]

Over longer planning horizons, AEMO also identifies limited visibility of expected changes in large IBL capacity, demand profiles and future demand growth. AEMO suggests this can make it harder to forecast electricity demand in the long-term and, in turn, increase uncertainty for new generation and network investment that may be needed.[38]

AEMO currently relies on information from networks and information provided voluntarily by large IBLs. However, large IBLs are not generally required to respond to AEMO's requests. This means AEMO cannot be assured that it will receive consistent and timely information to support its operational forecasts and longer-term planning.[39]

The specific characteristics that make large IBLs difficult to forecast are discussed in further detail in section 2.2 below.

2.1.4 Bespoke arrangements can create inconsistent requirements

AEMO's rule change request identifies issues with the current bespoke arrangements for integrating large IBLs into the NEM. AEMO notes that arrangements for large IBLs currently differ across networks and considers that this is resulting in inconsistent requirements, a lack of clarity in connections and unnecessary regulatory burden.

AEMO considers that a lack of clarity and consistency can increase compliance costs, delay connections and create uncertainty for proponents, potentially leading to inefficient investment outcomes. While current arrangements do allow for different approaches to accommodate different technologies, connection arrangements and operational capabilities, AEMO considers that inconsistent arrangements do not promote a shared understanding between AEMO, NSPs and large IBLs, of operational expectations, communication protocols and response requirements.

This issue extends beyond the requirements applying to an individual connection. AEMO identifies increasing interdependencies between distribution networks, transmission networks and AEMO as large IBLs connect across the NEM. For example, concentrations of large IBLs connected to distribution networks may affect transmission limits, network constraints, contingency management, forecasting and dispatch outcomes. Conversely, changes in transmission can impact the headroom available in distribution networks to effectively manage large IBL connections.

AEMO therefore considers that uncertainty about roles and responsibilities, including what appropriate information sharing is between DNSPs, TNSPs and AEMO, will become an increasingly important issue and so it will be important to clarify roles and responsibilities.

2.2 Large IBLs have characteristics that create different operational and planning challenges

Traditional large industrial loads have generally connected in stages over time. They have comprised of established technologies whose electrical characteristics and behaviour are well understood through decades of operational and engineering experience. Emerging large IBLs can differ materially from traditional load because of their technical design, scale and operational

37 AEMO, rule change request, pp.15-16.
38 AEMO, rule change request, p.16.
39 AEMO, rule change request, p.16

behaviour.[40] AEMO's rule change request identifies characteristics exhibited by emerging large loads that make them different from existing large loads, such as having:[41]

- multiple connection points
- concentrated connections
- controllable loads and back-up generation
- variable demand that can change rapidly or shift between facilities.

The Commission has already taken steps to recognise the distinct technical characteristics of large IBLs. Under the final *Improving the NEM access standards – Package 2* rule, IBLs with a nameplate rating of 30 MW or greater would be classified as large IBLs and be subject to various technical standards to manage their impacts on the power system.[42]

For the purposes of this rule change, the Commission considers there are three broad characteristics of emerging large IBLs that are particularly relevant - which go beyond just their technical characteristics:

- technical characteristics, including the use of power electronics and sophisticated on-site electrical infrastructure
- operational behaviour, particularly the ability of demand to change rapidly and materially during normal operation
- development characteristics, particularly the potential for large IBL demand to rapidly scale in capacity.

A further consideration is that the power system impact may arise not only from individual large IBLs, but from the aggregate behaviour of multiple facilities. AEMO notes that large IBL connections can be geographically concentrated and identifies the need to consider cumulative impacts where large IBLs affect transmission limits, constraints, contingency management, forecasting or dispatch outcomes.[43] This issue may become more important as data centres increasingly seek connection to distribution networks, where AEMO generally has less direct visibility of individual loads and their aggregate behaviour.

These characteristics provide the starting point for considering whether existing operational visibility, forecasting and information-sharing arrangements remain fit for purpose as the number and scale of large IBLs increase.

2.2.1 Power electronics can cause large IBLs to interact differently with the grid than traditional loads

As discussed in chapter 1 and the Commission's *Improving the NEM access standards – Package 2,* final determination, while many established load types have relatively limited dynamic interaction with the wider power system, large IBLs such as data centres can incorporate extensive power electronics and control systems whose behaviour may be influenced by, and interact with, surrounding network conditions. Their response to power system conditions can therefore depend on software, control systems and settings, as well as the physical characteristics of the facility.[44]

This can affect the power system in several ways. Large IBLs may:

40 AusNet, Integrating Data Centres, Prioritising power system integrity challenges in the NEM, White Paper.
41 AEMO, rule change request, p. 7.
42 *AEMC, Improving the NEM access standards - Package 2, final rule determination.*
43 AEMO, rule change request, p.11.
44 AEMC, *Improving the NEM access standards - Package 2*, Final rule determination, 12 November 2026.

- change demand rapidly, including through automated controls, batteries, UPS systems and back-up generation
- reduce demand or disconnect during voltage or frequency disturbances
- inject or absorb reactive power depending on their controls and settings
- respond differently to the same disturbance, even where facilities are similar in size
- have a material combined impact where several large IBLs respond at or around the same time.

As individual facilities become larger in size and the volume of large IBL connections in the NEM increases, information about their operation and expected behaviour becomes increasingly important to understanding their potential impact on the power system and market. Given the large potential demand swings, these can materially impact assessments of resource adequacy, FCAS requirements, constraints and ultimately price formation.[45] Without sufficient visibility of these characteristics, AEMO and NSPs may have more difficulty understanding, accurately modelling and preparing for how large IBLs will behave under normal and disturbance conditions.

2.2.2 Digital workloads and power electronics can result in rapid and significant changes in large IBL demand

Large IBL differ from many existing industrial facilities because their active power demand is increasingly determined by digital workloads and power-electronic interfaces rather than slow-moving physical processes. Modern data centres, particularly those supporting AI and high-performance computing applications, can rapidly increase or decrease load as computing tasks start, stop or transition between processing phases. These characteristics can result in demand changes across different timescales:

- **Minutes:** large facilities can ramp up or down by hundreds of megawatts within a single five-minute NEM dispatch interval. For example, an overseas data centre has been observed reducing demand from around 450 MW to 40 MW in 36 seconds.
- **Seconds and sub-seconds:** AI computing workloads can produce rapid and repetitive changes in power consumption. If these changes aggregate across a sufficiently large facility, they may affect power quality and power system stability.

The issue for the NEM is the potential size and speed of these changes, particularly where they are unexpected or occur across multiple large IBLs at the same time. They can make it harder for AEMO to forecast and balance supply and demand and may affect dispatch, frequency management and network operation.

Minute to minute variations

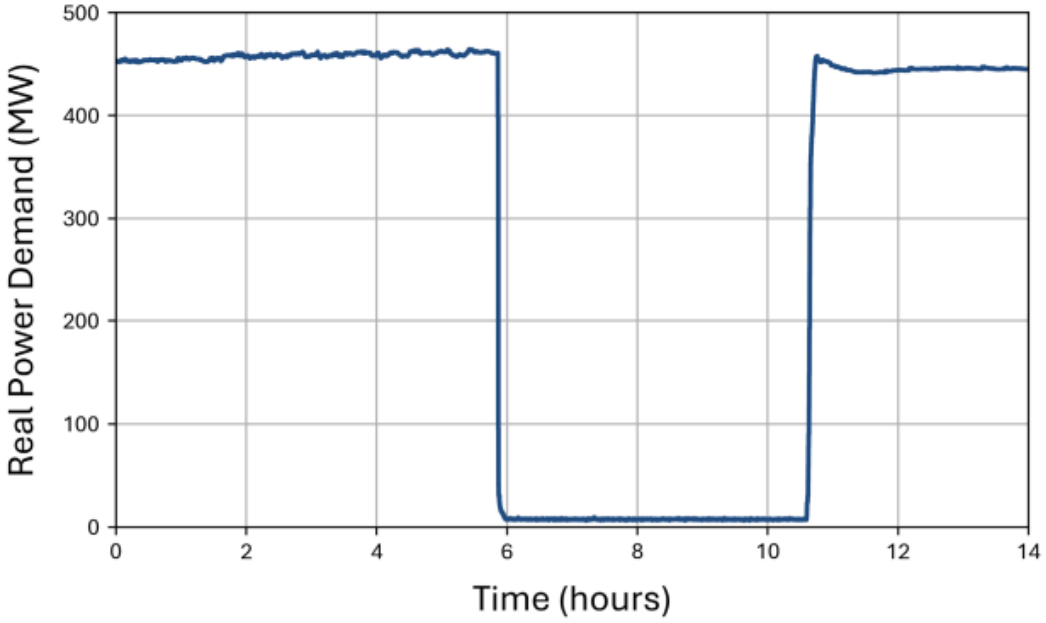
Examples of large and rapid changes in large IBL active power demand are well documented. The two examples provided below show the response of two separate data centres at the start and end of data processing cycles.

Figure 2.1 shows a North American data centre ramping down from approximately 450 MW to 40 MW within 36 seconds after which the load demand is relatively constant at close to 7 MW for approximately 4.5 hours. At the recommencement of operations, the data centre ramps back up to 450 MW over the course of only a few minutes.

45 AEMO, rule change request, p.7.

The important context is that the NEM operates on a 5-minute dispatching cycle with energy and frequency control ancillary services (FCAS) being scheduled at the commencement of each interval based on a combination of real time and forecast requirements. [46] Any significant, unexpected changes that occur within the dispatch window need to be managed using plant capabilities that are already online, until corrections can be made in ensuing dispatch intervals. System costs are increased if AEMO needs to procure additional FCAS to manage demand fluctuations and/or if other plant need to adjust generation/consumption accordingly (incurring costs from additional wear and tear of equipment).

Figure 2.1: Observed data centre load ramp down and up

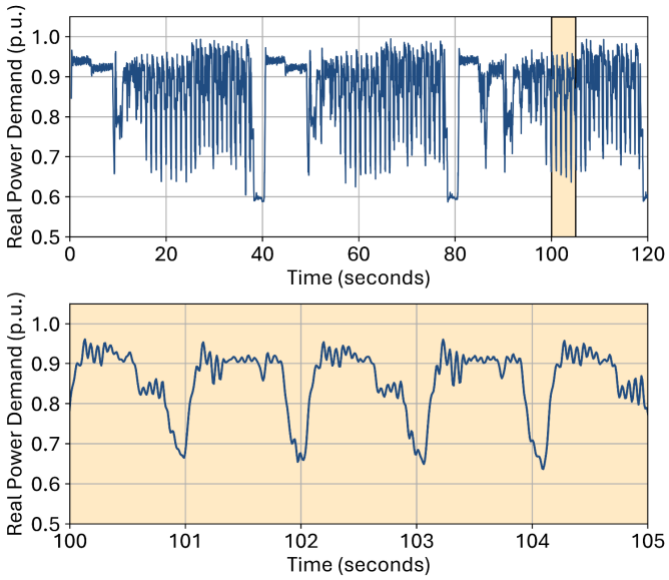


Source: NERC, 2025. Characterisation and risks of emerging large loads. p.19.

AI data centres can have load profiles that are periodic, repetitive, and sustained in nature. In the figure below, the data centre active power demand oscillates between approximately 0.95pu to 0.67pu each second. At a sufficiently large nameplate capacity, these movements in active power demand can be likened to multiple contingencies in the network during the dispatch interval.

46 The 5-minute dispatch cycle is now consistent with many other major power systems overseas. There has been a clear international trend toward 5-minute dispatch intervals (progressively reduced from 60 minutes in some cases), particularly in systems with high penetrations of IBR and increasing battery participation.

Figure 2.2: Example AI data centre load profile during training over two minutes (top) and five seconds (bottom)



Source: NERC, 2025. Characterisation and risks of emerging large loads. p.30.

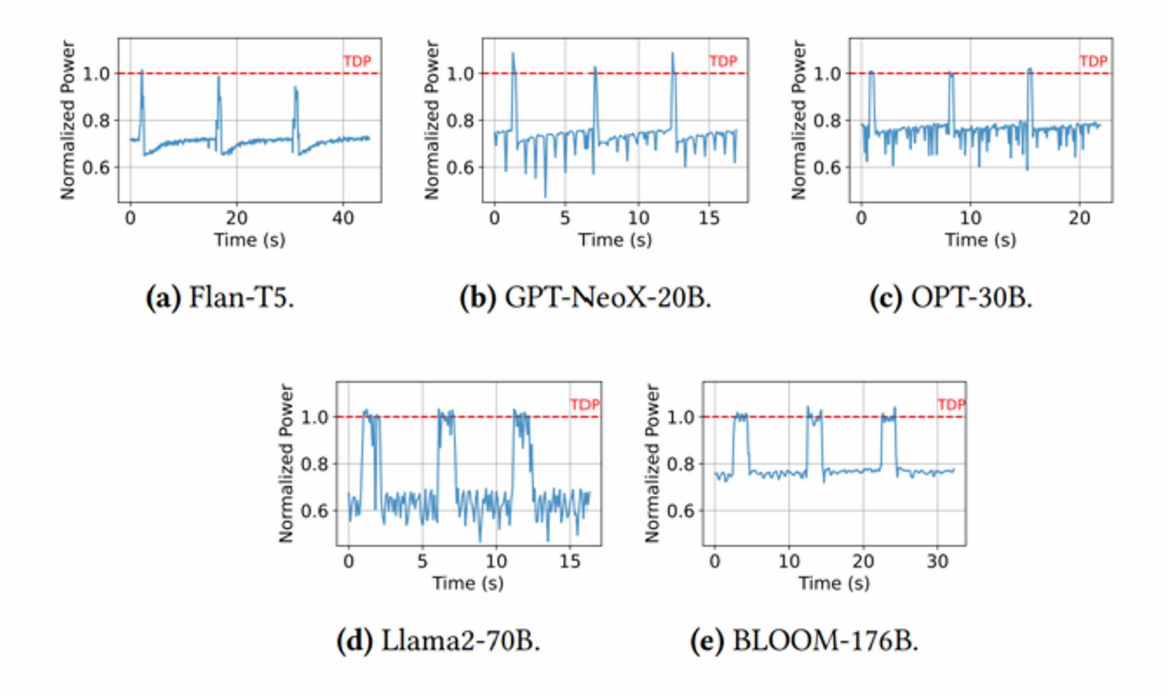
Price-responsiveness of large IBL operations may also be an issue to consider given the use of a 5-minute market settlement in the NEM.[47] This would very much depend on how the large IBL has negotiated their energy supply contract and any resulting spot price exposures or incentives.

Second to sub-second variations in load demand

Some AI compute loads can exhibit short second to sub-second variations in load demand depending on the types of data processing being undertaken. Variations also exist within specific activities, with large language model (LLM) inference having distinct power consumption phases corresponding to prompt computation and token generation. Prompt phases are brief and typically reach or exceed the graphics processing unit (GPU) thermal design power (TDP) limit, whereas token phases are longer and draw less power. The practical outcomes of such variances are shown in Figure 2.3 where distinct power usage patterns in 'prompt' (spiky) versus token phase (longer, more stable, and lower) are evident. Transient operation above TDP is observable in several of the examples.

47 Particularly any facilities which undertake processing that is not time critical and can voluntarily time shift energy intensive activities.

Figure 2.3: GPU power usage time-series for multiple inference models



Source: Patel, P., et. al., 2024. Characterising power management opportunities for LLMs in the cloud. p.7.

The risk is that dynamic GPU power variations like the profiles shown in the figure above, aggregate to become the overall site demand for a data centre at the network connection point. The potential impacts on the power system could include:

- **power quality:** the potential magnitude and frequency of cyclic power variations that may occur at connection point depending on the type of data processing that is being performed
- **power system stability**: the persistent application of such disturbances if accepted as part of normal operation, and the continuous risk exposure that would be introduced, e.g. cyclic power variations can create forced oscillations that propagate through the power system
- **adequacy** of FCAS and resources to manage demand shifts also relevant. Management of system reliability (big demand shifts during MSL or LOR events may complicate the management of those events making AEMO interventions unnecessary or requiring further interventions).

2.2.3 Large IBL can scale more rapidly than traditional large loads, creating challenges for planning and forecasting

Large IBL also differ from many traditional large loads where they are modular and highly scalable, which is the case for data centres. Computing capacity can be added progressively as new servers, equipment and customers are brought online, allowing facilities to expand in stages rather than reaching their full electricity demand when first connected. Large hyperscaler and co-location developments can also comprise multiple buildings or stages, enabling substantial additional load to emerge at an existing site or campus.[48]

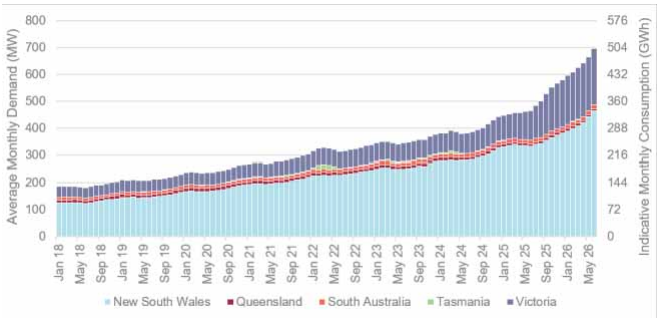
48 AusNet, Integrating Data Centres, Prioritising power system integrity challenges in the NEM, White Paper, June 2026;The European Network of Transmission System Operators for Electricity, Data centres and the power system: expected trends, challenges and opportunities, May 2026.

This creates a different visibility problem for longer-term planning. The scale and timing of future demand can be difficult to predict because a data centre's connection capacity may be significantly greater than its initial electricity use. Demand can then increase progressively, potentially rapidly, as additional computing capacity is deployed. This uncertainty can make it harder to forecast future demand and identify emerging reliability risks.

As a result, connection or contracted capacity alone may not provide a reliable indication of when, or how much, demand will materialise. A facility may connect well before reaching its expected level of electricity use, while further buildings, equipment or customers can subsequently increase demand.

Their demand may then increase progressively over several years as the facility becomes more fully utilised. AEMO reports that data centre operators commonly expect new facilities to take five to ten years to reach capacity, while mature data centres are projected to use around 50% of their network connection capacity in aggregate.[49] Without sufficient information about development stages, expected utilisation and demand ramp-up,[50] AEMO and networks may have difficulty forecasting when, where and how quickly large IBL demand will emerge.

Figure 2.4: Actual average data centre monthly demand and consumption, by region (MW and GWh)



Source: AEMO, 2026 Electricity Statement of Opportunities, p.36.

2.3 The current arrangements may not provide for the appropriate tools to forecast large IBL behaviour in the system

The NER contains a range of established information, forecasting and operational arrangements that provide AEMO and NSPs with visibility of scheduled and semi-scheduled resources across different time horizons. These arrangements support long-term planning, assessments of system adequacy, pre-dispatch and dispatch, and real-time power system operation. However, they do not necessarily apply in the same way to large IBLs that operate as non-scheduled load. This can create gaps in AEMO's and NSPs' visibility of how large IBL demand is expected to develop and change over time.

Large IBLs operating as non-scheduled load are not necessarily subject to equivalent arrangements. As a result, requirements that give AEMO forward information about the availability, operating capabilities and expected behaviour of scheduled resources may not apply directly to the large IBL or the large IBL operator.

This can create visibility gaps across different time horizons, including:

49 AEMO, 2026 Electricity Statement of Opportunities, p.6.

50 Ramp-up refers to the increase in a data centre's electricity demand as it progressively uses more of its installed capacity.

- long-term planning: limited information about when new demand will connect, ramp up or materially change
- operational planning: limited forward information about significant changes in demand that could affect system adequacy and forecasts
- dispatch: limited visibility of expected demand changes and how quickly large IBLs may increase or decrease consumption
- real-time operation: inconsistent access to telemetry and operational information about what a large IBL is doing
- system events: large IBL may not have the same direct relationship with AEMO as a Registered Participant for receiving and responding to operational instructions or directions.

Together, these arrangements provide an established framework through which AEMO obtains information needed to plan and operate the power system. They can provide information about expected demand and availability over planning horizons, changes expected ahead of dispatch, operational capabilities used within central dispatch, and the real-time state of relevant plant.

The core issue is therefore not that the NER lacks forecasting and operational tools. Rather, the existing tools were largely designed around scheduled and semi-scheduled resources and may not provide equivalent visibility of large IBLs operating as non-scheduled load. A large IBL may operate as non-scheduled load and a large IBL operator is not currently required to be a Registered Participant within the NEM registration framework (as the large IBL could have a retailer as their Registered Participant). If this is the case, none of the above information gathering obligations and requirements would apply to large IBL.

Table 2.2 summarises the principal existing arrangements and the time horizons over which they operate.

Table 2.2: Current information arrangement requirements for Registered Participants in the NER

	Long term planning	Operational planning		Real time operation
Time horizon/frequency	Electricity statement of opportunity (ESOO), Integrated System Plan (ISP) ESOO: 10 years / annually ISP: 20 years / biennially	Short Term (ST PASA) 7 days / 2 hours	Pre-dispatch (PD) PASA,5-minute pre-dispatch (P5) PASA PD PASA: 1 day / 30 mins P5 PASA: 1 hour / 5 mins	Dispatch and operational monitoring Dispatch: 5 minutes Operational monitoring: real-time
Purpose	Inform long-term capacity investment decisions	Support reserve assessment, operational readiness and intervention decisions.	Support dispatch preparation and reserve management	Support dispatch decisions, security management and operational intervention

	Long term planning	Operational planning		Real time operation
Information collection process	Longstanding information request and industry surveys	Forecast demand, plant availability, expected demand changes and short-term operational information.	Frequent updates from participants on generator availability, outages, demand forecasts, weather conditions	Telemetry, operational metering, SCADA and real-time communications
Example inputs	New developments, retirement schedules, connection timing, demand forecasts,	Short-term demand forecasts, plant availability, demand shifts and operational constraints, plant ramp limit.	Generator availability, outages updates, demand forecasts, weather forecast, reserve requirements, plant ramp limit.	Live demand, plant performance, operating status and system conditions, plan ramp limit.

2.4 We are seeking feedback on the issues AEMO has identified

As discussed above, AEMO considers that current information available to AEMO and NSPs depends on whether the large IBL is registered or not, how it participates in the market, and its connection arrangements. Therefore, there is no consistent set of requirements that apply to large IBL.

Our initial hypothesis is that the issue is not the absence of mechanisms in the NER for collecting operational and planning information. Rather, the potential gap is that existing mechanisms were developed primarily around particular participant categories, market participation arrangements and connection processes and therefore may not provide consistent and sufficiently timely visibility of operationally significant large IBLs across all relevant time horizons. The information available may vary according to how a facility is registered, connected and operated, even where its size and behaviour could materially affect power system operation. We are interested in whether stakeholders agree with this initial view.

If this view is agreed with, then we consider that there is a need to address both information provision and operational requirements across different time horizons

- **long-term planning:** information about project development, expected commencement, future demand, utilisation and the trajectory towards full operation, to support demand forecasting and assessments of future generation and network needs
- **medium- and short-term operational planning:** information about expected demand, planned outages and material changes in demand, including information that could be incorporated into MT PASA and ST PASA
- **pre-dispatch and dispatch:** sufficiently timely information about foreseeable changes in demand that may materially affect dispatch, reserve requirements or network constraints
- **real-time operation:** telemetry and operational information that allows AEMO and relevant NSPs to understand the operating state of significant large IBLs and respond appropriately to changing power system conditions.
- **operational behaviour:** technical requirements or limits on how rapidly large IBLs can increase or reduce demand where rapid ramping could materially affect power system operation. These requirements would address the behaviour itself, rather than simply requiring facilities to provide information about it.

The following chapters of this paper explore possible ways in which a more consistent framework for the information, visibility and operational requirements applying to large IBLs across the NEM could operate:

- **Chapter 3** considers ways in which a registration framework for large IBLs could be established. Registration could provide a basis for ongoing information requirements, including through the PASA framework.
- **Chapter 4** consults on new access standards for large IBLs, including requirements for telemetry, remote monitoring and control, and limits on the rate of change of active power. These requirements are intended to improve real-time operational visibility and provide mechanisms to manage rapid and material changes in large IBL demand.

Question 1: What are your views on the identified visibility and operation integration issues for large IBL?

We are interested in stakeholder feedback on:

- the views articulated by AEMO that current arrangements may not provide AEMO and NSPs with sufficient visibility of large IBLs across operational and planning timeframes
- the key gaps in current arrangements, and how material are they for forecasting, planning and power system operations
- operational risks associated with rapid and material changes in large IBL demand
- the extent to which aggregated or coordinated behaviour of multiple large IBLs may create additional risks
- whether current communication arrangements between AEMO, NSPs and large IBLs may not support timely coordination when demand changes materially or during power system events
- issues that are likely to become more material as the number and scale of large IBLs increase.

3 We are seeking feedback on a registration framework for large inverter based loads

Chapter 2 of the National Electricity Rules (NER) sets out the framework for registrations in the NEM. It distinguishes between the Registered Participant, which is the legal entity responsible for relevant rights and obligations under the NER, and the classification of individual units or assets, which supports the application of requirements associated with how those assets participate in the NEM.

Large IBLs already sit within these arrangements, for example as operating as non-scheduled or scheduled loads and (typically) with a retailer who acts as the Registered Participant. However, large IBL are not currently recognised as a specific classification or asset class within the Chapter 2 registration framework. This means that requirements specifically for large IBL cannot be applied in a targeted manner.[51]

To achieve the outcomes intended in its rule change request, AEMO proposes a new registration requirement for large IBL to be created.[52] Additionally, the Honourable Chris Bowen MP has suggested that the AEMC use this rule change to consider the objective that data centres be treated as market participants in the NEM.[53] This followed advice from the AEMC to ECMC recommending data centres be registered to support regulatory reforms and operational visibility (such as through participation as a Voluntarily Scheduled Resource).[54]

As set out in chapter 1, we are taking a more directional approach to this consultation paper.

In this chapter we set out initial views on how best to explicitly recognise large IBL in the NEM's registration framework to support the targeted application of obligations and rights. The options are designed as a starting point for stakeholder feedback that will inform the development of our draft determination. This chapter is structured as follows:

- AEMO and the Honourable Chris Bowen MP (and the AEMC in our previous advice) both suggested the registration of large IBL in the NEM. We are seeking views on creating new registration requirements for large IBL under the NER, as a basis for providing a regulatory hook for targeted obligations and rights to support operational integration and visibility, as well as future reforms.
- The Commission is seeking feedback on whether stakeholders consider that, while new registration requirements for large IBL should be mandatory, market participation should be voluntary. The Commission considers that the gold standard for the operational integration and visibility of large IBL would be to facilitate market participation as it would involve these plants being scheduled. However, we are also mindful that requiring large IBLs to be scheduled may not be appropriate since it would impose costs and fundamentally change their operations.
- Our initial view is that it would be preferable for large IBL to operate as a Voluntarily Scheduled Resource (VSR) or, on a voluntary basis, a scheduled load. VSRs are designed and intended to support voluntary and flexible market participation of unscheduled, price-responsive resources. This could provide a cost-effective way of facilitating the information provision that

51 Note that the exception to this are technical access standards, where the *Improving the NEM access standards – Package 2* rule established new access standards for large IBL.

52 AEMO, rule change request, p.19.

53 Letter from Minister Bowen to AEMC, 10 September 2026.

54 The AEMC's advice on data centres can be found here.

market participation would provide and integrating large IBL into the NEM. However, this requirement would need to commence following the implementation of the VSR framework.[55]

- We think leveraging the VSR framework is a better enduring solution compared to creating a permanent new Registered Participant category specifically for large inverter based loads.
- While a new Registered Participant category is not required for the enduring solution, we consider that modifications to the existing framework at the unit classification level are needed. The introduction of a new large IBL unit classification would allow for the explicit recognition of large IBL as a distinct asset class within the NER Chapter 2 registration framework. In addition to supporting the requirement for large IBL to be VSRs or scheduled loads, this would allow the targeted application of regulations to large IBL.
- Furthermore, since the VSR framework has not yet been implemented, we are considering whether a new "interim" Registered Participant category for large IBL operators is appropriate to apply specific operational regulations on large IBL operators instead of the retailer of the large IBL. This would sunset once the VSR framework is operational.
- We are seeking views on whether the large IBL definition (30 MW or greater) established in the *Improving the NEM access standards – Package 2* rule change would also be suitable for the purposes of the registration framework, or whether a different definition should be considered. Ideally we would capture as many large IBLs as possible under any new registration requirements, including existing assets. However, there may be instances where exemptions should apply and we are interested in stakeholder feedback in relation to this.
- We are considering whether or not the application of the Projected Assessment of System Adequacy (PASA) framework to large IBLs would be appropriate to provide adequate forecasting information to provide forewarning to AEMO and NSPs on significant demand shifts and future changes to plant characteristics. If these were to be applied, these information requirements would likely need to be implemented through the large IBL unit classification.
- We are interested in stakeholder views on additional requirements for large IBL implemented through registration. These may be, for example, a public register of large IBL, subjecting large IBL to R1 capability assessments, and notifications to AEMO to support prudential risk management.
- We are interested in views on whether or not there are issues with the current registration and exemption arrangements for large IBL back-up generation, and whether any changes to the NER may be required.

Box 3: Note the distinction between large IBL and large IBL operators

In this consultation paper, we reference and distinguish between large IBL and large IBL operators.

When discussing large IBL, we refer to the physical load assets that connect to the grid and are included in the registration framework via unit classifications (typically as non-scheduled load, like most load), as well as technical access standards under the *Improving the NEM access standards – Package 2* rule.

On the other hand, when discussing large IBL operators, we refer to the party responsible for running the large IBL. Like most parties operating load facilities, large IBL operators are typically not captured by the registration framework, as retailers are the Registered Participant responsible

55 The VSR framework is currently intended to commence in 2027, however AEMO have proposed delaying implementation until 2029 in its *IPRR staged implementation approach* rule change request.

for complying with the NER.

This distinction is important, as most (but not all) approaches outlined in this chapter refer and apply to large IBL, not large IBL operators. Regulations that apply to large IBL, and not large IBL operators, would mean that the relevant Registered Participant for the large IBL (typically a retailer) is responsible for compliance under the NER.

3.1 The Commission is seeking feedback on the need for registering large IBL under the NER

Large IBL are currently not explicitly recognised within the NEM's registration framework. This can create issues and complexities in applying obligations and rights specifically for large IBL. The Commission is seeking stakeholder feedback on whether large IBL should be explicitly recognised within the NER registration framework. This reflects both AEMO's rule change request and broader consideration of the appropriate participation and regulatory arrangements for data centres and other large IBL.

The Commission is seeking feedback about the merits in new and explicit registration requirements for large IBL.

We consider that the objectives for these registration requirements are to:

- **provide an explicit regulatory hook in the NER** through which relevant obligations and rights can be applied to large IBL in a targeted and consistent manner
- **establish information provision requirements that support operational visibility and planning**, including requirements such as PASA information that can be applied directly through registration
- **provide greater regulatory clarity and certainty** about how large IBLs participate in and interact with the NEM framework, including which facilities are subject to various rights and obligations. This includes the application of directions and associated compensation
- **provide a foundation for future reforms** by establishing a defined class of large IBL to which additional requirements or rights could be applied in future, rather than requiring bespoke regulatory approaches to be developed in future reforms
- **support proportionate and flexible regulation** by allowing targeted requirements to be placed on large IBL, while avoiding unnecessary duplication, avoiding unnecessary impacts on other assets and participants, and recognising differences in facility types, configurations and operating arrangements
- **provide an enduring framework** that can accommodate evolving large IBL technologies and operating models as their role in the NEM develops
- **support timely implementation of reforms** by having regard to the scale and pace at which large IBLs are connecting to the NEM and implementation considerations.

We are seeking stakeholder views on whether registration is an appropriate mechanism for achieving these objectives, the benefits and impacts of registering large IBL under the NER, and whether there are additional objectives that should inform the design of the registration framework.

3.1.1 AEMO and Energy Ministers have identified a need for large IBL registration and market participation

AEMO's rule change request seeks a new registration requirement for large IBLs. AEMO considers that registration would support the outcomes sought through its rule change request and align the treatment of large IBL with other reforms.

As AEMO notes, there is currently no specific registration requirement or participant category for large loads that do not choose to participate directly in the market.[56] AEMO therefore proposes establishing a new registration category for large IBL, which could provide a basis for applying relevant requirements to these facilities under the NER.[57]

Additionally, the Honourable Chris Bowen MP provided a letter to the AEMC, on 10 September 2026, suggesting the AEMC consider market participation of data centres as part of the assessment of this rule change request.[58] This follows the ECMC's agreement, with the exception of Queensland and the Northern Territory, to progress the AEMC's advice on regulatory options for data centres, which included a proposal for data centres in the NEM to be registered. Data centres that meet the definition of a large IBL would be captured by reforms considered through this rule change.

3.1.2 Registration would support market participation and support the integration of large IBL

As set out in our advice to Energy Ministers, we consider that new and explicit registration of large IBL under the NER could create a consistent 'regulatory hook' to establish obligations and interactions between large IBL and other parties under the NER. This could support the introduction of existing or new requirements on large IBL to address issues associated with the operational integration and visibility of large IBL. These considerations are detailed further in section 3.7.

The Commission also notes that registration of large IBL could also provide a foundation for future regulatory changes to apply to large IBL. For example, further reforms may be progressed through the *Data centre contracting obligation for firmed energy* rule change and/or potentially AEMO's proposed Market Visibility Framework (MVF) (which is currently being consulted on and could potentially establish visibility and participation modes for price-responsive resources (which may include large IBL)).[59]

Clarifying how large IBLs are treated under the NER could provide greater regulatory certainty for both large IBLs and other market participants. As discussed in chapter 1, large IBLs are a distinct and rapidly growing class of demand in the NEM. Clearly defining how these loads participate in, and interact with, the NEM framework could help other participants understand their respective rights and obligations and manage associated risks.

56 AEMO, rule change request, p.20.

57 AEMO, rule change request, p.20.

58 Letter from Minister Bowen to AEMC, 10 September 2026.

59 On 20 October 2026, the AEMC received the *Data centre contracting obligation for firmed energy* rule change request from Honourable Chris Bowen that seeks to ensure data centres entering the National Electricity Market (NEM) support the development of sufficient firm electricity supply to meet their growing demand.

Question 2: What are the benefits of, key objectives for, new and explicit registration requirements for large IBL?

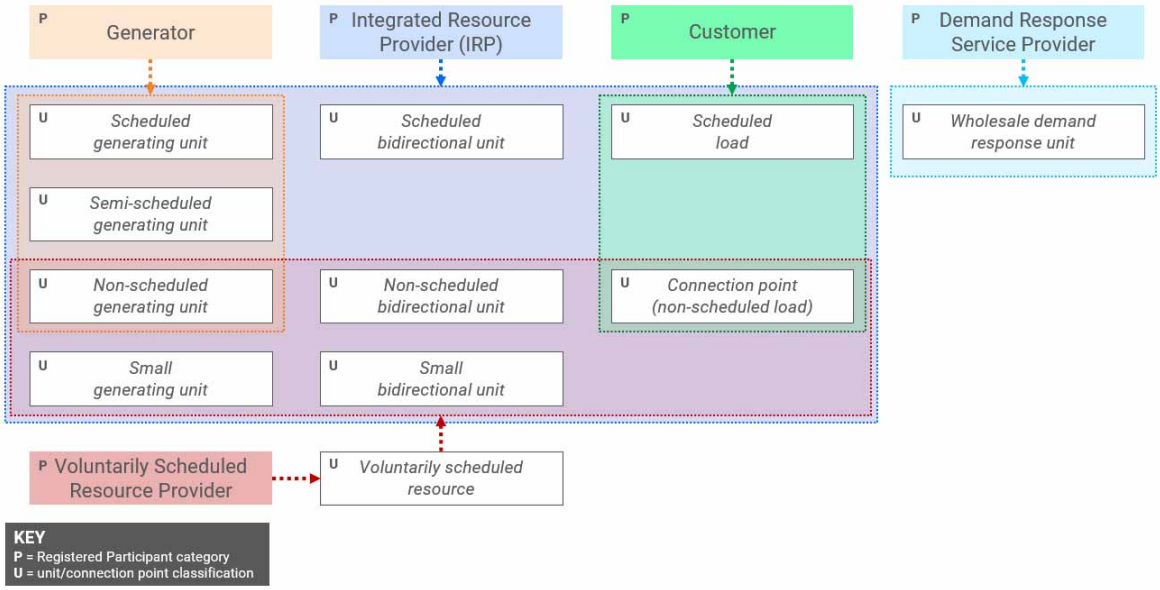
We are interested in stakeholder views on the benefits for new and explicit registration requirements for large IBL to recognise them in the NER. We are also seeking feedback on the objectives for new registration requirements.

3.2 The existing framework provides pathways for large IBL to participate voluntarily

The registration framework of the NEM is outlined in chapter 2 of the NER. While there are multiple categories and delineations for registration outlined in the NEM, here we focus on core registration categories that are relevant to the registration of large IBL.

Figure 3.1 illustrates the connections between several relevant Registered Participant categories and corresponding unit classifications for which those Registered Participants can be responsible for. For the generation and consumption of energy in the NEM, Registered Participants are the legal entities responsible for assets and must satisfy any corresponding obligations and rights.[60] Unit classifications allow for distinguishing between different classes of assets and the application of service-specific regulations. For example, a large 100 MW generating unit could have the Registered Participant as a Generator, with the unit classified as a scheduled generating unit.

Figure 3.1: Overview of the NEM's registration framework



Note: This diagram illustrates relationships between some of the key Registered Participant categories and unit classifications. However, it is not a full and complete representation of the entire registration framework. Also note that voluntarily scheduled resources and Voluntarily Scheduled Resource Providers are not yet implemented in the NEM.

Within the existing framework, large IBL typically operate as non-scheduled load and may have a retailer as the corresponding Registered Participant. Large IBL could also be classified, and

60 Note that there are other Registered Participant categories that are not responsible for assets connected to the power system, however the focus of this consultation paper is on large IBL assets.

operate, as a scheduled load or a wholesale demand response unit (WDRU), if eligible and desired.[61] Under the existing arrangements, there are few options for load to actively participate in the market:

- **Scheduled loads:** Loads may choose to be classified as scheduled loads. This involves providing bids to AEMO to get dispatched for each 5-minute dispatch interval, and only consuming energy for the dispatched quantity.
- **WDRU:** Loads can voluntarily participate in the market via the wholesale demand response mechanism (WDRM). The WDRM differs from scheduled loads by dispatching to provide demand response relative to a baseline consumption as opposed to dispatching to consume.

While we support large IBL operating as scheduled loads or WDRUs, we understand that these options are not appropriate for all large IBL due to likely material costs and risks. This is primarily because large IBL are a diverse group of loads that do not all have the capability to actively manage demand and participate in the market. At present, the majority of large IBL connecting in the NEM are data centres. There is a diverse range of operational modes for data centres, which vary based on the underlying computational use cases and business models.[62] For data centres that provide critical services, lease out computing infrastructure, and/or have computing workloads that cannot be readily shifted or managed, there are likely to be difficulties in complying with any dispatch instructions associated with active market participation. While we consider these challenges to not be insurmountable, we understand that the associated costs are likely to be material and may outweigh benefits.

Depending on the design of the facility and configuration with other on-site assets, large IBL could also participate in the NEM as a scheduled bidirectional unit, with an Integrated Resource Provider as the relevant Registered Participant. However, similar considerations arise to those discussed above for scheduled loads, in addition to requiring the facility operated as a bidirectional unit with both imports and exports through the connection point. Requiring large IBL to adopt this model solely to meet new regulatory requirements could therefore constrain facility design or impose costs that are disproportionate to the benefits, particularly where exporting electricity or actively participating in dispatch is not integral to the facility's business model.

At the same time, we would not want any new registration arrangements for large IBL to limit innovation or existing pathways for voluntary market participation. Large IBL that are able and willing to participate actively in the NEM should continue to have appropriate pathways to do so, including through scheduled or other relevant classifications. If there is a new registration framework, it should therefore complement, rather than displace, existing participation options.

While large IBL can opt into the existing registration framework, they are not recognised as a specific asset class. This limits the ability to apply new regulations directly and solely on large IBL.[63]

3.3 The Commission does not consider that a new enduring Registered Participant category is warranted at this stage

There are two approaches that the Commission can take to integrate large IBLs more explicitly into the NEM registration framework:

61 For example, Firmus Technologies is currently registered as a demand response unit for the provision of ancillary services.

62 Example use cases include real-time data processing for enterprises, cloud computing, and artificial intelligence training. Example business models include owner/operator models or co-location models (where the owner leases out computing infrastructure to customers).

63 We note that this limitation does not apply to all regulations specific to large IBL. For example, the *Improving the NEM access standards – Package 2* rule imposes technical standards on large IBL through the connection process.

1. establish a new, enduring Registered Participant category specifically for large IBL operators, with a corresponding set of rights and obligations
2. adapt the existing registration framework so that large IBL can be identified and subject to appropriate requirements.

The Commission do not consider there is a sufficient case at this stage to establish an entirely new and enduring Registered Participant category specifically for large IBL operators. We consider that developing a bespoke Registered Participant category for large IBL operators can risk increasing the complexity of the regulatory frameworks and/or creating overlapping participant categories and obligations. We also consider that there is value in attempting to retain the service-based regulation philosophy of the registration framework. The key Registered Participant categories of Generator, Customer, and Integrated Resource Provider are not technology-specific, and we consider introducing a new enduring Registered Participant category for large IBL operators would not be appropriate.

Therefore, we consider it would be preferable to adapt the existing registration framework to identify large IBL. Our initial views on what might be a workable approach are discussed in the rest of this chapter.

3.4 The Commission considers flexible market participation as through a VSR could be beneficial in future

Our initial view for testing with stakeholders is that the VSR framework provides the most promising long-term pathway for incorporating large IBL into the broader registration framework.

We consider that market participation may be a means of supporting improved operational integration and visibility of large IBL, however mandatory scheduled participation of large IBLs may not be appropriate given the range of large IBL business models. Therefore, any framework developed should provide the flexibility for the large IBL to consider its participation in the market. While we consider that the existing framework may support large IBL integration, these requirements are voluntary in nature and could result in an inconsistent application of requirements across large IBLs.

The *Integrating price-responsive resources into the NEM* (IPRR) final rule established the voluntary scheduled resource (VSR) framework. It sought to accommodate a wide range of resources, technologies and business models through a voluntary and flexible framework that builds on the existing NER arrangements. The Commission considered that this would make the framework resilient to changes in technologies and business models over time.[64]

This approach is particularly relevant to large IBL. The IPRR final determination expressly contemplated that VSRs could include large customers and flexible large loads, including data centres, and could accommodate individual resources as well as aggregated resources. [65] Participation from large IBL as VSRs could achieve the objectives of registration, by supporting operational visibility of large IBL in a proportionate and enduring manner.

Therefore, we are considering whether it would be appropriate to require large IBL to participate as VSRs or, if they choose, scheduled loads, once this framework is introduced. Operation as a VSR could effectively be a minimum requirement due to the voluntary and flexible design of the VSR framework, however operation as a scheduled load should also be allowed if desired.

64 AEMC, Integrating price-responsive resources into the NEM, Final rule determination, 19 December 2024. p.x.
65 AEMC, Integrating price-responsive resources into the NEM, Rule determination, 19 December 2024. pp.ii, iv.

The VSR framework is still being implemented. The Commission recently received a rule change request from AEMO seeking to delay VSR implementation from 2027 to 2029. Therefore, the Commission is considering the need for interim arrangements to transition into the VSR framework when it is implemented, refer to section 3.5 for more information.

Question 3: Should large IBLs be required to register as VSRs at a minimum, or alternatively a scheduled load, in future?

We are interested in stakeholder views on:

- whether the VSR framework is a promising long-term pathway for supporting the operational integration and visibility of large IBL
- following the implementation of the VSR framework, whether large IBL should be required to operate as a VSR at a minimum, or alternatively as a scheduled load (if desired)?

3.4.1 An overview of the VSR framework

The IPRR framework introduces a new unit classification, the voluntarily scheduled resource (VSR), which operates with a Voluntarily Scheduled Resource Provider (VSRP) as the Registered Participant. The main feature introduced by this framework is the dispatch mode, which would allow currently unscheduled price-responsive resources to be dispatched.

By incorporating resources such as virtual power plants, community batteries, and flexible large loads into the spot market, demand forecast errors and their consequential inefficiencies can be reduced.

A key design principle of the IPRR framework is that it is a flexible and purely voluntary mechanism. The financially responsible market participant (FRMP), which is typically the retailer, becomes a VSRP and nominates qualifying resources (either individually or aggregated) to operate as a VSR and participate in dispatch. Since regulations apply to the FRMP, there are no requirements on consumers to change behaviour or cede control over their assets.

VSRs can flexibly participate in the market to varying degrees by changing between different VSR modes:

- **Active mode:** VSRs must submit bids for energy that are not false or misleading, comply with dispatch instructions, and can be directed or issued a clause 4.8.9 instruction.
- **Inactive mode:** VSRs must submit bids for energy (with expectations to be representative of behaviour), however they are not dispatched and cannot be directed (although can be issued a clause 4.8.9 instruction).
- **Hibernated mode:** VSRs do not provide bids, are not dispatched, and cannot be directed (although can be issued a clause 4.8.9 instruction).

3.4.2 We consider that the VSR framework would meet the objectives of registration

Our initial view is that building on the VSR framework could meet many of the objectives we have identified for registering large IBL. In particular, the VSR framework could:

- **Support information provision and operational visibility**: The VSR framework already provides for a range of information to be provided to AEMO, including ST PASA availability, bids, real-time information, telemetry and other data specified through the VSR guideline. In particular, VSRPs are required to provide ST PASA information on available capacity and, where relevant,

energy availability. These arrangements closely align with the operational visibility and information provision objectives being considered for large IBL in this rule change.

- **Provide greater regulatory clarity while preserving existing arrangements**: A key feature of the VSR framework is that nomination as a VSR does not replace the underlying classification of the resource. Instead, additional obligations are layered onto existing arrangements. For large IBL, this could provide a way of clearly identifying the relevant resource and applying requirements to it while preserving existing relationships, including arrangements with retailers.
- **Support flexible and proportionate regulation**: The VSR framework was deliberately designed to be voluntary and flexible, recognising that price-responsive resources have different capabilities and operating models. VSRs can deactivate or hibernate, and the VSR guideline requires AEMO to facilitate ease of participation and apply restrictions only to the extent reasonably necessary to manage power system security and reliability. The framework can also accommodate different technical requirements according to the characteristics and size of the resource.
- **Provide an enduring and technology-neutral framework**: In making the IPRR final rule, the Commission considered that the VSR framework was flexible across a wide range of resources, technologies and business models and resilient to future market and technology changes. This is particularly relevant for large IBL, where technologies and operating models may continue to evolve rapidly.

The flexibility of the VSR framework may also help address some of the challenges associated with requiring large IBL to participate through existing scheduled categories. For example, VSRs can move between active, inactive and hibernated modes. An inactive VSR continues to provide bids, real-time data and ST PASA information to AEMO, maintaining a degree of operational visibility without being required to follow dispatch instructions. A hibernated VSR is removed from the scheduling obligations for a longer period. These features recognise that different resources may have different levels of controllability over time.

The IPRR framework was also designed to operate with existing retailer arrangements. Under the final rule, the VSRP is the financially responsible market participant for the relevant resource, which in many cases may be the customer's retailer. There is likely value in preserving the role retailers can play for customers including large IBL, rather than requiring large IBL operators to assume financial and settlement responsibilities solely because additional operational requirements apply to its facility.

3.4.3 We consider a future large IBL minimum requirement for participation as a VSR would be preferable

Due to the expected benefits from operational integration and visibility, it would probably be preferable to require, as a minimum, large IBL to operate as VSRs. We would also like to encourage participation as scheduled loads on a voluntary basis in response to incentives.[66] This would provide enhanced visibility to network and system operators of large IBL activities, as well as establish capabilities and incentives for market participation. Additionally, this could also support a transition towards AEMO's proposed MVF, which may require varying degrees of market visibility and/or participation for price-responsive resources.

66 Note: While we discuss and focus on scheduled load, we also consider that large IBL could operate as a scheduled bi-directional unit if it has other assets and is configured accordingly.

Operation as a VSR would effectively be a minimum requirement due to the flexible and voluntary nature of the arrangements, as being a scheduled load would also result in more stringent requirements and obligations for dispatch. However, we would not want to discourage large IBL participating as a scheduled load (or scheduled bidirectional units) and are aiming to provide optionality to large IBL to operate in the manner that is most suitable to them.

The IPRR rule change also includes a time-limited incentive mechanism, where early participation as a VSR is incentivised through potential payments. Our initial view is that it may not be appropriate for large IBL to be eligible to receive payments through this mechanism, as payments under the mechanism are limited. They should therefore be used to incentivise assets that may not otherwise participate as a VSR (compared to large IBL which could be required).

This requirement would need to come into effect no earlier than the implementation date of the IPRR framework. The AEMC is currently consulting on a rule change request from AEMO to delay the implementation of the IPRR framework to 2029, due to technical solution complexity and reform implementation congestion.[67] Refer to chapter 5 for more discussion on implementation considerations.

While we consider the WDRM provides a valuable service and we encourage large IBL to provide demand response, we do not consider that the WDRM is appropriate for a market participation requirement or mandate. The WDRM was designed to enable consumers to provide demand response through a third-party demand response service provider (DRSP) instead of their retailer, and hence is not designed to deliver the operational integration and visibility desired of large IBL. Additionally, there are complexities associated with the WDRM, such as the need for energy consumption to be sufficiently predictable to obtain an accurate and compliant baseline, in addition to complex operational and financial arrangements between the consumer, the retailer, the DRSP, and AEMO.

We are interested in stakeholder views on whether large IBL should be required to be VSRs at a minimum, or alternatively as a scheduled load, following the implementation of the IPRR framework.

3.5 We have developed enduring and interim approaches to recognise large IBL under the NER

While large IBL (like all load) are already captured within the existing registration framework, they are not currently recognised as a distinct class of asset. Currently, this limits the ability to apply regulations directly and solely on large IBL or large IBL operators. Under the status quo, large IBL (and load more generally) typically procure energy from a retailer, who is the Financially Responsible Market Participant (FRMP) that represents the large IBL in the wholesale market and is responsible for meeting any requirements associated with a large IBL.

The rule change request proposes that the registration framework could identify large IBL and apply targeted obligations to support their effective integration into the power system and market. AEMO did not include specific proposals for how this could occur in their rule change request.

Therefore, we have designed an enduring approach to recognise large IBL in the NER's registration framework by introducing a new unit classification for large IBL. This is outlined in more detail in section 3.5.1. This approach would preserve the broader structure of the existing registration framework, and would not impact other existing registered participant categories or unit classifications. A large IBL could retain its existing unit classification, while also being identified

67 The AEMC project page for the *IPRR staged implementation approach* rule change can be found here.

as a large IBL for the purposes of obligations specifically applying to that class of asset. The responsibility for this classification of large IBL would apply on the Registered Participant for the connection point(s), which typically is the retailer (like for most load).

The combination of a new large IBL unit classification with a requirement for large IBL to operate as VSRs at a minimum, or alternatively as scheduled loads, could provide an enduring solution that simultaneously improves operational integration and visibility of large IBL while providing a foundation for other targeted large IBL reform. We consider that this combination could achieve all objectives outlined in section 3.1. We also note that this combination focuses on large IBL, with NER regulations and responsibilities applying on the Registered Participant (i.e. the retailer of the large IBL).

However, the Commission is also considering the need for an interim Registered Participant category for large IBLs prior to the implementation of the VSR framework. While section 3.3 highlighted the Commission's preference to not introduce a new enduring Registered Participant category, we recognise that an interim solution may be necessary for the purpose of allowing directions to be applied directly to the large IBL owner instead of the retailer, as sought by AEMO in its rule change request.[68] This interim Registered Participant category would work in parallel to the new unit classification, where the large IBL operator is a Registered Participant and the large IBL assets are classified under the new unit classification. The large IBL operator could have an additional party, such as a retailer, to manage other requirements such as prudential requirements and settlement with AEMO.

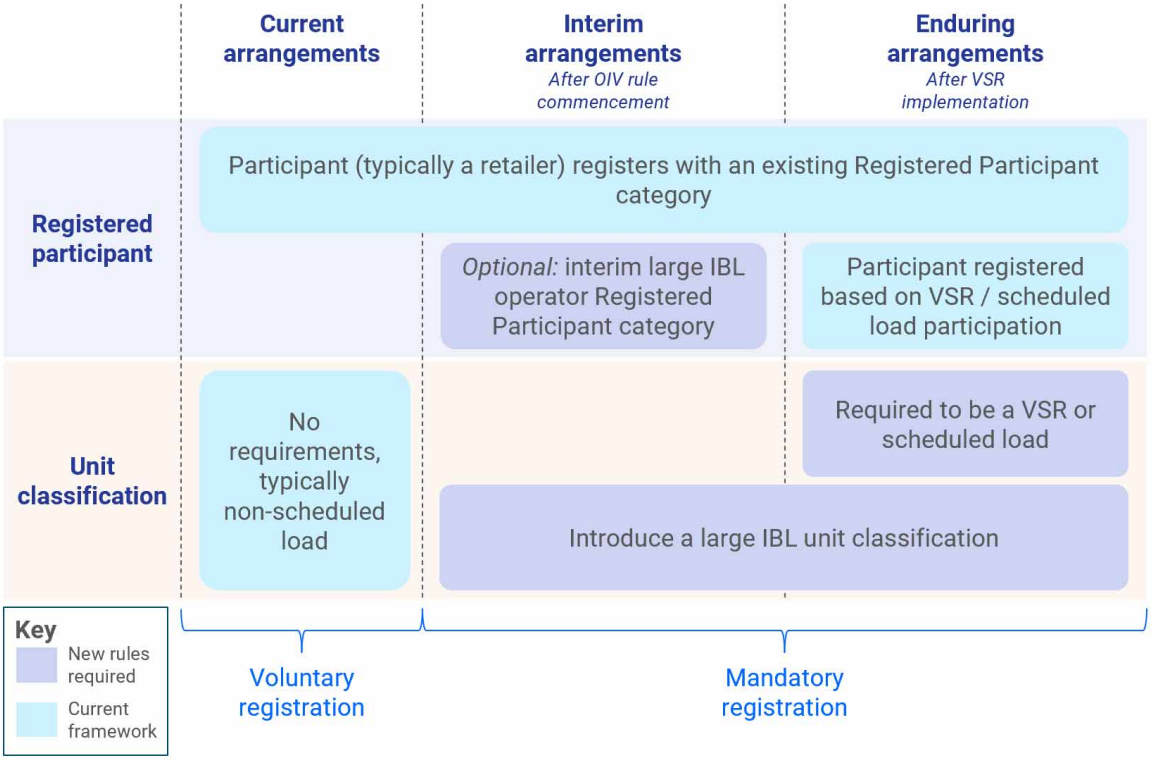
This section is structured as follows:

- Section 3.5.1 discusses the enduring approach of introducing a new large IBL unit classification
- Section 3.5.2 discusses the interim approach of an interim large IBL operator Registered Participant category.

The collection of proposed options for consideration are illustrated below in Figure 3.2. The enduring approach following the implementation of the VSR framework would consist of the new large IBL unit classification, as well as the requirement for operation as a VSR (or alternatively as a scheduled load). However, an interim approach of introducing an interim large IBL operator Registered Participant may be warranted prior to the implementation of the VSR framework. This interim solution could operate in parallel to the new enduring large IBL unit classification.

68 AEMO, rule change request, p.6.

Figure 3.2: Approach for interim and enduring registration requirement



This discussion is intended as a starting point for consultation. The Commission will consider stakeholder feedback on the benefits, costs and practical implications of these options in developing its approach for the draft determination.

Question 4: How should large IBL be recognised in the NER?

We are interested in stakeholder feedback on:

- the potential approach to introduce a new large IBL unit classification
- whether an interim Registered Participant category is needed to place particular obligations directly on large IBL operators.

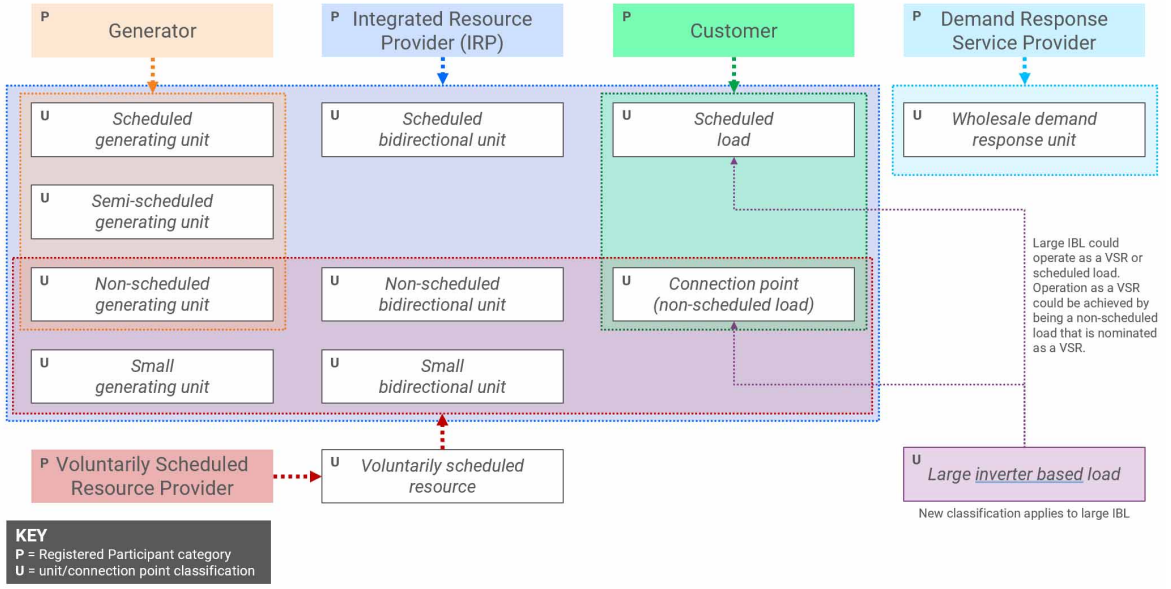
3.5.1 We are seeking feedback on introducing an enduring large IBL unit classification

At this stage, our initial preferred option is to introduce a new large IBL unit classification. This is because it would allow the targeted application of regulations on large IBL, aim to reduce impacts to other assets and the broader registration framework, and provide flexibility to large IBL. This is set out below as a starting point for consultation and we are interested in stakeholder views on how well this would meet the objectives, the practical challenges of implementing this approach and whether there are any alternatives that we should consider.

A new unit classification for large IBL would be additive to the registration framework and apply separately from and independently of other unit classifications. This means that large IBL could be registered and classified as per the status quo (subject to requirements to operate as a VSR or

scheduled load), with the only change being an additional registration requirement to recognise them as a large IBL, potentially minimising implementation costs. Figure 3.3 illustrates how this new classification would be integrated within the registration framework.

Figure 3.3: How a new large IBL classification could be incorporated in the registration framework



Note: This diagram assumes that large IBL are required to operate as a VSR or scheduled load. It is also illustrative by implying, under this requirement, large IBL must either be a non-scheduled load or scheduled load, when large IBL could also be another non-scheduled unit classification (e.g. non-scheduled bidirectional unit) that is nominated as a VSR or be a scheduled bidirectional unit. If this requirement is not implemented, large IBL could also operate as a WDRU.

Assets that would fall under the definition of large IBL (discussed in section 3.6) would need to be declared and registered under the large IBL classification. The Registered Participant responsible for the large IBL would also be responsible for appropriate classification and other regulations applicable to the large IBL. For example, if AEMO issued a direction to the large IBL, it would need to do this via Registered Participant because directions need to be issued to the Registered Participant. We expect this Registered Participant to be the retailer of a large IBL, however we recognise that alternative arrangements may exist (for example, if a large IBL operator undertakes the role of a retailer themselves).

While large IBL would need to have this new classification applied to them, it would not be mutually exclusive to other unit classifications. For example, the large IBL would separately need to be classified as a non-scheduled load or scheduled load. This means that the large IBL unit classification is an addition to the registration framework and does not replace other unit classifications for large IBL.

The Commission generally prefers service-based regulation to focus on obligations for services and/or desired outcomes, rather than focusing on particular technologies or asset types. However, we recognise that the context and issues of this rule change are related to large IBL and their particular impacts on the power system and market. Therefore, without diminishing the general preference and objectives for service-based regulation, we consider that asset-based regulation is warranted in this instance. The introduction of a new classification, which adds to the existing framework without more structural or fundamental changes, aims to preserve the more service-based classification of units and would not amend existing unit classifications.

Box 4: Examples of large IBL registration under a new classification

If a new classification is introduced, all large IBL would need to be declared and registered under the classification. However, higher-level unit classifications and Registered Participant categories can be applicable. Examples include large IBL being:

- a non-scheduled load (i.e. a load not classified as a scheduled load) with a Customer as the Registered Participant
- a scheduled load with a Customer as the Registered Participant
- a scheduled bidirectional unit (if the facility is configured to be capable of importing and exporting, such as with a battery in front of the IBL) with an IRP as the Registered Participant
- a non-scheduled load with a Customer as the Registered Participant, in addition to being a VSR with a VSRP(following the full implementation of the *Integrating price-responsive resources into the NEM* rule).

We note that the relevant Registered Participant would likely be the retailer of the large IBL, but could be the large IBL operator.

We consider that this new unit classification should commence as soon as practicable, including if this is prior to the implementation of the VSR framework. Changes to existing Registered Participant categories or unit classifications could have broader impacts and systems changes. Timely and cost-effective implementation supports the delivery of benefits. Refer to chapter 5 for more information on how we are considering implementation in this rule change process.

3.5.2 We are seeking input on an interim large IBL operator Registered Participant category

The delay to implementation of the VSR framework means that, in the interim, there may be potential gaps for large IBL. For example, when AEMO issues directions or instructions to maintain the power system, these directions or instructions are sent to the relevant Registered Participant. We understand that there could be uncertainty for AEMO if it can only direct or instruct the relevant retailer of a large IBL, who would need to pass on the requirement to the large IBL operator.

Therefore, introducing an interim requirement for large IBL operators to be Registered Participants might resolve any potential issues. Consistent with section 3.3, we would prefer to not introduce a new enduring Registered Participant category for large IBL operators. However, we recognise that an interim solution may be required. This is illustrated in Figure 3.2 under the interim arrangements, prior to the implementation of the VSR framework.

Possible interim Registered Participation options are requiring large IBL operators to be the sole Registered Participant for the large IBL or introducing a new interim Registered Participant category for large IBL operators that only has specific obligations applying to it.

We consider that requiring large IBL operators to be the sole Registered Participant for large IBL is not preferable, as this would likely disincentivise or not support large IBL having retailers. We consider that the role of the retailer is important in supporting consumers to interact with the electricity system, by navigating markets (including settlement, risk management, and prudential requirements), regulations, and systems on behalf of consumers.

Therefore, the introduction of a new interim Registered Participant category only with specific obligations for large IBL operators would likely be the more preferable change. However, we

consider that there may also be some negative consequences of this approach which could mean the costs and risk outweigh the benefits of resolving a specific issue(s).

These consequences include likely significant complexity in disentangling and determining where obligations, responsibilities, and rights should sit under the NER when multiple Registered Participants are involved, with flow-on impacts for compliance and enforcement. For example, while obligations to comply with directions could be placed specifically on the large IBL operator, there could be consequential impacts on metering, remote monitoring and control, and directions compensation. Navigating and complying with new regulatory responsibilities, including different sets of responsibilities for retailers with large IBL customers and other customers, may impose and increase costs for industry. Therefore, attempting to apply targeted regulations directly on the large IBL operator may result in broader obligations that go beyond the objective, deviate from the service-based philosophy of Registered Participant categories, and/or could have negative consequences. Careful demarcation and limitations to specific key obligations relevant to current policy requirements would be required to avoid this.

If a new interim Registered Participant category were introduced for large IBL operators, we expect this would only be necessary prior to the implementation of the VSR framework. This is because, if large IBL are required to operate as VSRs or scheduled loads, we expect operational issues to be resolved through VSR and scheduled load regulations. Therefore, the interim Registered Participant category for large IBL operators may sunset once the VSR framework is implemented, with sufficient time to allow for a transition to the enduring framework.

In considering potential changes to Registered Participant categories, we will consider the additional benefits and costs. We are interested in stakeholder views on potential benefits and costs, particularly within the context of other potential regulatory changes to large IBL outlined in this consultation paper. For example, if there were to be requirements for large IBL to be VSRs or scheduled loads in future (see section 3.4), we are interested in whether there are potential benefits in the interim.

3.6 We are seeking stakeholder feedback on which assets should be subject to registration

In considering who should be subject to the proposed registration framework for large IBL, there are two key policy questions:

1. whether the existing NER definition of large IBL, including the 30 MW threshold, provides an appropriate basis for determining which facilities should be captured by the registration framework
2. how the registration requirement and any associated obligations should apply to new and existing large IBL.

The following sections seek stakeholder feedback on both matters.

Question 5: Which large IBL should be subject to registration requirements?

We are seeking stakeholder views on:

- whether the large IBL definition established in the *Improving the NEM access standards – Package 2* final rule is appropriate, including the 30 MW threshold
- how to treat existing large IBL.

3.6.1 We are seeking feedback on the application of any new requirements to meet the existing large IBL definition under the NER or whether a new threshold is required

The final rule for *Improving the NEM access standards – Package 2* creates a definition of large IBL for the purposes of applying technical access standards:[69]

> An *inverter based load* with a *nameplate rating* of 30 MW or greater.
>
> To the extent an *inverter based load* comprises multiple elements or pieces of equipment covered by a single *connection agreement*, the *nameplate rating* must be measured as the aggregate consumption of those elements.

An inverter based load is defined as:[70]

> *Plant* (other than a *production unit*) that is supplied by power electronics, including inverters, converters or rectifiers, and potentially susceptible to power electronic control instability.

Our initial position is that this provides a useful starting point to consider as an appropriate definition of large IBL in this rule change. Having aligned definitions of large IBL would establish a clear, transparent, and predictable framework for stakeholders to navigate.

This definition, consistent with the focus of this rule change, is on large IBL (or aggregations of materially similar IBL) with an active front end and based on characteristics relevant to the power system. The definition of large IBL is not seeking to capture all large loads that may use power electronics within the facility alongside non-inverter-based equipment (such as synchronous, induction-based, or other conventional loads). We are interested in stakeholder views on whether this definition would appropriately cover the large IBL facilities and/or if some facilities may unintentionally/unnecessarily be covered.

The 30 MW threshold reflects that assets of this size are more likely to have a material impact on the power system, and are consistent with the breakpoint used to classify generating units as scheduled or non-scheduled. Furthermore, AEMO's data on the current connection queue indicates that approximately 91% of data centres (the majority of connecting large IBL) in the NEM, excluding Queensland, have a proposed capacity above 30 MW. This means that the 30 MW is likely to be sufficient at capturing large IBL seeking connection.

While the 30 MW threshold provides a useful starting point, we are open to views on whether the threshold should differ from the definition used for technical access standards. For example, if we only consider registration, there may be benefits from capturing large IBL that would be below 30 MW.

Our initial view is that, regardless of the large IBL definition, regulations apply to all IBL plant behind one or more connection points that surpass the 30 MW threshold in aggregate. This would prevent situations where a large IBL facility hosts multiple sub-30 MW plant to avoid regulations, despite exceeding 30 MW in aggregate.

69 Chapter 10 of the *Improving the NEM access standards – Package 2* final rule.

70 Chapter 10 of the *Improving the NEM access standards – Package 2* final rule.

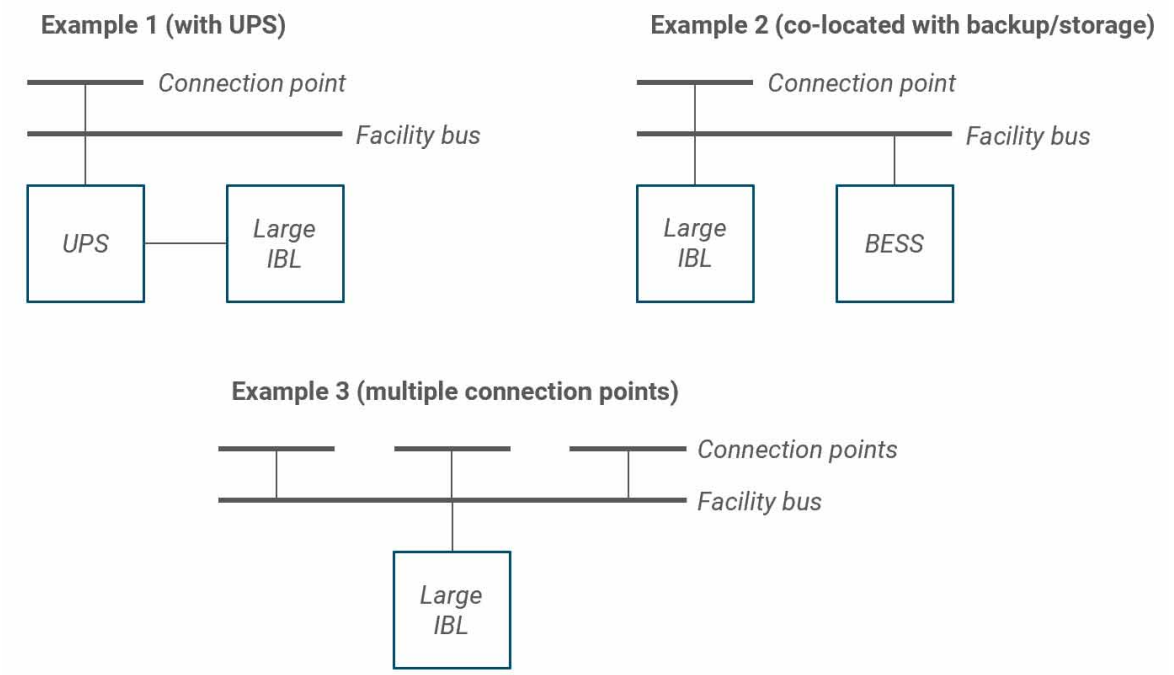
This would be consistent with the general use of connection points as a reference point in the existing registration framework, for example the classification of scheduled generating units under clause 2.2.2(a) of the NER is:

> A generating unit which has a nameplate rating of 30 MW or greater or is part of a group of generating units connected at a common connection point with a combined nameplate rating of 30 MW or greater must be classified as a scheduled generating unit…

Further, this would also aim to apply independently of any non-IBL plant co-located with the large IBL, or how the IBL is placed relative to its connection point(s). We understand that large IBL are typically co-located with other assets, such as UPS or back-up generation, to provide continuous, high-quality power supply and improve reliability for the site. We consider that registration and regulations considered in this rule change process should apply only to large IBL, regardless of what assets they may be co-located with or how the entire facility is configured behind the connection point. Figure 3.4 illustrates several high-level and simplistic examples of different large IBL configurations.

The definition of large IBL under the *Improving the NEM access standards – Package 2* rule change is aimed at addressing these points. Nonetheless, we are interested in seeking stakeholder input on how large IBL can be configured and whether the definition of large IBL can sufficiently capture the intended load for the purposes of registration.

Figure 3.4: Illustrative examples of basic facility configurations



3.6.2 We are seeking feedback on the plant that needs to be captured under this registration approach

Under proposals discussed in section 3.4 and section 3.5, there may be options for both new and existing assets to be captured. Subject to further consideration, we would aim for new and existing large IBL to be classified under a new large IBL unit classification. While obligations for

large IBL tied to registration would apply to new large IBL that connect to the NEM, we will need to consider the costs and benefits regarding the application of new obligations to existing large IBL.

As previously discussed, the rate and scale of data centres connecting in the NEM is rapid. The magnitude of benefits from any changes under this rule change process would likely be linked to the proportion of these large IBL that new regulations would apply to. Therefore, applying regulations to existing large IBL, in addition to new large IBL, has the potential to deliver material, additional benefits.

However, we also recognise that there may be costs for existing large IBL in complying with new regulations. For example, other costs could include the installation of new equipment to comply with any of the proposed changes.

In considering the potential benefits and costs associated with requiring existing large IBL to comply with any new regulations, there are several possible options we could explore, and are interested in stakeholder views on:

1. **Exempt existing large IBL from new obligations:** Where compliance costs and complexity associated with new obligations are material for existing large IBL, exemptions from these obligations could be appropriate. This could avoid material costs for existing large IBL, however it may not maximise total benefits and could potentially leave some issues associated with large IBL unresolved.
2. **Require existing large IBL to comply with new obligations, but allow exceptions for large IBL with material costs:** This option could theoretically best balance benefits and costs, by allowing existing large IBL to be exempt from new obligations. This could be done through an assessment process, where large IBL are considered on a facility-by-facility basis and need to demonstrate they would incur material costs or complexity from complying with new regulations. However, this could be complex and administratively burdensome process that may be inefficient and/or inappropriate.
3. **Require all existing large IBL comply with new obligations:** Requiring all large IBL, both new and existing, to comply with new obligations would maximise operational integration and visibility. However, for existing large IBL where compliance costs and complexity are material, this may not deliver net additional benefits and could impact their business operations.

Note that this discussion applies to regulations enacted by reference or in relation to the registration framework. We think it is unlikely that new requirements imposed through access standards, such as those contemplated in chapter 4, would automatically apply to existing large IBL, unless they seek to re-negotiate their connection agreement.

Additionally, we note that, while we are considering options to apply new regulations to existing large IBL, we are conscious of not interfering with any accrued or vested rights for existing large IBL. This may inform our approach to considering existing large IBL and we will consider this as we develop detailed policy design for the draft determination. Nonetheless, we are interested in testing whether to apply new registration requirements and any subsequent regulations on existing large IBL.

Therefore, we are interested in stakeholder views of the potential benefits and costs associated with requiring existing large IBL to register under a new classification and comply with associated regulations. In particular, we are interested in understanding what costs would be incurred for existing large IBL.

3.7 We are seeking feedback on the information requirements imposed on the large IBL classification

The Commission considers that the explicit recognition of large IBL in the registration framework could be used to impose a number of minimum requirements in respect of large IBLs. As a starting point for consultation we are seeking stakeholder feedback on the application of directions or instructions and projected assessment of system adequacy (**PASA**) requirements. We consider these requirements would respond to AEMO's rule change request, which calls for:

- advance notice of expected significant changes in large IBL demand, so these changes can be reflected in short-term forecasting, including ST PASA and pre-dispatch
- information on large IBL demand characteristics and expected demand growth, to support efficient power system planning, investment and utilisation of generation and network assets.

Question 6: Would the proposed minimum requirements provide sufficient information to AEMO to support improved operational visibility of large IBLs?

We are seeking stakeholder views on:

- if the PASA framework appropriate for the provision of information to support significant shifts in demand
- as a starting point, should a significant demand shift be defined as:
  - a change of 5 MW or more for large IBLs between 30 MW and 100 MW
  - a change of 10% or more of demand for large IBLs above 100 MW
- the proposed STPASA and MTPASA reporting requirements
- incentives for accurate information provision and any other information provision requirements.

3.7.1 Incorporation of large IBL in PASA can improve power system operations and asset utilisation

In its rule change request, AEMO considered that large IBL should provide forewarning of expected significant demand shifts that could be factored into PASA.[71] This could support the efficiency of the market and operational decisions.

We are seeking views on requiring large IBLs to provide information on load forecasts, material demand shifts and expected ramp-up profiles to improve visibility into near-term demand. This information would inform and improve the accuracy of PASA.

PASA is the principal method AEMO uses to forecast the power system's ability to remain within the reliability standard.[72] AEMO prepares PASA in two timeframes:

- Short Term PASA (ST PASA) covers 6 trading days from end of the trading day covered by most recent pre-dispatch schedule with a half-hourly resolution; and
- Medium Term PASA (MT PASA) covers 24 months from the Sunday after the day of publication with a daily resolution.

71 AEMO, rule change request, p.16.

72 The PASA is a comprehensive program of information collection, analysis, and disclosure of medium term and short term power system security and reliability of supply prospects so that Registered Participants are properly informed to enable them to make decisions about supply, demand and outages of transmission networks in respect of periods up to 2 years in advance (or up to 3 years in advance, where specified).

The Commission is considering whether PASA requirements should apply in respect of large IBLs through the unit classification approach. The PASA framework currently imposes requirements for information provision on the Registered Participant, not the unit itself. As a result, PASA obligations attaching to the large IBL classification would fall on the Registered Participant responsible for the large IBL, which may be its retailer. We will need to consider how current PASA provisions would apply to large IBLs should stakeholders indicate broad support for the use of this framework to provide the relevant information to improve operational visibility of large IBLs.

This issue is particularly relevant because current requirements affecting the visibility, predictability and dispatchability of large loads vary depending on how the load is registered. Table 3.1 summarises the existing requirements under the NER across the different registration categories.

Table 3.1: Summary of visibility, predictability and dispatchability of Large Loads under the current NER framework

Dimension	Scheduled Load	Voluntarily Scheduled Resource (VSR)*	Wholesale Demand Response (WDR)	Non-scheduled Customer Load
Visibility	HIGH • Real-time MW telemetry and dispatch/SCADA feedback.	HIGH-MODERATE • Aggregated MW telemetry (dependent on size/location). • Individual site behaviour can be obscured by aggregation.	MODERATE-LOW • Does not provide total site MW in real-time. • Response telemetry required in defined size/location circumstances; otherwise, baseline and metering verification.	LOW-MODERATE • Site SCADA may exist via NSP for larger sites (e.g. major industrial loads). • No market requirement for real-time site-level MW telemetry.
Predictability (bids / availability / forecast)	HIGH • 5-minute consumption bids, availability, ramp limits and rebids feed dispatch, 5MPD and PD. • Forward availability	HIGH-MODERATE • Active bids inform dispatch/5MPD/PD, while inactive bids represent expected MW. • Availability information for PD & ST PASA	MODERATE-LOW • Bid response MW, MRC and availability inform dispatch/5MPD/PD. • Baseline estimates 'without response'can	LOW-MODERATE • Voluntary forward schedules for some loads, including planned outages (received by email).

Dimension	Scheduled Load	Voluntarily Scheduled Resource (VSR)*	Wholesale Demand Response (WDR)	Non-scheduled Customer Load
	feeds PD & ST PASA.	is less certain.	be used to inform PASA (not a firm site demand forecast).	• AEMO uses available real-time data and forward scheduled to predict load in the short-term horizon.
Dispatchability (central dispatch / constraints)	HIGH • MW consumption targets for registered load with dispatch conformance in NEMDE. • Load subject to network constraints.	HIGH-MODERATE • Net MW targets and conformance when active. • No energy dispatch conformance when inactive.	MODERATE-LOW • 5-minute MW response instruction relative to baseline, up to offered capability/MRC. • AEMO does not control total site load or subsequent return to baseline.	LOW • Commercial/site operator controls consumption. • NSP arrangements, emergency directions or RERT contracts are separate from central dispatch.
Communication (channels / protocols)	HIGH • Participant bidding and dispatch channels, • Operational contacts, and • Compliant SCADA arrangements • with NSP.	HIGH-MODERATE • VSRP provides market interface and aggregated telemetry (NSP SCADA or SCADA Lite as applicable). • Direct site-level communications are not	MODERATE-LOW • DRSP receives market dispatch and coordinates site response. • Comms standards apply where required; no direct AEMO-to-site channel.	LOW-MODERATE • Communications generally via NSP, site operator and connection agreements.

Dimension	Scheduled Load	Voluntarily Scheduled Resource (VSR)*	Wholesale Demand Response (WDR)	Non-scheduled Customer Load
		assured.		
Technical / Engineering Information	HIGH • Scheduled load parameters (limits, ramp rates) are available to market systems. • Performance standards, studies and dynamic models conducted during registration process.	HIGH-MODERATE • Aggregation, zones, capability and technical checks for VSR participation. • Underlying inverter models, ride-through and connection obligations remain sit specific.	MODERATE-LOW • MRC, baseline eligibility and technical response capability; DNSP endorsement as applicable.	LOW-MODERATE • Technical studies, performance obligations and models depend on applicable connection requirements and system-security impact.

Source: AEMC analysis based on stakeholder engagement.

ST PASA can help improve visibility of significant changes in large IBL demand over the short term

Large IBLs can change their demand materially and rapidly, making these changes difficult to anticipate from historical demand patterns. [73] Incorporating relevant information on expected large IBL demand into the seven-day ST PASA horizon could help AEMO anticipate significant demand changes and improve short-term reliability forecasting and operational preparedness.[74]

There are various options for how these reporting requirements could be introduced. For example, ST PASA reporting requirements for large IBLs could be relatively light-touch (fewer obligations than generators have to meet); or large IBL could provide all the information that generators have to provide. Our initial view is that a light touch approach may be more appropriate and more aligned with the intended purpose of improving the accuracy of AEMO's load forecasts, which the market can respond to. For example, large IBLs could be required to provide forecast load quantities, in MW, for each half-hour period from the following day through to seven days ahead. These forecasts could be updated daily, broadly consistent with the existing approach for scheduled and semi-scheduled plant.

73 MISO, Large Load Interconnection Reliability Requirements, April 2026

74 AEMO, Operational integration and visibility of large inverter-based loads, rule change request, p.5

MT PASA provides an opportunity to improve medium-term visibility of changes in large IBL demand

Better information on expected demand, material demand changes and the ramp-up to full operation could help AEMO better assess reliability risks, network investment, and efficient dispatch.[75]

This is particularly important because connection capacity does not necessarily reflect actual demand. Even after a large IBL connects, there can be considerable uncertainty about when it will commence operations, how quickly its demand will increase and the level of its eventual utilisation. For data centres, AEMO notes that new facilities may take five to 10 years to reach capacity, while mature data centres are projected, in aggregate, to use around 50% of their network connection capacity. [76] This means that relying on connection capacity alone may provide an incomplete picture of the demand that is likely to materialise and when. As the scale of large IBL connections grows, better visibility of their expected ramp-up and utilisation could improve the demand assumptions underpinning medium-term reliability assessments.

Our initial view is that there may be merit in large IBLs providing information on expected demand, material demand changes and their expected ramp-up to full operation for MT PASA. This would give AEMO earlier visibility of changes in large-load demand and support more informed reliability, operational, investment and outage planning.

Similar information requirements are being considered internationally. In the United States, Midcontinent Independent System Operator (MISO) is developing large-load interconnection reliability requirements in response to the growth, scale and operational complexity of large loads. Its proposed framework includes requirements relating to data, modelling and ramping, alongside broader visibility and operational requirements for large loads[77]

Drawing on stakeholder discussions and international examples, we are seeking stakeholder views on the information large IBLs should provide to support visibility, as set out in Table 3.2.

Table 3.2: Summary of information large IBLs could provide to improve visibility

Information category	Required information	Timing/update trigger
Real-time visibility	• SCADA (preferred) or SCADA Lite (Mandatory for Transmission connected large IBLs)	• Real or near real time
Short-term expected load profile	• Average MW for each 30-min interval over the next 7 days (PD & ST PASA) • Price/Volume (load) pairs for each 30-min interval for current Pre Dispatch	• Once daily (minimum) • Updates for material intraday deviations
Medium-term planned load reductions or increases	• Reduction from base load at daily resolution for the next 6 months (possibly	• Once monthly (minimum) • Update for material deviations

75 AEMO, rule change request, p.16.

76 AEMO, Electricity Statement of Opportunities for the National Electricity Market, August 2026

77 MISO, Large Load Interconnection Reliability Requirements, April 2026.

Information category	Required information	Timing/update trigger
	extended to 2 years to cover MT PASA horizon). • Expected increases or ramp-up in demand, at daily resolution for the next six months, potentially extending to two years to align with the MT PASA horizon.	
Unplanned outages and short-notice reductions	• Phone the AEMO Control Room for material deviations • Update to the short-term expected load profile (if required)	• Phone: immediately • Profile: within 2 hours
Standing data	• Site Name / Site ID / Location • Load Type (e.g. mine, smelter, data centre, electrolyser etc.) • Max contracted withdrawal over a 30-minute interval (MW) (base load) • NMI & TNI mapping • Site configuration (e.g. number of potlines, site aggregation etc.) • Embedded generation details if applicable (gen type, size, run frequency etc.) • Site contact information • Market information (e.g. WDR and/or VSR enabled) • Retailer, owner, operator, controller	• Submitted during registration • Resubmit for material changes

Source: AEMC analysis, informed by stakeholder discussions and international practice.

Ensuring accurate and timely information provision

The proponent considers that requiring large IBLs to provide information would support timely information sharing between large IBLs, networks and AEMO, and support efficient market operation, planning and investment.[78] For the proposed ST PASA and MT PASA information

78 AEMO, rule change request, p.16.

requirements to improve AEMO's visibility of large IBL demand, the information provided would need to reflect participants' best available expectations at the time of submission. We are therefore considering what requirements may be appropriate to support the provision of accurate and up-to-date information, while recognising that forecasts of future demand will inherently be subject to uncertainty.

For ST PASA, the combination of forecast information and the proposed real-time operational information requirements discussed in chapter 4 could provide a mechanism for identifying material differences between expected and actual demand. Real-time visibility of a large IBL's demand could assist AEMO to identify where actual demand is materially different from the participant's ST PASA submission and, where appropriate, engage with the participant to understand the difference and support the provision of updated forecasts. This may reduce the need for more prescriptive accuracy requirements, particularly given the proposed daily updating of ST PASA forecasts.

The existing MT PASA framework provides a useful reference point for considering the appropriate standard for information provided by large IBLs. Under NER clause 3.7(d), relevant Market Participants must submit specified MT PASA information that represents their 'current intentions and best estimates'. Note that this provision is also classified as a tier 1 civil penalty provision.

We are also considering whether a similar 'current intentions and best estimates' obligation, or another appropriate standard, should apply to PASA information provided in relation to large IBLs. This is due to inherent uncertainty associated with forecasting future large-load demand, and the need to provide appropriate incentives for participants to keep information accurate and up to date.

3.7.2 Other information provision obligations that may be considered for units classified as a large IBL

Beyond the proposed PASA requirements, the Commission is interested in exploring whether additional information from large IBLs may be required to support longer-term power system planning and investment. In particular, information on expected large IBL demand and its development over time may be relevant to the demand forecasts and assumptions underpinning the ESOO and ISP.

As the number and scale of large IBLs increase, improved visibility of when these loads are expected to connect, commence operations, ramp up and reach expected levels of utilisation could provide a more robust basis for assessing future demand. This could, in turn, support more informed planning and investment signals regarding the generation, firming, network and other power system capabilities required to meet future demand.

Information on long-term demand expectations for large IBL may also become increasingly important as other reforms affecting the supply of large loads are developed. For example, the Commission is separately considering arrangements associated with the firming of new large loads. Information provided through longer-term forecasting and planning processes could help ensure that expected growth in large IBL demand, and any associated changes in generation and firming requirements, are appropriately reflected in assessments of future power system needs.

The Commission is therefore interested in stakeholder views on whether additional information provision requirements should apply to large IBLs to support the ESOO, ISP or other planning processes, including what information should be provided, by whom, and at what stage in the development and operation of a large IBL.

3.8 We are seeking stakeholder feedback on additional requirements for large IBL implemented through registration

If large IBL are registered under a new classification (or any alternate approach), there may be value in considering additional requirements for registration that could support the operational integration of large IBL. These would apply in addition to any existing and relevant registration requirements. This section includes suggestions for:

- a public register of large IBL
- subjecting large IBL to R1 capability assessments
- notifications to AEMO to support prudential risk management.

We are seeking stakeholder feedback on these additional requirements for registration, including their potential costs and benefits. We are also interested in stakeholder views on any additional requirements that may be of value.

A register of large IBL could support transparent information-sharing

Large IBL that are declared under the new large IBL classification could be placed on a new register that is maintained and published by AEMO. Currently, there is no central document that provides public information on large IBL in the NEM. A new register could provide transparent information on large IBL within the NEM, similar to AEMO's generation information page, to support efficient investment decisions by informing stakeholders of in service and intending large IBL across the NEM.[79] Example information from large IBL to be included in a new register could include their region within the NEM, nameplate rating, and other information that may deliver public benefits.

We are interested in stakeholder views on the potential benefits of a public register of large IBL, and what information should be included. We note that the concurrent *Cost recovery for network augmentations* rule change process is also seeking stakeholder views on the collection and sharing of information of large loads. Both rule change processes will work closely together to manage any gaps or overlaps.

Subjecting large IBL to R1 capability assessments

When large IBL are connected to the power system, they have the potential to impact the power system in a manner similar to inverter-based generation. Therefore, it may be appropriate for large IBL to be subject to similar assessments of technical capabilities.

While large IBL will be assessed through the connection process, including an R0 assessment, detailed design of the large IBL could change after signing the connection agreement. Under the existing arrangements, large IBL are currently not required to pass an R1 capability assessment, which is used to demonstrate that commissioned plants comply with performance standards agreed in the connections process. Conversely, registered generators (and bidirectional units) must complete an R1 capability assessment to demonstrate the plant meets its performance standards (among other assessments).

We understand from AEMO that it may be appropriate for large IBL to be subject to an R1 capability assessment as part of registration, consistent with the approach for registered generation. This could provide technical assurance that large IBL are capable of meeting their performance standard and operating in a manner that supports the power system. The benefit and focus of any capability assessment on large IBL at registration should be focused on any material

79 AEMO's Generation information publication can be found here.

changes to the large IBL since the R0 assessment undertaken for its connection application, and be proportionate to the facility's impact on the network. This would recognise the value of previous assessments and avoid unnecessary, duplicate assessments of unchanged capabilities.

If an R1 capability assessment is applied to large IBL, there may be benefits in aligning processes between generators and large IBL. Furthermore, there would likely be benefits in AEMO having flexibility to rely on, or delegate, aspects of the assessment to the relevant NSP.

We note that the AEMC's *Enhancing investment certainty in the R1 process* rule change, which commenced in July 2024, made changes to:

- formalise the commencement and conclusion of the R1 process through timely notifications by NSPs and AEMO, and guidance on what constitutes a complete R1 package
- clarify the obligations of all parties during the R1 process and introduce a timeframe for AEMO to determine whether it is satisfied of a plant's capability to meet or exceed its technical performance standards.

We are interested in stakeholder views on whether large IBL should be subject to an R1 capability assessment (or any other technical assessment) as part of registration, including the potential benefits, costs, and matters to consider.

Notification to AEMO to support prudential risk management

Under the NER, Market Participants must satisfy, as part of their registration requirements, prudential requirements to demonstrate they are capable of meeting any payment obligations to AEMO.[80] Box 5 provides a brief summary of the NEM's prudential framework.

Box 5: The NEM's prudential framework

The prudential framework aims to manage the financial risks that a participant's failure to meet payment obligations (e.g. paying for energy consumption in the NEM) to AEMO results in financial losses for other market participants or disrupts the settlement process.

To manage these risks, each participant is required to provide credit support to AEMO, which can be used to address any payment shortfalls associated with that participant. The required minimum amount of credit support (called the Maximum Credit Limit (MCL)) for a participant is calculated by AEMO using a variety of factors, including AEMO's expectation of that participant's load. AEMO publishes its methodology for calculating MCLs in its Credit Limit Procedures.

Large IBL (and load more generally) typically procure energy from a retailer, who is the Financially Responsible Market Participant (FRMP) that represents the large IBL in the wholesale market. It is this FRMP that is responsible for meeting any prudential requirements associated with a large IBL.

We understand from AEMO that, given the potential size and speed of large IBL connecting in the NEM, there could be increased prudential risks if AEMO is unable to reflect any additional load in a Market Participant's MCL. This could occur if AEMO is not notified of a retailer being responsible for any new large IBL prior to its connection.

Increased prudential risk is associated with increased risk and exposure for AEMO and other market participants to payment shortfalls, in the event that the market participant is unable to meet its payment obligations and AEMO does not hold sufficient collateral. Therefore, managing prudential risks could support the effective operational integration of large IBL.

80 Market Participants are a subset of Registered Participants that interact and engage with the spot market.

Therefore, we are considering whether or not Market Participants should be required to notify AEMO when they have a large IBL connecting to the NEM. This notification could be part of the registration process (for example, included within the classification process) or the broader prudential framework. We are interested in stakeholder views on the costs and benefits associated with this potential change.

We recognise that this issue regarding prudential risks is not necessarily unique to large IBL and could be applied to all large loads. However, broadening any prudential requirement notifications to AEMO would represent a more holistic change to the prudential framework and is beyond the scope of this rule change.

3.9 We are seeking stakeholder views on registration exemptions for large IBL back-up generation

AEMO proposes streamlined and consistent registration requirements for large IBL back-up generation.[81] Noting AEMO's existing powers under the NER to exempt systems from registration, in addition to the ongoing consultation on AEMO's Guide to Registration Exemptions and Production Unit Classifications, we are interested in stakeholder views on issues regarding the registration of large IBL back-up generation, and whether a change to the NER is required to address any issues.

Question 7: Should back-up generation for large IBL be exempted from registration under the NER?

We are interested in stakeholder views on:

- issues associated with exempting back-up generation from registration
- whether issues should be resolved through AEMO's Guide to Registration Exemptions and Production Unit Classifications or a rule change, including the benefits, costs, and risks of either approach.

3.9.1 AEMO has existing powers to exempt systems from registration

Under rule 2.1A of the NER, a person must be registered in the relevant category in respect of generating systems and integrated resources systems connected to the transmission or distribution systems. Specifically, a person cannot own, control or operate a generating or integrated resource system unless that person is registered.

However, exemptions from registration can be granted by AEMO for certain generating and integrated resource systems under clause 2.1A.2 of the NER. AEMO has broad powers in granting exemptions, with certain limitations including that:[82]

- AEMO may exempt a person or class of persons from registration, and may apply conditions if AEMO deems appropriate
- exemptions should be in accordance with the registration information resource and guidelines, which are developed by AEMO[83]

81 AEMO, rule change request, p.15.

82 Clause 2.1A.2(a) of the NER.

83 See clause 2.1.3 of the NER. AEMO publishes the Guide to Registration Exemptions and Production Unit Classifications on its webpage for registration exemptions, found here.

- exemptions cannot, in AEMO's opinion, be inconsistent with the NEO.

Being exempted means that the person does not need to register as the relevant Registered Participant and the corresponding units do not need to be classified.[84]

3.9.2 AEMO is currently consulting on clarifying exemptions for uninterruptable power supplies and back-up generation at load facilities

AEMO is currently in the process of consulting on the Guide to Registration Exemptions and Production Unit Classifications, which forms part of the registration information resource and guidelines.[85] AEMO's consultation paper, published on 15 September 2026, is intended to make the exemption framework clearer, more efficient and more proportionate to risk, while maintaining appropriate safeguards for power system security, reliability, quality of supply, and market operation.[86]

AEMO's consultation paper proposes a variety of changes, including clarifications regarding the exemption of uninterruptible power supplies (UPS) and back-up generation at load facilities such as data centres.[87] While subject to change during AEMO's consultation process and/or following the AEMC's final determination on *Improving the NEM access standards – Package 2* the proposed clarifications are:[88]

- Load facilities would not be required to seek an exemption simply because it includes UPS, if the UPS is treated as part of the load facility (as opposed to a separate plant). This may be the case if the UPS:
  - is used solely to provide continuous energy supply to load devices within the same facility
  - does not export energy to the grid via its connection point
  - does not provide any ancillary services.
- Generation co-located at a facility installed for back-up purposes may not require registration or exemption where it:
  - is used solely to maintain continuous energy supply to load devices within the same facility
  - transfers supply from grid to back-up (and vice versa) using a break-before-make switching sequence that does not include any period during which the back-up generation operates in parallel with the grid
  - does not operate in parallel with the grid in any other circumstances.

The consultation mark-up of the Guide to Registration Exemptions and Production Unit Classifications also includes additional example classifications that are relevant to large IBL back-up generation. These are shown below in Table 3.3.

Table 3.3: Example classifications in consultation mark-up of AEMO's Guide to Registration Exemptions and Production Unit Classifications

Description (based on nameplate rating)	Typical classification
20 MW uninterruptible power supply system within a data	No registration or exemption required

84 Clauses 2.1A.2(b) and 2.1A.2(c) of the NER.
85 AEMO's webpage for this consultation process on the Guide to Registration Exemptions and Production Unit Classifications can be found here.
86 AEMO, Amending the Guide to Registration Exemptions and Production Unit Classifications – Consultation paper, p.3.
87 AEMO, Amending the Guide to Registration Exemptions and Production Unit Classifications – Consultation paper, pp.3-4.
88 AEMO, Amending the Guide to Registration Exemptions and Production Unit Classifications – Consultation paper, p.15.

Description (based on nameplate rating)	Typical classification
centre that does not export energy to the transmission network or distribution network via its connection point and does not intend to provide ancillary services	
50 MW back-up diesel generating unit at a load facility that transfers supply using break-before-make switching and does not connect to the grid	No registration or exemption required
25 MW back-up diesel generating unit within a load facility that is connected to the grid (even if temporarily for the purposes of resynchronisation)	Non-scheduled generating unit and non-market generating unit (Exemption may be available, subject to AEMO-assessment)
20 MW diesel rotary uninterruptible power supply (D-RUPS) system within a data centre that does not export energy to the transmission network or distribution network via its connection point, with the diesel generation connected to the network (even if temporarily)	Non-scheduled unit and non-market generating unit (Exemption may be available, subject to eligibility criteria or AEMO-assessment)

Source: AEMO, Guide to Registration Exemptions and Production Unit Classifications – Consultation Mark-Up, p.43.
Note: This is a selected subset of the example classifications included in the source document.

3.9.3 We are interested in stakeholder views on issues associated with exempting back-up generation from registration

AEMO's rule change request outlines that back-up generation for large IBL may or may not need to be registered or exempted by AEMO, depending on its configuration, and that the process is unnecessary for back-up generation.[89] AEMO outlines that:[90]

> The registration requirements for LIBL with back up generation (like many data centres) can differ significantly depending on whether that generation could be connected to the NEM. If the generation can be connected to the NEM, however briefly, the connecting party must adhere to the connection requirements of generation or bi-directional plant. This means compliance with Schedule 5.2 access standards and the requirement to either register or attain a registration exemption.
>
> These requirements are overly burdensome for back-up generation if it will not be used to export energy or provide energy services and doesn't pose system security issues in the transmission system.

While not providing a specific proposal, AEMO proposes that for a "consistent, lighter-handed, and technology-neutral approach for the connection of back-up generation".[91]

Within the context of the existing arrangements under the NER and AEMO's ongoing consultation to clarify the exemption's guide, we are interested in seeking stakeholder views and understanding on:

- potential issues associated with the process for registering or exempting back-up generation for large IBL

89 AEMO, rule change request, p.15.
90 AEMO, rule change request, p.15.
91 AEMO, rule change request, p.16.

- approaches to address any potential issues, such as clarifying exemptions for large IBL back-up generation in the NER or in AEMO's Guide to Registration Exemptions and Production Unit Classifications.

Note that, in this rule change process, the AEMC can only amend the NER. Any changes to the Guide to Registration Exemptions and Production Unit Classifications are subject to AEMO's decision-making in its ongoing consultation process.

4 We are seeking input on operational and information requirements for large IBL

The Commission is seeking stakeholder feedback on the potential need for new access standards for large IBLs, covering communications, remote monitoring and active power management, including requirements governing the rate of change of active power (RoCAP).

The access standard requirements being consulted on in this section would build on the *Improving the NEM Access Standards - Package 2* rule change, and would likely apply to plants seeking to connect to the power system or modify an existing connection. The final rule for the *NEM access standards - Package 2 - rule change* established the definition of a large IBL as plant with a nameplate rating greater than or equal to 30MW that is supplied by power electronics, including inverters, converters or rectifiers, and potentially susceptible to power electronic control instability. Especially relevant for this chapter, *Improving the NEM Access Standards - Package 2* also introduced requirements for large IBL to be able to "have facilities to detect instability in voltage, reactive power and active power at the connection point". Large IBL that is 100MW or greater is required to have access to a phasor measurement unit (PMU) with capability to send data for the schedule 5.3 plant to AEMO and the NSP.

The Commission recognises that any new access standard (if implemented) may not be imposed on existing connection agreements.

Our initial view that we are interested in stakeholder views on is that new requirements relating to these areas could potentially help address concerns raised by AEMO in their rule change request that relate to access to real-time telemetry and the implications of rapid active power fluctuations for power system security. Stakeholder feedback on the design, costs and benefits of the proposals below will inform the consideration of these issues further as we progress this rule change.

4.1 We are consulting on new access standards pathways to address issues related to operational visibility

AEMO's rule change request identifies a need for more consistent and timely information about the operation of large IBLs to support their integration into power system and market operations. In particular, AEMO proposes real-time monitoring and communication requirements for relevant large IBLs, together with forecasts about expected significant demand shifts so these changes can be reflected in ST PASA, pre-dispatch PASA and NEMDE. The Commission has considered how the registration framework may be a mechanism to give effect to PASA requirements.

AEMO considers that improved monitoring, communications and information sharing would provide AEMO and NSPs with greater visibility of large IBL behaviour, support more accurate forecasting and dispatch, and enable changing power system conditions and significant demand shifts to be managed more effectively. AEMO identifies access standards as one mechanism for establishing nationally consistent monitoring and communication requirements. These requirements have been suggested to respond to concerns that AEMO is unable to accurately forecast demand over operational timeframes, following a large influx of IBL connections in recent years.

The existing access standards framework sets minimum requirements and provides scope for technical requirements to be negotiated as part of the connection process. Connecting applicants negotiate access standards with NSPs with the Rules setting out a framework for AEMO to

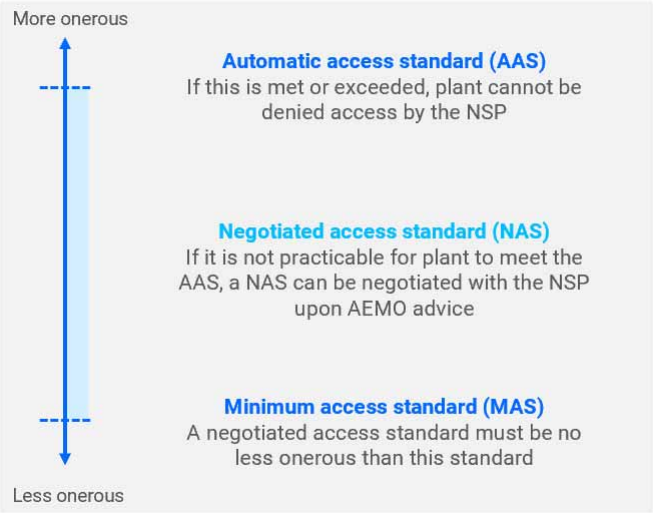
provide advice on matters relevant to power system security. However, AEMO's rule change request identifies inconsistency in the operational information available for large IBLs and proposes that any requirement for monitoring and communication requirements are consistent.

The Commission has further analysed these ideas set out in the rule change request and has set out our initial thoughts on how this might work in this chapter. We are seeking stakeholder views on whether large IBLs should have:

- standardised monitoring and remote-control capabilities
- real-time telemetry and communications systems
- rate of change of active power (RoCAP) capabilities and limits.

If the NER did establish clear minimum requirements for the monitoring, communications, control and active power capabilities of large IBLs, then this would provide a common baseline for large IBL connections across the NEM, while retaining the existing access standards framework to accommodate negotiated outcomes where appropriate. This would provide greater clarity for connecting parties, NSPs and AEMO about the minimum capabilities expected of large IBLs and support more consistent operational visibility across the NEM, rather than determining the requirements on a connection-by-connection basis.

Figure 4.1: Access standards framework



The access standards are currently set out in Schedules to Chapter 5 of the NER:

- Schedule 5.2 provides access standards for generators, integrated resource providers and synchronous condensers
- Schedule 5.3 provides access standards for loads
- Schedule 5.3a provides the access standards for high voltage direct current (HVDC) links.

Through this consultation, we are seeking views on whether new access standards would promote the safe, secure and reliable operation of the power system, and align with the proposed assessment criteria (see section 6.2.2). The alternative to new access standards would be to continue to rely on requirements imposed on a case-by-case basis through individual connection agreements (the status quo). The Commission welcomes stakeholder feedback on whether access standards would achieve more consistent outcomes than the status quo.

4.1.1 Any new access standards, if made, would likely apply to new and modified connections

If the Commission decides to introduce new access standards through this rule change process, we would need to have regard to the existing Chapter 5 framework and the status of individual connections in applying those access standards.

There are limitations on applying subsequently introduced access standards to plant that is already connected under an existing connection agreement. Existing plant is not automatically required to renegotiate its established performance standards each time the NER access standards are amended. However, where existing connected plant is subsequently altered, the processes in clause 5.3.12 may apply where the relevant conditions are met, including where an alteration affects the plant's performance against a relevant technical requirement. The Package 2 final determination similarly notes that clause 5.3.12 does not, of itself, require all existing plant to be reassessed against the standards applicable to a new connection.

We will consider these matters further in considering whether or not to implement new access standards in this rule change. In doing so, the Commission will consider how the reforms can be implemented effectively while providing appropriate certainty for existing participants and connection applicants progressing through the connection process.

4.2 We are consulting on communications, telemetry and remote-control access standards

The rule change request is seeking to implement new communications, telemetry and remote-control access standards for large IBLs to provide real-time data on active and reactive power consumption, as well as connection point voltage and frequency. These requirements would establish a consistent baseline for the provision of real-time operational information to AEMO and NSPs and, where appropriate, provide capabilities that support coordinated operational information provision to support the secure operation of the power system.

Clause S5.2.6 of the NER currently imposes communication and remote monitoring and control access standards for Schedule 5.2 plant, including generating systems, integrated resource providers and synchronous condensers.[92] As a starting point for consultation, we are after feedback on whether these standards could apply to large IBL under Schedule 5.3, and if not, why not or what might need to be modified. We consider it appropriate to start with considering Schedule 5.2 as taking this approach would leverage established technical requirements that are already familiar to connecting parties, NSPs and AEMO and may reduce complexity by building on existing concepts and technical requirements rather than creating anew framework for large IBLs.

Question 8: What communications, telemetry and remote-control requirements are appropriate for large IBL?

We are seeking stakeholder feedback on the proposed telemetry and communications requirements and the development of any future access standard requirements.

In addition to feedback on the proposed minimum and negotiated access standards, we are interested in stakeholder views on a range of design and implementation issues, including:

- what responsibilities should lie with DNSPs, TNSPs and AEMO in terms of data sharing, and how should joint planning to ensure connections do not compromise other parties

92 NER Clause S5.2.1(a)

- how prepared are networks, particularly DNSPs, to facilitate this real-time communication
- what real-time information sharing currently occurs between NSPs and large IBL
- what costs and practical difficulties will large IBLs have in meeting these proposed monitoring obligations, including managing confidential information.

4.2.1 We are seeking stakeholder feedback on a new access standards for real-time information sharing

Minimum Access Standard (MAS)

One option would be to develop a MAS that would apply to large IBLs of 30 MW or greater,and IBLs below 30 MW with significant cumulative impact (which represents combined behaviour of large IBLs that may give rise to an insecure operating state). Its purpose would be to provide SCADA/telemetry for the plant, providing real-time access for NSPs and AEMO to:

- active power
- reactive power, where transmission-connected. [93]

The MAS would require large IBLs to provide remote monitoring equipment to transmit to AEMO's control centres in real time. The minimum standard would only require this information to be transmitted to AEMO and would not impose requirements for the receipt of information from AEMO. The minimum standard would also place requirements on the connecting party to arrange the installation and maintenance of any telemetry installed, in accordance with NER rule 4.11. Failure to maintain the equipment in accordance with the appropriate standards would result in a tier 3 civil penalty.[94]

Under this approach, the connecting party would be required to provide and maintain a telephone facility for the purposes of operational communications between the plant's responsible operator and AEMO's control centre. They would also need to provide electricity supplies for remote monitoring equipment and remote control equipment and have the capability keep such equipment available for at least 1 hour following total loss of supply at the connection point.

These requirements would be based on the requirements for Schedule 5.2 participants, and would help to ensure that AEMO is able to maintain awareness of large assets in the network and communicate with operators as needed.

Automatic Access Standard (AAS)

In addition,we are considering whether there is a need for a new AAS that would also apply to large IBL of 30MW or greater, or IBL with significant cumulative impact. To meet the AAS, the connecting party must have remote monitoring equipment capability of transmitting the quantities AEMO reasonably requires to discharge its market and power system security functions set out in Chapters 3 and 4 or the NER. These include:

- connection point voltage and frequency,
- circuit breaker status,
- tap-changing transformer tap position(s) and voltages,

93 In Access Standards Package 2, large IBL is already required to monitor this information. The minimum access standard would require them to further communicate this information in real time to AEMO, in line with current NEM data communication standards for Schedule 5.2 participants.

94 NER clause 4.11.1(b).

- either the number of identical generating units operating or the operating status of each non-identical generating unit.

These quantities would give AEMO real-time situational awareness at the point of connection, as well as greater information about the operational status of a data centre. We're interested in stakeholder feedback on whether these are the right quantities for the AAS.

In addition to the above, scheduled loads would be required to share the following values, necessary for AEMO to manage dispatch:

- maximum active power limit
- minimum active power limit
- maximum active power raise ramp rate
- maximum active power lower ramp rate.

Data would be provided automatically to NSPs and communicated between NSP and AEMO control rooms in the same manner that network and generation information is currently exchanged.

Under the AAS, large IBL would also provide AEMO the capability to remotely control the voltage control set point and voltage control mode (where applicable), and also active power limit and active power ramp limits. This would be used as a last resort security tool, allowing AEMO the ability to limit the rate of load change or shed load to maintain grid security.

Further to the telephone and electricity supply requirements in the MAS, plant would be required to provide two separate telephone facilities, and be able to supply backup power to remote control and monitoring equipment for at least 3 hours. These requirements would also be consistent with the automatic access standard for Schedule 5.2 participants.[95]

Requirements for large IBLs would be determined through the connection process, with NSPs and applicants negotiating an access standard between the minimum and automatic standard where appropriate, and AEMO advisory matters applying as relevant. This approach provides flexibility to account for site-specific circumstances while maintaining a common framework for operational visibility.

4.2.2 We are interested in stakeholder views on the benefits of data provision to NSPs and AEMO

AEMO oversees millions of separate electricity supply and demand decisions in real time every day. To do this safely, securely and at the lowest cost for consumers, AEMO requires information that provides situational awareness of network and system conditions.

To anticipate changes and maintain the supply-demand balance, system operators require visibility of system and plant conditions and an understanding of how those conditions may change. This information must be comprehensive and available within operational timeframes. Examples include real-time electrical demand, generation output, wind and solar forecasting data, demand response availability, battery state of charge, system voltages, system frequency and power flows on major network elements.

Generators are subject to well-established communications and telemetry obligations under clause S5.2.6.1 of the NER. By contrast, equivalent requirements for loads are generally imposed through connection agreements at NSP discretion under clause S5.3.9, rather than through a consistent rule-based framework. Historically this has been manageable because most loads exhibited relatively stable and predictable demand patterns.

95 These requirements would be based on NER clause S5.2.6.2

However, the fast-changing and potentially less predictable nature of large IBLs means that AEMO and NSPs may require greater operational visibility to maintain system security. The Commission has heard from AEMO and stakeholders that they often lack access to information regarding the operating status and consumption of large IBLs.

This issue is compounded by the fact that the impacts of large IBLs may extend beyond the network to which they are directly connected. DNSP-connected loads may affect TNSP networks, while loads connected to one distribution network may affect other electrically close distribution networks.

The Commission is interested in stakeholder views about whether enabling AEMO and NSPs to access to this information would result in them better able to:

1. maintain awareness of the operating status of large IBLs
2. investigate unusual operating behaviour
3. coordinate operational responses to emerging security risks
4. implement operational interventions, including load curtailment as a last resort, where required to maintain power system security.

We are interested to understand whether stakeholders agree that introducing new access standards in the NER, would ensure real time monitoring requirements are consistent and predictable for all parties. Some networks and jurisdictions are already requiring large IBL to include communications capabilities in new connections. For example, SA's *Technical Regulator Guidelines: Requirements for Data Centres* requires that large data centres provide SCADA and telemetry for real time monitoring, or Endeavour Energy, a NSW DNSP, publishes detailed standards for communications equipment to ensure a base level of communications capability. Stakeholders routinely tell us that the more alike access standards are between different networks and jurisdictions, the more efficient the connections process is. The Commission aims to strike a balance between providing greater clarity, consistency and investor certainty through requirements set out in the NER, while retaining the flexibility within the access standards framework for different outcomes to be negotiated between the minimum and automatic access standards where appropriate to the circumstances of a particular connection.

4.2.3 The instability monitoring requirements under the new Access Standards Package 2 final rule may set a basis for telemetry requirements

The Commission encourages NSPs, when progressing current and upcoming large IBL connections, to consider the potential real-time telemetry requirements being consulted on through this rule change. Early consideration could help ensure that monitoring and communications arrangements agreed through the connection process are capable of supporting any future operational visibility requirements, while avoiding unnecessary rework or disruption to connection processes if new requirements are subsequently introduced.

The Access Standards Package 2 final rule provides a useful foundation for this. In particular, the new instability access standard requires relevant large IBLs to have capabilities to detect instability at their connection point and exchange information with AEMO and the relevant NSP. For IBLs of 100 MW or more, the framework also provides for access to a phasor measurement unit (PMU), subject to the applicable access standard and aggregation arrangements. PMUs provide high-resolution voltage and current measurements that support the detection and management of power system instability. [96]

96 AEMC, *Improving the NEM access standards - Package 2, final rule determination*

These requirements have been designed primarily to support the detection, analysis and management of instability, rather than to establish the broader real-time operational visibility framework being considered through this rule change. The Commission also notes that this would not capture connections between 30 and 100 MW. Nevertheless, there may be opportunities for monitoring equipment installed to meet the instability access standard to also support the provision of real-time operational information, where it can be configured to provide the data and granularity required by AEMO and NSP control rooms. Further, the Commission understands from some bilateral discussions with stakeholders that early contemplation of the installation of real time telemetry devices could reduce overall system costs in the long term (e.g. it may be cheaper to consider real time telemetry during early design phases).

Early consideration by NSPs of the potential real-time telemetry requirements, to the extent it is possible under the existing provisions of the NER, is particularly important because, as noted in section 4.1.1, there may be limitations on the extent to which new access standard requirements can subsequently be applied to plant with established performance standards and connection agreements.

While the Commission encourages NSPs to consider whether monitoring and communications infrastructure can practicably be configured to support the potential future provision of real-time telemetry, it does not prejudge the Commission's final decision on the proposed telemetry requirements. We also seek to reduce the risk that connections progressing during the rule change process need to revisit monitoring arrangements if the parties do not finalise their connection agreements by the time we make any final rule. This would support a more consistent and efficient transition if new requirements are ultimately introduced.

The Commission invites stakeholder feedback on this consideration, including the practicality and costs associated with leveraging the instability monitoring standards.

4.2.4 We are interested in the costs of providing real time information

Much of the real-time information currently used to support power system operation is transmitted through supervisory control and data acquisition (SCADA) systems. However, a range of communication pathways exist. SA Power Networks' technical requirements for embedded generation contemplate a range of communications pathways, including optical fibre, radio and mobile carrier networks, with the appropriate arrangement depending on the circumstances of the connection.[97]

The availability and configuration of communications infrastructure may differ across the transmission, sub-transmission and distribution networks. In particular, telecommunications pathways may be less uniform for connections deeper within distribution networks. Establishing the communications infrastructure necessary to provide real-time information may therefore involve different technical requirements and costs depending on the location and characteristics of a connection.

This may be particularly relevant for large IBLs, including data centres, seeking to connect deeper within distribution networks. Where suitable communications infrastructure is not already available, additional infrastructure may be required to provide relevant control rooms with timely and reliable visibility of these facilities. Any requirements for real-time information should focus on the information and performance required, rather than unnecessarily prescribing the telecommunications technology through which that information must be provided. We are

97 SA Power Networks, 2025. Technical standard - TS134 - Communication systems (inc SCADA) for embedded generation. p.11-12

interested in stakeholder views on the potential costs associated with augmentations required to provide the appropriate information to control room and network operators.

4.3 We are consulting on a new access standard to manage the rate of change of active power

We are interested in views on whether or not large IBLs should be subject to a new access standard that manages the rate of change of active power (RoCAP). AEMO's rule change request calls for the AEMC to consider the need for appropriate limits on the RoCAP. However, the rule change request does not provide further details on how this may be implemented within the NER. The Commission has worked closely with AEMO staff in developing this initial approach for stakeholder consultation.

Currently, loads are not required to adhere to communications and telemetry standards that apply to generators and bi-directional plant. These standards require generators and bi-directional plant to install systems that monitor energy import and export characteristics at the connection point and communicate this information to AEMO control rooms to facilitate real time operation of the power system to maintain voltage and frequency at a stable level.

Chapter 10 of the NER defines the ramp rate as the rate of change of active power (expressed as MW/minute) required for dispatch. The Commission notes that in the context of data centres, the term 'ramping' has been used to also refer to rate at which the nameplate rating of the plant may change over time. For avoidance of doubt, for the remainder of this sub-section the term 'ramping' will mean the RoCAP. Should the Commission continue to develop this access standard, any rules drafted will seek to align with established terminology in the NER where appropriate.

As a starting point for consultation, the Commission has set out some initial ideas on what minimum and negotiated access standards for active power management of large IBLs could be, in response to issues raised in the rule change request.

Question 9: How should rate of change of active power from large IBL be managed?

We are seeking stakeholder feedback on the proposed active power management framework and the development of any future access standard requirements.

In addition to feedback on the proposed minimum and negotiated access standards, we are interested in stakeholder views on a range of design and implementation issues, including:

- Measurement of ramping requirements, including whether rates of change in active power should be measured and assessed for compliance purposes differently to a linear movement in MW/minute
- Further technical analysis and modelling, including the appropriate inputs, assumptions and outputs that may be required to refine the proposed automatic access standard values
- Application of access standard principles to aggregated facilities, including whether existing principles relating to aggregation remain appropriate and how these principles should be applied in the context of large IBLs
- Compliance, monitoring and enforcement arrangements, including appropriate telemetry requirements, methods for detecting breaches of ramping limits, governance arrangements, and the role of penalties in supporting compliance

- Alternative implementation approaches, including whether active power management requirements could be more effectively implemented through other mechanisms, such as a case-by-case assessment framework or a tiered approach that differentiates requirements based on facility characteristics or system needs.

4.3.1 Rate of change of active power is currently managed through the central dispatch process

The existing NER framework manages changes in the active power of scheduled resources through the central dispatch process.[98] Rather than imposing a general maximum rate limit up to which these resources can change their active power output, the framework requires participants to provide information about the resource's ramping capability, which is then taken into account by NEMDEwhen issuing dispatch instructions.

Chapter 3 of the NER requires scheduled resources to participate in central dispatch.[99] Chapter 10 of the NER defines a scheduled resource to include:

- scheduled and semi-scheduled generating units
- scheduled bi-directional unit
- wholesale demand response unit
- scheduled network service
- scheduled load
- voluntary scheduled resource (other than a hibernated voluntary scheduled resource).

AEMO operates the dispatch process to balance supply and demand, maintain power system security and maximise the value of spot market trading based on dispatch bids.[100]

The existing requirements establish a minimum level of ramping capability that a scheduled resource must generally make available to the dispatch process. They do not establish a general maximum rate of change below the physical capability of the resource.

Rather, the upper bound on a bid ramp rate is the maximum ramp rate of the resource notified to AEMO, through its bid. The NER however specifies some technical requirements for controlling changes in active power over a dispatch interval. Clause S5.2.5.14 sets technical requirements for controlling active power changes within a five-minute dispatch interval, including linear ramping and increasing or reducing active power at a constant rate in response to instructions.

Participants must provide AEMO with up and down ramp rates for their scheduled (and in some cases semi-scheduled) resources. For a scheduled load, these ramp rates form part of its dispatch bid for each trading interval. The ramp rate represents the highest rate at which the resource can move between consumption points and is used by NEMDE as an input to dispatch.

Clause 3.8.3A establishes minimum and maximum bounds on the ramp rate that may be submitted by a market participant. For a non-aggregated scheduled load, the minimum ramp rate requirement is the lesser of 3 MW/minute or 3 per cent of its maximum consumption, subject to the applicable rounding requirements. The bid ramp rate must also not exceed the resource's maximum ramp rate provided to AEMO. A participant may submit a ramp rate below the minimum

98 NER clause 3.8.3A.
99 NER clause 3.8.2(a).
100 NER clause 3.8.1(a)

where an event or other occurrence physically prevents, or makes it unsafe for, the plant to achieve the minimum rate.

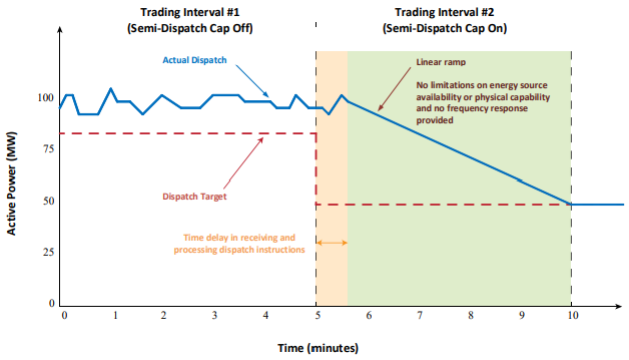
AEMO takes the submitted ramp rates into account when determining dispatch targets. AEMO's dispatch procedure states that NEMDE accounts for the applicable maximum and minimum ramp-rate requirements when producing a dispatch target. The resulting dispatch instruction specifies the active power outcome the scheduled resource is to reach at the end of the relevant trading interval.

Scheduled loads and other relevant scheduled resources are expected to ramp linearly from their initial active power to their dispatch target across the trading interval. This requirement applies independently of any maximum and minimum ramp rates, which constrain the change in dispatch target that NEMDE can determine.

This enables the dispatch process to coordinate changes in the active power of scheduled resources across the power system. A resource may be technically capable of changing its output or consumption more quickly, but its energy dispatch is shaped by the ramp rate provided to NEMDE and the dispatch target determined through central dispatch. Scheduled resources that fail to respond to their dispatch instructions within a tolerable time and accuracy may be declared non-conforming.

This framework is particularly relevant to resources such as battery energy storage systems. Where a battery is registered as a scheduled bidirectional unit, its dispatch bids must specify up and down ramp rates for both generation and consumption. AEMO's dispatch procedure also provides for a composite ramp rate where a scheduled bidirectional unit moves between generation and consumption during a trading interval.

Figure 4.2: Semi-scheduled generating unit linear ramping with no limiting factors



Source: AEMO, Dispatch procedure SOP3705, p.21.

4.3.2 The existing framework does not provide for an equivalent coordination approach for large IBLs outside central dispatch

While scheduled resources can have high physical ramping capability, the central dispatch process provides a mechanism for coordinating how that capability is used for energy dispatch. Rapid active power response can also be valuable where a resource is providing services such as FCAS. The NER separately provides for the co-optimisation of energy and market ancillary services through central dispatch.

However, this coordination depends on the load participating in central dispatch. A large IBL that is not classified as a scheduled load is not subject to the Chapter 3 scheduled-load bidding and

ramp-rate framework described above. The current Chapter 3 framework therefore does not, through these arrangements, coordinate the rate at which such a load changes its active power consumption.

While the system is currently designed to manage a single significant shift in demand over a dispatch interval, it may not be designed to manage multiple significant shifts occurring in close succession. An unexpected change in demand that is not captured through the dispatch process may need to be managed through regulation FCAS. This risk may become more significant as increasing numbers of large data centres connect with active front ends. In particular, rapid or uncontrolled changes in active power from multiple large IBLs could, in aggregate, pose risks to power system security.

This distinction is relevant to our view about the importance of enabling flexibility when it comes to participating in the market . As discussed in our advice to Ministers and in chapter 3, the Commission's starting position is that we want to preserve flexibility for large IBLs to select the level of participation in the market that best reflects their plant and business model.[101] While a large IBL that participates in central dispatch would consequently be subject to the applicable dispatch and ramp-rate arrangements, we do not consider that this will be a typical choice for a significant number of large IBLs. Therefore, relying on scheduling alone would not provide a common mechanism for managing rapid active power changes across all large IBLs.

4.3.3 We are seeking stakeholder feedback on a framework for rate of change of active power management for large IBLs

The Commission wonders whether there may be merit in implementing an access standard for the management of the RoCAP for large IBLs.

AEMO's rule change request identifies a need to manage rapid changes in large IBL demand where these may adversely affect network or wholesale market operation or power system security. It proposes establishing limits on how quickly large IBLs may change their demand over short timeframes, while retaining scope for faster changes where these are beneficial to the power system, e.g. in the provision of FCAS, in response to a fault under a remedial action scheme, as dispatched demand response. AEMO identifies access standards as one mechanism through which such ramp-rate requirements could be established.

While the rule change request does not detail a possible solution for how these limits could be provided, one way it could be is to do this through an access standard requirement. In developing the approach set out in this section, we have worked with AEMO staff on how this could best operate. The Commission is seeking views on this initial design of both automatic and negotiated access standards, the role of active power control capabilities, and the circumstances in which alternative arrangements may be appropriate. The proposed framework seeks to balance the benefits of establishing a clear baseline requirement for new connections while retaining flexibility for proponents with more advanced operational capabilities and site-specific circumstances.

Minimum standard

One way in which the minimum access standard could be specified would be to require large IBLs to operate within a fixed maximum ramp limit as a condition of connection.

We understand from AEMO that appropriate indicative ramping values for this standard could be:

- ±40 MW/min for connections in the mainland NEM

101 AEMC, 2026. Data centre energy obligation - advice to ECMC. p.6.

- ±10 MW/min for connections in Tasmania.

There may also be merit in having accompanying active power control requirements that would align with the requirements currently applicable to non-scheduled generating units under clause S5.2.5.14(a)(2) of the NER. This could include minimum requirements to:

- automatically reduce or increase the active power level within 5 minutes, at a constant rate, to or below the level specified in an instruction electronically issued by a control centre
- automatically limit the active power level, to below the level specified
- not change the active power level within 5 minutes by more than the raise and lower amounts specified in an instruction electronically issued by a control centre.

Negotiated standard

We are also after feedback on whether or not the framework should enable a large IBL to negotiate an access standard that allows a faster rate of active power change than that allowed under the minimum access standard.

Under this approach, a connecting party would be able to propose a higher ramping value where it can demonstrate that appropriate monitoring, visibility and control capabilities are in place, and that the proposed operating characteristics can be accommodated without adversely affecting power system security. This would be consistent with the negotiated access standard framework set out in clause 5.3.4A(b)(2) of the NER.

4.3.4 We are seeking feedback on not having an automatic access standard under this approach

We are interested in views on whether or not an automatic access standard for active power management is necessary. An automatic access standard would need to specify a level of performance that could be accepted without negotiation because the associated changes in active power would be unlikely to pose a material system security risk. However, the appropriate ramping capability of a large IBL may depend on its size, connection point and local power system conditions. Setting a single automatic standard may therefore either be unnecessarily restrictive for some large IBLs or provide insufficient protection in other circumstances.

Our initial view is therefore that a minimum and negotiated standard may provide a more appropriate framework. The minimum standard would establish the lowest level of performance that all large IBLs must be capable of meeting, while allowing AEMO, NSPs and connecting parties to negotiate a more appropriate level of performance having regard to the circumstances of the connection.

There is also currently limited experience within the NEM and internationally from which to establish a sufficiently robust range of acceptable ramping values that could be used to define both minimum and automatic access standards. Available international experience indicates that active power ramp rate requirements are typically specified as fixed limits, with values generally ranging between approximately 10 MW/min and 60 MW/min depending on the characteristics and operational needs of the relevant jurisdiction. This further suggests that it may not be appropriate to define an automatic access standard at this stage.

An overview of some ramping limits applied in some international jurisdictions are set out in Table 4.1 below.

Table 4.1: Ramping limits applied across international jurisdictions

Jurisdiction	Ramping limit
Energinet	60MW/min
FinGrid	Adjustable from 5% to 100% of the maximum and minimum active power nameplate output, but with a maximum limit of 50MW/min
MISO [1]	30MW/min
American transmission company (ATC)	• less than 25MW for any period of time less than 5s • change in active power that is greater than 50MW should be limited to a rate of change less than 0.5MW/s
Alberta Electric System Operator (AESO)	10MW/min
Le Resea de Transport d'Electricite	Defined on a case by case basis
Southwest Power Pool	Defined on a case by case basis

Source: [1] MISO, Large load interconnection reliability requirements, p.12.

At this stage, the Commission considers that a set ramping limit could provide a simple and transparent approach, align with international practice, and provide a strong basis for determining system requirements and maintaining power system security and reliability. However, our thinking is preliminary. Stakeholder views will be important in determining what, if any, ramping requirement should apply. At this point in time, we do not consider that the available evidence does not currently supports the development of an access standard that sets out a range of permissible ramping control limits across all large IBL connection scenarios.

Therefore, our initial view is that adopting a minimum access standard only, combined with the ability to negotiate alternative arrangements where appropriate, is likely to provide sufficient flexibility while the evidence base for active power management requirements continues to develop.

4.3.5 Determining an appropriate ramp rate limit will require consideration of system-wide and local impacts

In determining an appropriate rate of change of active power requirement, we will need to consider how rapid changes in demand may affect both the power system as a whole and the network in the vicinity of an individual connection.

As discussed in Access Standards Package 2, aggregation of plant can be considered at the connection point when assessing the technical performance of an individual connecting facility. However, changes in active power demand can also affect power system frequency and therefore have impacts beyond the immediate connection point. This becomes particularly important where changes in demand across multiple large IBLs occur at the same time or in close succession. We are therefore considering how a ramp rate requirement should account for both the behaviour of an individual facility and the potential aggregate behaviour of large IBLs across the power system.

Through our engagement with AEMO, we understand that a number of technical considerations may be relevant when determining an appropriate ramp rate. These include:

- **frequency impacts**: considering whether changes in active power demand can be accommodated while maintaining frequency within applicable operating limits, including where multiple large loads change demand at or around the same time

- **voltage impacts**: considering how rapid load changes may affect local network voltages and whether available voltage control equipment can adequately manage these changes
- **power quality**: considering whether shorter-duration or cyclic changes in active power could contribute to voltage fluctuations, flicker or harmonic distortion at the connection point
- **power system stability**: considering whether repeated or cyclic variations in demand could interact with existing power system oscillatory modes or other control systems
- **the cumulative impact of large IBLs**: considering whether a ramp rate that is manageable for an individual facility remains appropriate where multiple facilities exhibit similar or correlated behaviour.

These considerations may arise over different timescales. For example, changes occurring over minutes may primarily affect the balance between generation and demand and the ability of frequency control services to respond, while second and sub-second variations can also raise local power quality and stability considerations. The appropriate regulatory response may therefore need to distinguish between large movements in active power over a dispatch interval and much faster or cyclic variations in demand, rather than seeking to manage all forms of active power variability through a single ramp rate.

A further consideration is how the framework should manage aggregation and correlated behaviour across multiple facilities. A uniform ramp rate could provide a clear and predictable baseline for individual large IBLs. However, a rate that is appropriate when facilities operate independently may not necessarily manage the system-wide impact if a number of large IBLs ramp in the same direction at the same time. The potential for correlated behaviour is therefore relevant to both the initial design of the ramping requirement and whether the framework needs mechanisms to manage particular system conditions or locations over time.

4.3.6 Ramping levels will need to balance system security needs with technology availability

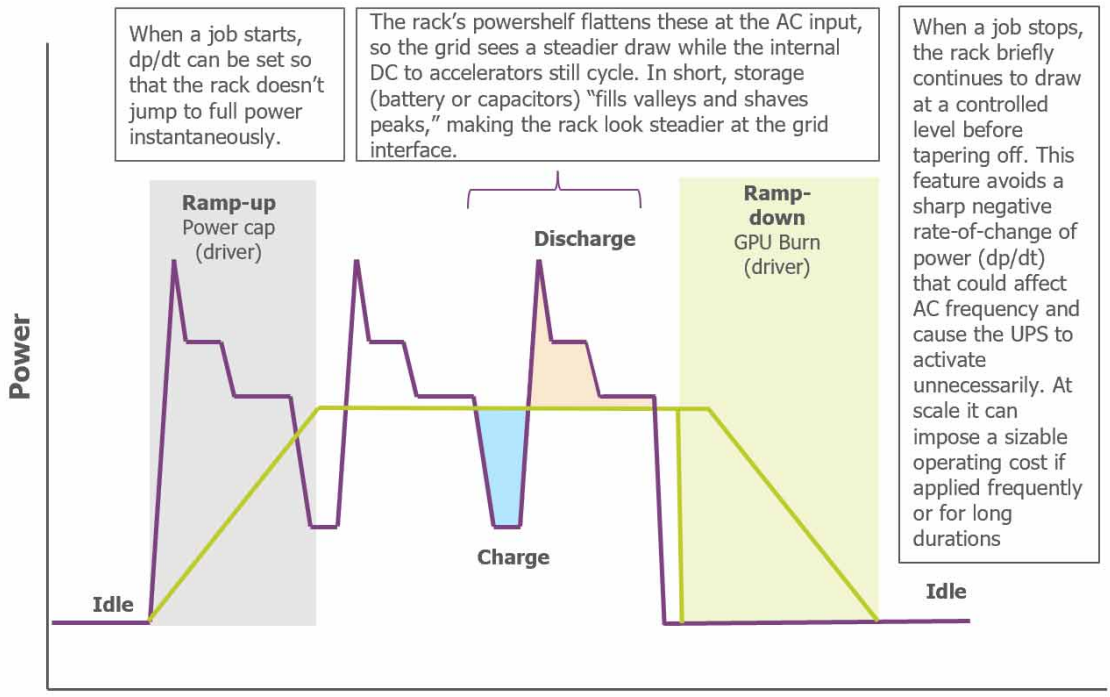
We are acutely aware that technologies for managing rapid changes in active power are continuing to develop - and that large IBL have different operating models and characteristics. AusNet and Bespoke Energy identify a range of approaches being developed by data centre proponents and equipment manufacturers to shape the power profile seen by the grid. These include rack-level controls, power capping, workload management and energy storage. However, these capabilities are still emerging and are not universally adopted.[102]

Broadly, these technologies may assist in managing three aspects of a large IBL's power profile:

- **Ramp-up:** controls can limit how quickly power demand increases when a workload starts. AusNet describes a "gentle start" approach under which input power rises progressively to keep the rate of change of active power within a defined envelope. Workload staggering and site-level ramp limits may provide complementary approaches.
- **Managing variability during operation:** fast energy storage, including capacitors incorporated into rack-level power systems, can smooth short-duration variations in computing demand. Energy storage charges during troughs and discharges during peaks, allowing the grid to see a smoother power profile than the underlying computing load.
- **Ramp-down:** controls can reduce the rate at which demand falls when a workload finishes. AusNet identifies approaches that temporarily maintain GPU activity before progressively reducing demand, alongside alternatives including workload scheduling, power capping and on-site energy storage.

102 AusNet and Bespoke Energy, 2026. Integrating data centres - prioritising power system integrity challenges in the NEM. p.48-50.

Figure 4.3: Rack-level technologies currently being considered



Source: AEMC, based on AusNet and Bespoke Energy, 2026. Integrating data centres: prioritising power system integrity challenges in the NEM. White paper. p.48-50.

These approaches may have different technical and cost implications. For example, maintaining GPU activity to support a controlled ramp-down can consume energy and, if applied frequently or for extended periods, could impose a material operating cost. It suggests that this approach therefore needs to be considered alongside alternatives such as workload scheduling, power capping and energy storage.

Our initial view is that any rate of change of active power requirements should balance the level of ramping that can be accommodated securely by the power system with the capabilities reasonably available to large IBLs to manage their grid-side demand. We are interested in stakeholder input on these technologies, including whether particular ramping requirements could have material implications for equipment design, energy consumption, maintenance or operating costs, and how these capabilities are expected to evolve over time.

5 We are seeking feedback on implementation considerations

5.1 We are seeking to balance timely implementation with a practical and robust delivery pathway

In light of the substantial number of large IBL, mainly data centres, currently seeking connection to the NEM, there are likely to be benefits from implementing any new arrangements for large IBLs in a timely manner.[103]

We consider that timely implementation is likely to maximise benefits of more efficient integration and visibility - as well as providing regulatory predictability to the sector. Providing early clarity on the future regulatory framework would help connecting parties, NSPs and AEMO make informed investment and implementation decisions. Our proposed assessment criteria therefore include both timely implementation and the need for a proportionate regulatory response that minimises implementation costs, complexity and delay (see chapter 6 for further details on the Commission's proposed assessment criteria).

These assessment criteria will assist us in thinking through the most appropriate implementation pathway, including transitional arrangements and whether staged commencement would be appropriate. Ultimately, the implementation pathway must:

- allow AEMO, NSPs and affected connecting parties sufficient time to make necessary system, process and operational changes
- manage interactions with other reforms, such as changes that affect the same systems and processes
- provide sufficient regulatory certainty for large IBLs progressing through the connection process
- minimise the risk of inefficient expenditure or unintended consequences
- ensure that transitional arrangements appropriately address both new and existing large IBLs.

The Commission has not formed a view on the appropriate commencement date or whether a staged implementation approach would be necessary. We will develop those arrangements having regard to the final policy design, the changes required to implement it and stakeholder feedback on costs, sequencing and readiness.

5.2 We are prioritising early engagement with AEMO to support a timely implementation pathway

The potential reforms considered in this consultation paper could affect a number of AEMO's operational and market systems. Depending on the final rule (if any), changes may be required to a wide range of systems and processes, including (for example):

- registration processes
- operational forecasting and PASA
- SCADA and telemetry arrangements
- updates to relevant access standards

103 The Hon Chris Bowen MP, Minister for Climate Change and Energy, has written to the AEMC and AEMO supporting consideration of mandatory registration and encouraging close collaboration to implement any final rule promptly. The Minister noted that registration would provide a foundation for this rule change and other future reforms related to data centres.

- external reporting.

Experience from other reforms indicates that interactions between different requirements can materially affect implementation complexity.

To support timely and effective implementation, the AEMC is working closely with AEMO during the early stages of policy development. This is intended to:

- identify material system and process impacts before the policy design is settled
- understand dependencies between proposed requirements
- test whether alternative designs could achieve the policy objective at lower cost or with less implementation risk
- identify interactions with AEMO's existing reform program
- inform realistic commencement and transitional arrangements.

This engagement will inform, but not determine, the Commission's policy assessment. The Commission will continue to assess the available options against the NEO, including the expected benefits and costs.

5.3 Implementation costs may fall across several affected parties

The Commission will assess implementation and ongoing costs across the range of affected parties. We are also actively engaging with AEMO to understand implementation impacts and considerations.

We are interested in stakeholder views on the types and magnitude of costs that different parties could be exposed to.

5.3.1 Costs for AEMO

The potential reforms considered in this consultation paper could affect a number of AEMO's operational and market systems.

Experience from other reforms indicate that interactions between different requirements can materially affect implementation complexity.

To support timely and effective implementation, the AEMC is working closely with AEMO during the early stages of policy development.

This engagement will inform, but not determine, the Commission's policy assessment. The Commission will continue to assess the available options against the NEO, including the expected benefits and costs.

The Commission will also consider ongoing administrative and operating costs, including costs associated with data validation, compliance monitoring, participant support and maintaining procedures and guidelines.

5.3.2 Costs for large IBL developers and operators

Depending on the final policy design and the capability of existing facilities, costs for connecting applicants and large IBL operators could include:

- preparing and maintaining registration information
- providing planning and forecasting data
- installing or upgrading telemetry, communications and remote-monitoring equipment

- establishing interfaces with NSP or AEMO systems
- installing active-power-control capability
- undertaking modelling, testing and compliance activities
- changing operational processes and maintaining ongoing data quality
- modifying existing plant to meet requirements that were not anticipated when the facility was designed.

The magnitude of these costs may differ materially between new facilities and existing facilities. New facilities may be able to incorporate requirements during design and procurement, while existing facilities may require retrofit work. Costs may also vary across transmission and distribution connections and according to the facility's size, technical configuration and existing communications capability.

5.3.3 Costs for NSPs

NSPs may incur costs to:

- modify connection and assessment processes
- receive, validate, store and exchange additional planning or operational information
- establish or upgrade telemetry and communications pathways
- integrate large IBL information into network operations and planning
- coordinate information sharing between DNSPs, TNSPs and AEMO
- assess compliance with any new access standards or operational requirements
- manage transitional arrangements for projects already in the connection pipeline.

These impacts may differ between NSPs depending on existing systems and practices. In particular, the Commission is interested in whether DNSPs would require new capability to provide AEMO and upstream NSPs with timely access to information from distribution-connected large IBLs.

5.3.4 Costs for retailers

The Commission also recognises that the proposed registration framework may have implications for retailers, depending on how roles and responsibilities are allocated between large IBL owners or operators and their retailers. This may include costs or risks associated with complying with, or supporting compliance with, new registration and access standard requirements. The Commission notes that any new requirement would be designed not to be passed down to small customers.

The Commission is seeking stakeholder views on the nature and materiality of any costs or risks for retailers, including whether particular aspects of the proposed registration or access standards framework could create additional obligations, implementation costs or commercial risks for retailers.

5.4 The wider NEM reform program may constrain implementation capacity

The implementation of new regulations for large IBL would occur during a period of substantial concurrent NEM reforms.[104] This can create reform implementation congestion, which may impact the implementation time for a final rule (if any).

While not inferring equivalence between IPRR and large IBL reforms on potential implementation costs, complexity or delays, we note the current issues AEMO is experiencing in implementation the IPRR framework:[105]

> In April 2026, AEMO took the prudent decision to pause project delivery [of IPRR] and to assess and explore alternative approaches with stakeholders to reduce implementation risk accounting for the existing reform landscape.
>
> A combination of technical solution complexity and the impact of reform implementation congestion were the principal drivers leading to the pause decision. Reform congestion is also impacting AEMO's IPRR delivery capacity with competing priorities across an extensive reform program.

Consequentially, the time to implement a final rule (if any) in this rule change process would be highly dependent on the complexity and scale of system and process changes required by a final rule, and AEMO resourcing availability to implement changes alongside other existing implementation programs. While the timely implementation of new regulations would deliver additional benefits, there may be consequential costs or impacts to the implementation of other reforms.

The Commission will therefore consider:

- the scale and complexity of changes required across AEMO systems
- the implementation effort required from NSPs, connecting applicants and other affected parties
- dependencies on related reforms or foundational system changes
- opportunities to sequence related changes efficiently
- the consequences of delaying benefits compared with the risks and costs of compressed implementation
- the lead time required to update procedures, guidelines, connection processes and supporting systems.

5.5 Staged implementation may support earlier delivery of priority capabilities

A staged approach may provide a way to deliver priority elements of the reform while managing more complex system changes over time. This could involve commencing different obligations at different times, applying initial arrangements to a defined cohort, or progressively introducing functionality as systems and participants become ready.

104 Example NEM reforms include (without limitation): Improving security frameworks, Project EnergyConnect market integration, Flexible trading arrangements, Cash security, Integrating price responsive resources into the NEM, Inverter dispatch, ST PASA replacement, NEM external identity and access management, Industry data exchange, Real-time data for consumers, and Improving compensation frameworks.

105 AEMO, IPRR staged implementation approach rule change request, p.6.

There may be benefits in implementing new functionality progressively, allowing AEMO and participants to build operational experience, test systems and business processes, and incorporate lessons as implementation proceeds. A staged approach could help manage reform congestion, support participant readiness and reduce the risk of system rework.

There may be similar benefits in considering a staged pathway for the reforms proposed in this rule change. For example, subject to policy development and implementation advice, it may be possible to sequence:

1. establishment of the registration framework
2. commencement of planning and forecasting information obligations
3. implementation of real-time telemetry and communications requirements
4. commencement of any more complex operational or active-power-control requirements.

This is an illustrative sequence only. The appropriate pathway will depend on the dependencies between requirements. In particular, registration may be needed as the regulatory mechanism through which other obligations apply, while real-time or forecasting requirements may depend on AEMO and NSP systems being able to receive, validate, use and exchange the relevant information.

Staging would also involve trade-offs. It could increase administrative complexity, require affected parties to make changes more than once, or defer some of the benefits of the reform. Experience from the IPRR rule change indicates that staged delivery can create additional onboarding, administrative and transitional costs, even where it is expected to reduce larger implementation risks.

The Commission has not formed a preliminary view on whether the reforms from this rule change process should be staged. We are interested in stakeholder views on whether staging would support earlier and more robust implementation, what elements should be prioritised, and how unnecessary duplication or transitional costs could be avoided.

5.6 Transitional arrangements will need to provide certainty for projects at different stages of development

A key implementation issue is how any new requirements should apply to large IBL facilities at different stages of development, connection and operation.

There are a significant number of data centre projects in the connection pipeline. The timing of those projects means that some facilities may progress materially through the connection process, enter into connection agreements or commence operation before any final rule takes effect. Clear transitional arrangements may therefore be important to:

- provide certainty to prospective and existing connecting parties
- avoid unnecessary delays to efficient connections
- reduce the risk of avoidable redesign or duplicated investment
- preserve the benefits of applying the reforms to a sufficiently broad group of large IBLs
- recognise material differences between proposed, committed, connected and operational facilities.

The Commission is consulting on whether any proposed registration and operational requirements should apply to both new and existing large IBLs. Applying requirements to existing facilities may increase the operational visibility and system benefits achieved by the reform. Conversely, existing facilities may face material compliance costs because they were designed, contracted and

connected under the NER requirements applying at the time. Those costs could include modifications to communications, telemetry, control or other operational equipment.

It may be appropriate to differ between any proposed registration requirements and any proposed operational requirements.

For example, any new registration category for large IBLs, and the obligations attaching to such registration category, could apply prospectively from commencement to all facilities meeting the relevant criteria for large IBLs. This includes existing facilities, facilities progressing through the connection process (once operational), and future facilities, with an appropriate period for existing facilities to update their registration category and comply with any new arrangements.

By contrast, any new or amended operational requirements (including changes to access standards) that may require a facility's existing performance standards to be amended or reopened would need to be considered in the context of the Commission's rule-making process. For large IBL connection applicants that have not finalised performance standards in an executed connection agreement by the commencement of any final rule, new access standards and operational requirements would apply through the ordinary process of negotiating connection agreements and developing performance standards in line with NER requirements as in force at that time.

Potential transitional approaches could include:

- additional lead time for existing facilities, including a transitional period to register and comply with registration-related obligations
- application based on defined development or connection milestones
- staged compliance with different categories of obligation
- targeted exemptions or alternative compliance pathways where full compliance would impose disproportionate costs relative to the expected benefits.

Unlike earlier chapters in this paper, these are options for consultation rather than preliminary Commission positions. The Commission will consider whether any differentiation is justified by relevant differences in implementation cost, practicability and expected system benefits, while seeking to preserve a technology-neutral and coherent regulatory framework.

As part of our assessment of the benefits and disadvantages of applying any proposed requirements to both new and existing connections, we will consider any potential impacts on existing rights or liabilities, such as those under connection agreements. The detailed transitional arrangements will be developed once the scope and design of any proposed obligations are clearer. It is noted that while a rule may impose obligations on existing participants, amendments cannot affect the previous operation of a provision or accrued rights and liabilities under existing provisions.

5.7 We are seeking feedback on implementation considerations

The Commission seeks stakeholder views and input on the practical steps, costs and lead times required to implement the possible reforms discussed in this paper.

Question 10: How should any reforms be implemented?

We are seeking stakeholder input on:

- the changes that AEMO, NSPs and large IBL developers and operators need to make to implement the proposed reforms
- the material costs, risks and dependencies associated with implementation
- pathways and timeframes to implement reforms and comply with regulatory changes, including what transition arrangements may be required.

6 Making our decision

When considering a rule change proposal, the Commission considers a range of factors.

This chapter outlines:

- issues the Commission must take into account
- the proposed assessment framework
- decisions the Commission can make
- rule-making for the Northern Territory.

We would like your feedback on the proposed assessment framework.

6.1 The Commission must act in the long-term interests of consumers

The Commission is bound by the National Electricity Law (NEL) to only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national electricity objective.[106]

The NEO is:[107]

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

The targets statement, available on the AEMC website, lists the emissions reduction targets to be considered, as a minimum, in having regard to the NEO.[108]

6.2 We propose to assess the rule change using these four criteria

6.2.1 Our methods to analyse the proposed rule

Considering the NEO and the issues raised in the rule change request, the Commission proposes to assess this rule change request against the set of criteria outlined below. These assessment criteria reflect the key potential impacts, costs, and benefits of the rule change request. We consider these impacts within the framework of the NEO.

The Commission's regulatory impact analysis may use qualitative and/or quantitative methodologies. The depth of analysis will be commensurate with the potential impacts of the proposed rule change. We may refine these methodologies as this rule change progresses, including in response to stakeholder submissions.

106 Section 88 of the NEL.
107 Section 7 of the NEL.
108 Section 32A(5) of the NEL.

Consistent with good regulatory practice, we also assess other viable policy options - including not making the proposed rule (a business-as-usual scenario) and making a more preferable rule - using the same set of assessment criteria and impact analysis methodology where feasible.

6.2.2 Assessment criteria and rationale

The proposed assessment criteria and rationale for each is as follows:

- **Safety, security and reliability:** Under this criterion, we will assess whether potential reforms would support the safe, secure and reliable operation of the power system at least cost to consumers over the long term. We will consider whether clearer and more consistent arrangements for integrating large IBLs into the market framework can accommodate their differing technical and commercial characteristics while providing sufficient visibility to identify and manage their individual and cumulative impacts before they give rise to insecure operating conditions.
- **Principles of market efficiency:** Under this criterion, we will assess whether potential reforms would improve information transparency and support efficient operational, planning and investment decisions. We will consider whether improved visibility and operational integration of large IBLs would support more efficient forecasting, dispatch and reserve processes, while recognising the diversity of large IBLs and preserving efficient commercial arrangements and pathways for capable loads to participate in the market. Conversely, inadequate visibility and integration could increase operational risks and market inefficiencies, placing upward pressure on costs over time.
- **Implementation considerations:** Under this criterion, we will assess the practicality, timing and cost of implementing potential reforms. We will consider implementation timeframes, interactions with related reforms, and whether responsibilities are clearly allocated across market bodies and participants. We will also consider whether the proposed response is proportionate to the nature and materiality of the identified issues and risks, so that benefits can be delivered promptly as data centre connections grow while minimising unnecessary cost, complexity and delay. For example, any requirements for data sharing should balance potential benefits with implementation costs and difficulty. We will consider the costs of meeting telemetry and RoCAP control requirements (including costs associated with modelling to meet the access standard requirement), as well as the costs for NSPs and AEMO to establish communication pathways and implement any new registration requirements.
- **Principles of good regulatory practice:** Under this criterion, we will assess whether potential reforms would support a clear, proportionate, predictable and consistent regulatory framework for large IBLs. We will consider whether the framework is simple and transparent, proportionate to the nature and materiality of the identified risks, and flexible enough to accommodate different large IBL configurations and uncertainty in the scale and pace of future impacts. We will also consider whether reforms align with related large IBL and data centre reforms, promoting greater consistency across jurisdictions and network service providers and supporting a coherent regulatory framework.

Question 11: Do you agree with the proposed assessment criteria for this rule change process?

Do stakeholders agree with the proposed assessment criteria? Are there additional criteria that the Commission should consider or criteria included here that are not relevant?

6.3 We have three options when making our decision

After using the assessment framework to consider the rule change request, the Commission may decide:

- to make the rule as proposed by the proponent [109]
- to make a rule that is different to the proposed rule (a more preferable rule), as discussed below, or
- not to make a rule.

The Commission may make a more preferable rule (which may be materially different to the proposed rule) if it is satisfied that, having regard to the issue or issues raised in the rule change request, the more preferable rule is likely to better contribute to the achievement of the NEO.[110]

109 The proponent describes its proposed rule in the rule change request, pp. 19 -20.

110 Section 91A of the NEL.

Abbreviations and defined terms

AAS	Automatic access standard
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CER	Consumer energy resources
Commission	See AEMC
DNSP	Distribution network service provider
DRSP	Demand response service provider
ECMC	Energy and Climate Change Ministerial Council
ESOO	Electricity Statement of Opportunities
FCAS	Frequency control ancillary services
IBL	Inverter-based load
IPRR	Integrating price-responsive resources into the NEM
IRP	Integrated Resource Provider
ISP	Integrated System Plan
MAS	Minimum access standard
MCL	Maximum Credit Limit
MVF	Market Visibility Framework
NEL	National Electricity Law
NEM	National Electricity Market
NEMDE	National Electricity Market Dispatch Engine
NEO	National Electricity Objective
NER	National Electricity Rules
NSP	Network service provider
PASA	Projected Assessment of System Adequacy
PMU	Phasor measurement unit
RoCAP	Rate of change of active power
SCADA	Supervisory control and data acquisition
TNSP	Transmission network service provider
UPS	Uninterruptible power supply
VSR	Voluntarily scheduled resource
VSRP	Voluntarily Scheduled Resource Provider
WDRM	Wholesale demand response mechanism
WDRU	Wholesale demand response unit