AEMO
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Interim Guideline for Connection of Inverter Based Loads

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Current version release details

Version	Effective date	Summary of changes
1.0	19 November 2026	Initial version. Guideline for consultation.

Important notice

Purpose

AEMO has prepared this document to provide guidance for proponents and all parties associated with the process to connect inverter based loads to the power system.

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1. Introduction

The increasing trend of data centre connection to distribution and transmission networks has highlighted the potential impacts of inverter based loads (IBLs) on power system security and stability. There is a global recognition by network service providers (NSPs) and power system operators that more detailed original equipment manufacturer (OEM) models and formal technical performance requirements are vital to manage impacts on power system security, reliability and operability[1].

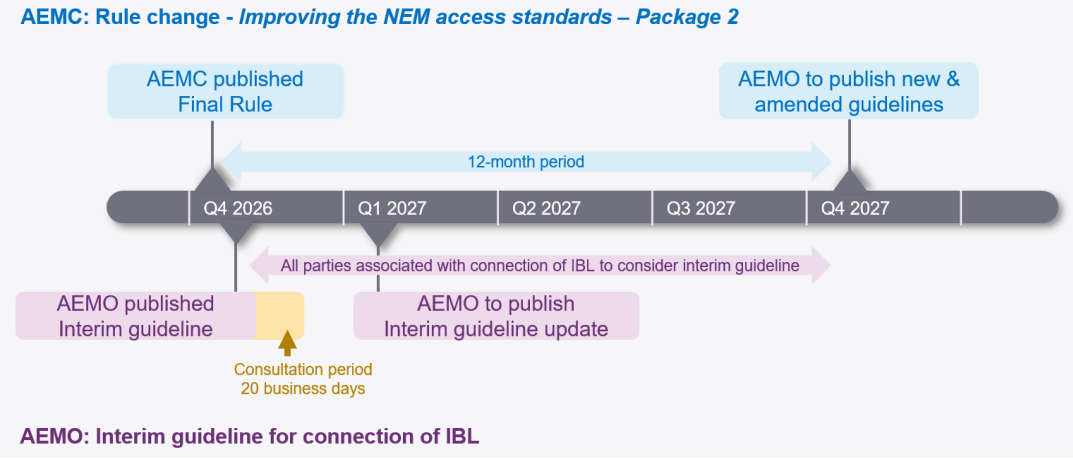
On 12 November 2026, the Australian Energy Market Commission (AEMC) published its Final Determination and Final Rule for *Improving the NEM access standards – Package 2*[2] ('the Package 2 rule change'), which includes new access standards for large IBLs in relation to disturbance ride-through and managing power system stability.

The Final Rule requires AEMO to update the Power System Model Guideline (PSMG) and the Power System Stability Guidelines (PSSG) within 12 months of its commencement[3]. It also requires AEMO to develop a new Schedule 5.3 Participant Modelling Guidelines[4], consistent with the modelling principles established by the Final Rule.[5]

This interim guideline supports a consistent approach to processing IBL connections and provides an opportunity to harmonise technical requirements while AEMO develops the new Schedule 5.3 Participant Modelling Guidelines and updates its existing technical guidelines.

All parties involved in connecting IBLs to the power system should apply this interim guideline, including any subsequent updates, until AEMO publishes the Schedule 5.3 Participant Modelling Guidelines. AEMO invites stakeholder feedback to inform the January 2027 update of this interim guideline. This is shown in Figure 1.

Figure 1 Interaction and timeline for the AEMC Package 2 rule change and the interim guideline



[1] Energy Systems Integration Group, Large Loads Performance Requirements, February 2026. At https://www.esig.energy/reports-briefs/large-load-interconnection-performance-requirements/.

[2] AEMC, Improving the NEM access standards – Package 2. At https://www.aemc.gov.au/rule-changes/improving-nem-access-standards-package-2.

[3] Clause 11.197.6.

[4] According to clause S5.3.1aa(d), AEMO may publish the Schedule 5.3 Participant Modelling Guidelines in the same document as the PSMG.

[5] Clause S5.3.1aa.

1.1. Purpose and scope of the interim guideline

The purpose of the interim guideline is to:

- Provide clarity and improve certainty for proponents and all parties associated with the process to connect IBLs to the power system.
- Harmonise NSP and AEMO requirements by providing a standardised approach in the period between publication of the Final Rule and completion of AEMO's updated guidelines[6]. This includes providing guidance on key elements, such as IBL connection size thresholds, performance expectations, and modelling requirements.

This interim guideline reflects the performance requirements introduced through the Package 2 rule change and should be read in conjunction with its Final Determination and the associated National Electricity Rules (NER) provisions. To the extent of any inconsistency between this interim guideline and the NER, the NER prevails.

Connection applicants that anticipate difficulties meeting the applicable NER requirements or the interim guideline arrangements should raise these issues with the NSP or AEMO to identify and agree a pathway forward.

Appendices in this guideline provide further guidance on interim requirements:

- Appendix A summarises the modelling, design data and operational information that IBLs may be required to provide to the NSP and AEMO during the connection process.
- Appendix B provides specific guidance for distribution connected IBLs.

An accompanying Frequently Asked Questions (FAQ) has been published to support the interpretation and application of the interim guideline for connection of IBLs.

1.2. Consultation timeline

AEMO has engaged broadly with industry stakeholders in developing this interim guideline. We appreciate the contributions made throughout this process and will continue collaborating closely with industry.

This interim guideline reflects AEMO's current approach. AEMO encourages all parties associated with the process to connect IBLs to the power system to apply this guideline and provide feedback during the 20-business day consultation period. Feedback received will be carefully considered and used to inform the update and refinement of the interim guideline, scheduled for publication in January 2027.

AEMO's expected timeline for this consultation is outlined in Table 1 below.

Table 1 Consultation timeline

Consultation	Dates
Publication of the interim guideline	19 November 2026
Webinar on the interim guideline	2 December 2026

[6] While the Package 2 Final Rule requires AEMO to develop the Schedule 5.3 Participant Modelling Guideline and amend the Power System Model Guidelines, Power System Stability Guidelines, other guidelines will also need to be updated. These include the Access Standard Assessment Guidelines and AEMO's Commissioning Guideline.

Consultation	Dates
Submissions due on the interim guideline	17 December 2026
Publication of the interim guideline update	29 January 2027

The publication date of the interim guideline update in the table above is indicative and subject to change.

1.3. Abbreviations and definitions

Terms defined in the National Electricity Law and the NER have the same meanings in this guideline, unless otherwise specified. For ease of reading, NER-defined terms are not italicised.

In addition, the words, phrases and abbreviations in the table below have the meanings set out opposite them when used in this document.

Term	Definition
AC	Alternating Current
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AFL	Available Fault Level
BESS	Battery Energy Storage System
BSP	Bulk supply point
CMLD	Composite Load Model
DC	Direct Current
DRT	Disturbance ride-through
DNSP	Distribution Network Service Provider
DSO	Distribution System Operator
EMT	Electromagnetic Transient
FAQ	Frequently asked questions
FCAS	Frequency control ancillary services
HIL	Hardware in loop
HVAC	Heating, Ventilation, and Air Conditioning
IBL	Inverter Based Load
IBR	Inverter Based Resource
IEEE	Institute of Electrical and Electronic Engineering
IGBT	Insulated-Gate Bipolar Transistor
LIBL	Large Inverter Based Load
LV	Low Voltage
MV	Medium Voltage
MW	Megawatt
MVA	Mega Volt-Ampere
NEM	National Electricity Market
NER	National Electricity Rules
NSP	Network Service Provider
OEM	Original Equipment Manufacturer

Term	Definition
PERC	Power Electronic Reconnecting and Ceasing
PLL	Phase Locked Loop
PMU	Phasor Measurement Unit
PSCAD	Power System Computer Aided Design
PSDS	Power System Design and Settings Datasheet
PSMG	Power System Model Guideline
PSSG	Power System Stability Guideline
PSS®E	Power System Simulation Engine
RMS	Root Mean Square
RUG	Releasable User Guide
SCADA	Supervisory Control and Data Acquisition
SCR	Short Circuit Ratio
SMIB	Single machine infinite bus
SSIAG	System Strength Impact Assessment Guide
SSR	Sub-synchronous resonance
TNSP	Transmission Network Service Provider
UPS	Uninterruptible Power Supply

2. Inverter based loads

2.1. Inverter based load definition

The NER includes the following definitions:

'*inverter based load*'

> 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.

'large inverter based load'

> An i*nverter 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.

'*Uninterruptible power supply (UPS)*'

> Equipment that is:
>
> a) designed and operated primarily to maintain continuity of *supply* to a *connected load*, including when the normal supply to that *load* is interrupted or is outside specified operating limits; and
>
> b) not designed or intended to export *active power* to the national grid through the *connection point*.

There are several technologies used in IBLs. A passive interface structure, such as a diode bridge rectifier, relies on natural or uncontrolled conduction and typically does not introduce control system stability problems.

The most common structure of the active front-end converters (e.g., commonly Insulated Gate Bipolar Transistor (IGBT)-based) of IBLs is similar to voltage source converters used in inverter based resources (IBRs). Their control system depends on a phase locked loop (PLL) system to track the grid phase angle and frequency to maintain synchronism with the grid.

Plant with PLL-based active front-end converters are considered IBLs and they are susceptible to control system stability problems, similar to IBRs, when there is a grid disturbance or if the PLL is unable to maintain grid synchronisation. For example, data centre UPS systems with PLL-based active power control may exhibit control interactions that increase instability problems and system security risks.

Other technologies that do not rely on PLL synchronisation are expected to also be classified as IBLs and their treatment will depend on their performance characteristics and ability to meet the access standards.

There are also data centre configurations that are a hybrid of an IBL and other plant, including battery energy storage systems (BESS) or generating systems, including IBRs, and synchronous condensers. More scenarios are described in the FAQ document.

2.2. Treatment of inverter based loads (below 30 MW)

The NER sets out the applicable access standards for IBL under NER Schedule 5.3. These are proportionate to the risk presented by their connection, as determined by the NSP.

NER Schedule 5.3 applies to IBLs with active power below 30 MW where the NSP assesses that:

- The operation or connection of the IBL is expected to adversely affect on the quality and security of network services to other Network Users. The extent to which Schedule 5.3 access standards apply depends on the expected impact assessed by the NSP.
- There may be an aggregate impact[7] of the IBL connection together with any other inverter based load connections, including existing and planned new connections, where:
    - those other connections are electrically proximate, and
    - the NSP considers that it would be reasonable and appropriate to consider the aggregate impact of those connections, having regard to their electrical configuration.

For the final dot point dealing with aggregation, the relevant NER Schedule 5.3 access standards apply, subject to the applicability provisions of each standard.

2.3. Treatment of large inverter based loads

NER Schedule 5.3 access standards apply in respect of large inverter based loads (LIBLs) (e.g., ≥30 MW), subject to NER S5.3.1a and the application provisions and requirements of each technical standard.

The 30 MW nameplate threshold applies both to an individual IBL and to an IBL comprising multiple elements or pieces of equipment covered by a single connection agreement.

Separately, under NER S5.3.1a(b)(2), the NSP may treat an IBL as a LIBL having regard to the aggregate impact of that connection together with other IBL connections, as outlined in the previous section. This approach reflects the potential impact of those IBLs on the power system.

2.4. AEMO's advisory matters

Certain NER Schedule 5.3 technical requirements are AEMO advisory matters, including the requirements in NER S5.3.5 and S5.3.11 to S5.3.14. Where an applicable performance standard concerns an AEMO advisory matter, the NSP must involve AEMO in accordance with the relevant NER connection or alteration process.

This document discusses the level of involvement AEMO considers appropriate to:

- Meet AEMO's requirements for information, models and data necessary for AEMO to meet its power system security requirements.
- Provide clarity to distribution NSPs on AEMO's expectations for the performance of IBLs.
- Support NSPs connection and technical assessment processes.

Please refer to Appendix B for detail on how AEMO proposes to treat distribution connected IBLs from an operational perspective, and what this means for NSP decisions on material cumulative impacts.

[7] NER S5.3.1a(b).

3. Expected IBL performance

The NER defines access standards for IBLs to operate stably and remain connected following a power system disturbance, with focus on performance standard requirements for protection systems and settings, disturbance ride-through, short circuit ratio (SCR), and instability monitoring and detection for IBLs connected to distribution or transmission networks, as summarised in Table 2.

Table 2 IBL performance standard requirements [8]

IBL performance standard requirements		Clause	Inverter based loads (<30 MW)	Large inverter based loads
Disturbance ride-through requirements	Protection systems and settings: • Vector shift (or similar) protection must not operate for phase shifts below 20 degrees. • Requirement that protection systems don't operate based solely on number of disturbances that occur during a period of time.	S5.3.13	NSP discretion[9]	Required
	Response to frequency disturbances	S5.3.12	NSP discretion[10]	Required
	Response to voltage disturbances • Including active power and current consumption, and post-disturbance active power recovery	S5.3.13	NSP discretion[8]	Required
System strength requirements	SCR withstand capability	S5.3.11	N/A	Required
Monitoring requirements	Detection of instability in voltage, reactive power and active power	S5.3.14	N/A	Required
	Phasor measurement unit (PMU) access and data exchange		N/A	If required by NSP/AEMO

All access standard requirements not explicitly listed in Table 2[11] remain applicable to LIBLs, and to the extent that the NSP considers appropriate for IBLs (< 30 MW).

Further details on the NER Schedule 5.3 access standards can be found in the Package 2 Final Determination[12] and Final Rule[13].

[8] AEMO has a formal role in relation to applicable AEMO advisory matters, as specified in the relevant NER connection or alteration process. See Appendix B for the treatment of distribution connected IBLs.

[9] If the NSP considers the plant may adversely affect network service quality or security for other Network Users.

[10] NSP must consider the potential aggregate impact of IBLs < 30 MW connections on its network. See Appendix B.

[11] Including NER S5.3.5 Power factor requirements, S5.3.6 Balancing of load currents, S5.3.7 Voltage fluctuations, S5.3.8 Harmonic voltage distortion.

[12] At https://www.aemc.gov.au/sites/default/files/2026-11/final_determination_-_rule_change.pdf.

[13] At https://www.aemc.gov.au/sites/default/files/2026-11/erc0394_-_final_rule.pdf.

3.1. System strength assessment for LIBLs

For the purposes of applying the System Strength Impact Assessment Guidelines (SSIAG), the definition of LIBL in the NER replaces the SSIAG's existing IBL classification framework. [14]

Under NER 5.3.4B, S5.3 plant including a LIBL is required to demonstrate no general system strength impact according to the SSIAG. A general system strength impact includes any adverse system strength impact and any reduction in available fault level (AFL) at the connection point caused by the LIBL.

The reduction in AFL for a LIBL is directly related to its withstand SCR capability[15]. Based on experience from recent LIBL connections and an improved understanding of LIBL performance characteristics, AEMO has identified limitations in applying the existing withstand SCR assessment methodology outlined in the SSIAG to LIBL. AEMO has raised this matter with the AEMC.

The existing withstand SCR methodology cannot be directly applied to LIBLs because their limited reactive power capability and lack of dynamic voltage control can constrain power transfer in the low SCR single machine infinite bus (SMIB) test system before rated load can be reached. Detailed technical explanation of the power transfer limit in the SMIB environment can be found in AEMO's withstand SCR technical note[16].

AEMO is currently investigating alternative approaches with the AEMC and other key stakeholders to address this issue. The outcome is expected to be reflected in the Security framework enhancement final determination[17] and the amended SSIAG.

Regardless of the outcome, the NSP will still be required to assess whether the proposed connection will have an adverse system strength impact assessment. In determining the scope and level of detail of this assessment, including whether wide area PSCAD™/EMTDC™ studies are required, the NSP should consider the size of the connecting plant and its location in the power system, including the strength and sensitivity of the surrounding network. A smaller connection in a strong part of the network may require a less detailed assessment, while a larger connection, or one in a weak or sensitive location, may require more detailed studies.

[14] AEMO, System Strength Impact Assessment Guidelines, July 2024. At https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/network-connections/system-strength-impact-assessment-guidelines.

[15] AEMO, System Strength Impact Assessment Guide, Section 3.4.2: $\Delta AFL\ (MVA) = -\ (SCR_{withstand} - \alpha) \times P_{rated}$.

[16] AEMO, System Strength Withstand SCR Methodology Review. At https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/network-connections/system-strength-impact-assessment-guidelines/system-strength-withstand-scr-methodology-review.

[17] AEMC, Security framework enhancements. At https://www.aemc.gov.au/rule-changes/security-framework-enhancements.

4. IBL modelling requirements

Accurate modelling of IBLs is a fundamental requirement to allow NSPs and AEMO to assess and support the secure and resilient operation of the power system. Depending on the size of the IBL, models of sufficient accuracy are necessary to demonstrate the required performance, including:

- ride-through performance
- small-signal stability and sub-synchronous resonance (SSR)
- protection operation
- control interaction.

The assessments for which these models are required include the following:

- Assessment of individual IBLs against their Customer Performance Standards.
- System strength assessments of individual LIBLs.
- System strength planning studies of all LIBLs (for example, studies to determine requirements for new synchronous condensers or other system strength sources on the shared transmission network).

This section sets out interim IBL modelling and information requirements to support verification of compliance with IBL performance requirements until AEMO publishes the new Schedule 5.3 Participant Modelling Guidelines. AEMO has used the modelling principles established by the Final Rule to inform these interim requirements, including:

- Proportionality: by tailoring modelling requirements to the size, complexity and potential impact of Schedule 5.3 plant on power system security.
- Materiality: by aligning modelling information requirements with what is reasonably necessary to assess a Schedule 5.3 Participant's compliance with applicable access standards and Chapter 5 obligations.
- Consistency: by enabling the application of consistent modelling expectations where reasonably practicable.
- Practicability: by having regard to the availability, maturity and validation of modelling information.
- Efficiency: by achieving the required modelling outcomes without unnecessary effort or duplication, while supporting staged information provision, recognising existing validated models where suitable, and setting clear assessment criteria.

Refer to NER S5.3.1aa(b) for complete set of principles.

4.1. Provision of models

The modelling standards in the NER vary in accordance with plant size. AEMO will engage with stakeholders to develop the new Schedule 5.3 Participant Modelling Guidelines and update the Power System Model Guidelines (PSMG), but in the interim, proponents should first discuss with the NSP and AEMO the type and level of detail required in plant models. Where clarification is required, NSPs are encouraged to contact AEMO directly.

In general, models should include sufficient details to represent the expected plant performance in the steady state and during power system voltage and frequency disturbances.

4.1.1. Model provision for IBLs

AEMO and NSPs require sufficient information to assess the expected cumulative grid impacts of IBLs. The required model complexity is linked to the potential for cumulative impacts.

All LIBLs are expected to require detailed models because their potential individual and cumulative impacts are higher than smaller IBLs where the potential for material grid impacts is smaller. For LIBLs, the level of model detail should be similar to that required for a generator and should align with Section 3.2 of the PSMG[18].

For IBLs connected to the distribution system, the plant performance may be adequately described in generic models. In all cases, sufficient models and modelling information must be provided to the Distribution Network Service Provider (DNSP) to allow the Distribution System Operator (DSO)[19] to be able to manage security within the distribution system.

Table 3 provides guidance as to the expected level of model detail for IBLs (<30 MW) and LIBLs.

4.1.2. Modelling formats and platforms

At the time of connection application, modelling information may be supplied in various formats including generic, detailed site specific or a combination of both. In general, site specific data is expected for the reticulation network while the UPS/converter model may be generic at the application stage.

Models should be provided in root mean square (RMS) and electromagnetic transient (EMT) modelling platforms and, regardless of the format, the models should represent voltage and frequency protection functions or settings necessary to capture plant response to a range of disturbances necessary to test the performance of the load against its Customer Performance Standards, with parameters fitted to align with actual performance to within the accuracy tolerances defined in the PSMG.

While a generic model may be sufficient at the application stage, a detailed site specific model must be provided at least six months prior to energisation[20] for all LIBLs and, where required by the NSP, IBLs (<30 MW). These models must be capable of being configured for the specific connection site.

A summary of IBL model provisioning requirements in RMS and EMT platforms is presented in Table 3.

[18] AEMO, Power System Model Guidelines, September 2025. At https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system-security-market-frameworks-review/2025/power-system-model-guidelines-v30.pdf.

[19] DSO refers to the DNSP control centre, that is the real-time operations of the DNSP. The term is used here for convenience.

[20] Some NSPs may require the model to be submitted further in advance of energisation.

Table 3 Model provisioning

	RMS	EMT
Compatible software version	• PSS®E version 34.7 or greater as per the PSS®E 36 Transition[21]. • Model source code must also be provided. • For further information see 4.3.11 of the PSMG.	• PSCAD™/EMTDC™ version 5.0 and higher. • For further information see 4.3.12 of the PSMG.
Modelling complexity levels	• **Simplified RMS** model includes: IEEE polynomial static load (ZIP) model, composite load model (CMLD) or any suitable load model including protection relay functions. • **Detailed RMS** model includes: Generic load model (for example Power Electronic Reconnecting and Ceasing (PERC)[22]) with sufficient features and adjustable parameters to represent site specific active and reactive power response to voltage and frequency disturbances (OEM-specific models are acceptable). The model should represent converter current limitations, protection trips and post disturbance recovery where applicable.	• **Generic EMT** modelling may include: Sufficient information to model voltage and frequency response and protection systems by using PSCAD component library. • **OEM-specific** EMT model includes: Detailed PSCAD model including key components necessary to identify control interactions and instability, protection function blocks.
Modelling complexity requirements	• **IBLs (<30 MW):** Simplified or detailed RMS model may be required based on NSP's system impact assessment, in consultation with AEMO. • **LIBLs:** Detailed RMS model is required.	• **IBLs (< 30 MW):** An OEM-specific or a generic EMT model may be required based on NSP's system impact assessment, in consultation with AEMO. • **LIBLs:** OEM-specific detailed EMT model is required.

There may also be options to permit the initial use of simpler models, provided undertakings exist for the proponent to subsequently provide adequately detailed models. In all cases, proponents are encouraged to engage early with the NSP and AEMO to clarify the type of model required for their project. Where clarification is required, NSPs are encouraged to contact AEMO directly.

4.1.3. Circumstances requiring detailed models at the application stage

If AEMO and the NSP identify that a generic or simplified model cannot adequately represent the protection system and load behaviours (e.g., active power recovery, disconnection) in response to a system disturbance and is inadequate to assess potential power system security risks, then a detailed site specific user-defined, or an OEM model may be required at the application stage. For further information see Section 4.3 of the PSMG.

These circumstances may arise, for example, in:

- Locations where the system strength is limited.
- Locations where multiple IBLs are connected or planned to be connected.
- Situations where other large inverter based equipment is located in close proximity (e.g., an IBR or LIBL ≥ 30 MW).

[21] AEMO, PSSE version 36 Transition Fact Sheet, June 2026. At https://www.aemo.com.au/-/media/files/electricity/nem/network_connections/psse_v36_transition_final.pdf.

[22] PERC model available at https://dev.azure.com/nerc/_git/LMWG_Resources?path=/Data_Center_Model_PERC1. This model is under development and is quoted as an example.

The specific risks that exist in such situations relate to the possibility of control system interactions, the potential for system voltage incidents to trigger synchronised behaviours in a number of IBLs, and any other IBL responses that have the potential to adversely affect power system security for the specific location.

4.1.4. Model validation and commissioning requirements

The applicable commissioning requirements in NER 5.8 apply to Schedule 5 Participants with new or replacement Schedule 5.3 plant rated at least 30 MW or 30 MVA, unless AEMO determines otherwise under NER 5.8.1A.

AEMO is currently reviewing model validation and commissioning requirements for IBLs. Requirements are expected to vary with modelling platform (EMT or RMS) and size of the load. AEMO's involvement in commissioning is expected to be similar to its involvement for an equivalent sized IBR generator.

For EMT model validation, inverter hardware in loop (HIL) testing or similar validation methods will be required to demonstrate alignment with actual plant behaviour.

RMS models may be validated through benchmarking against the EMT model. Additional plant testing is not expected to be required for RMS model validation.

Depending on the size and complexity of the IBL reticulation network, steady state measurements may be required at the connection point and selected points in the reticulation network during commissioning.

Post commissioning, EMT and RMS model validation may be required following power system disturbances by aligning modelled responses with disturbance records. Disturbance records may include phasor measurements (from PMU) and higher speed voltage and current waveform recordings.

4.2 Information provision requirements

The interim arrangements for information provision are intended to support proponents in progressing their IBL connection projects (such as data centres) from an early stage and guide the development of minimum requirements for IBL connection.

Appendix A outlines the information provision requirements relating to modelling, design data and operational considerations. These requirements may necessitate the submission of various forms of technical documentation to capture the necessary data. AEMO may discuss assessment objectives with the NSP and may also request data, as necessary.

Such documentation commonly includes, but is not limited to, a releasable user guide (RUG) or similar documentation, Power System Design and Settings Datasheet (PSDS) [23] or equivalent, and detailed model documentation including block diagrams and associated parameters, information on protection systems and ride-through limitations, as required by AEMO and the NSP.

In addition, Section C.5 of PSMG highlights the components to be included in the models and analytical tools (e.g., EMT and RMS platforms) used for IBL model development. This applies to LIBLs and IBLs subject to assessment by the NSP.

[23] AEMO will assess the applicability of the PSDS for loads.

5. Alterations to IBL

NER 5.3.12(a) requires a proponent to follow the clause 5.3.12 alteration procedure if it proposes to alter an IBL, and that alteration will affect the plant's performance relative to a technical requirement in Schedule 5.3 that is an AEMO advisory matter.[24]

Applicable alterations include the following[25]:

- Increase in size of an IBL which had not previously been assessed or approved by the NSP or AEMO.
- Change of UPS model, type or manufacturer, either as full or partial replacement of in-service plant or as a variation from equipment originally proposed as part of a planned expansion of the facility.
- Change to UPS operating mode, for example from power factor control to voltage droop control.
- Change in reticulation network plant affecting reactive power at connection point, this may include addition of harmonic filters or power transformers.
- Retuning of the UPS control, for example as may be required to optimise the withstand SCR.
- Change in the operating protocol for back-up generation from break before make to make before break.

Proponents should engage early with both the NSP and AEMO to discuss the proposed alteration, its expected impact and to confirm whether it is required to follow the NER 5.3.12 process.

5.1. NER 5.3.12 notification exceptions

Some alterations will not require notification as they are not subject to NER 5.3.12 requirements or will not meet the NER 5.3.12(a) criteria. For example:

- Like-for-like equipment[26] replacement not impacting the performance of the system.
- Automated change of control mode previously accepted by the NSP and AEMO.

5.2. NER 5.3.12 Process

This section sets out the high-level process that a Schedule 5.3 Participant must follow under NER 5.3.12 when proposing an alteration to connected plant, as follows:

1. Proponent will notify NSP/AEMO of proposed alteration.
2. Proponent can prepare an initial submission to discuss with NSP/AEMO the NER 5.3.12 scoping[27] (optional).

[24] NER S5.3.5, S5.3.11, S5.3.12 (new), S5.3.13 (new) and S5.3.14 (new).

[25] This is a non-exhaustive list of alterations that can trigger the clause 5.3.12 alteration process.

[26] Original system equipment is proposed to be replaced with identical equipment that is of the same model and manufactured by the same OEM and has the same settings and firmware.

[27] The NSP and AEMO will work with the Proponent to identify key activities, indicative timing and estimated assessment costs.

3. Proponent will prepare the NER 5.3.12(b) submission[28].
4. NSP/AEMO will perform the NER 5.3.12 assessment.
5. NSP/AEMO will notify the proponent of the assessment outcome[29].
6. If the alterations are approved, Proponent will prepare and submit the test plan.
7. NSP/AEMO will assess the test plan.
8. If the test plan is approved, Proponent can perform the proposed alterations.

[28] AEMO, NER 5.3.4A Fact Sheet Access Standards Negotiation Principles. At https://www.aemo.com.au/-/media/files/electricity/nem/network_connections/transmission-and-distribution/application/ner-534a-fact-sheet.pdf?rev=fe539fdff07f4aaa9d293d438536e5f6&sc_lang=en&hash=AC08A0440144F4C854049C181DAC1072.

[29] NER 5.3.13 (a).

6. Transitional provisions

NER 11.197 outlines that the new access standards apply to existing connection applications or alteration proposals depending on the stage of the connection process reached by 12 November 2026, when the Final Rule commenced. The following is a general summary only. Applicants should refer to NER 11.197.2 to 11.197.5 to determine how the transitional arrangements apply to their circumstances.

New access standards apply

The new access standards apply to existing connection enquiries and to applications or alteration proposals where the relevant technical requirements had not been confirmed under NER 5.3.4A before 12 November 2026.

Grace period applies

The previous access standards initially continue to apply where the relevant technical requirements had been confirmed under NER 5.3.4A before 12 November 2026, but the applicant had not received an offer to connect, or the participant had not received the relevant confirmation for an alteration proposal.

The applicant or participant may elect to apply some or all of the new access standards. Subject to the detailed transitional provisions, all new access standards apply from 12 May 2027 if the relevant connection agreement or alteration process has not reached the stage specified in NER 11.197.3 by that date.

Previous access standards continue to apply

The previous access standards continue to apply to applications that have received an offer to connect, acceptance of alteration proposal under NER 5.3.10 or 5.3.13, or executed a connection agreement before 12 November 2026. Existing connection agreements are not amended merely because the Final Rule has commenced, although the new access standards generally apply to later amendments of performance standards in accordance with the NER.

Appendix A. Information provision requirements

A.1 Modelling information

Table 4 Modelling information

Information category	Information requirements	IBL < 30 MW	LIBL	Model requirements	Documentation requirements
Power electronic converters and battery energy storage	Representation of AC/DC, DC/AC and DC/DC conversion stages and energy storage, including associated controls and harmonic filters. Representation of capability to provide reactive power support, where such capability is available.	If required by NSP	Required	EMT	- Detailed model documentation - RUG
	Representation of UPS system side AC quantities including energy storage and harmonic filters. Representation of capability to provide reactive power support, where such capability is available.			RMS	
Protection functions	Protection functions or similar information (e.g., relay behaviour) for modelling load component response to voltage and frequency disturbances, including: • Under and over voltage trip thresholds with pickup and delay times. • Under and over frequency trip thresholds with pick up and delay times.	Required	Required	Representation of key protection or relay behaviour in RMS and EMT models	- Detailed model documentation - RUG
	Representation of each load component's response within the voltage and frequency trip thresholds (where load remains connected).	Required – simpler format for smaller loads as agreed with NSP and AEMO	Required		
	Frequency and voltage protections for non-power electronic components (e.g., AC-connected cooling system), as needed for system security risk assessment.	Subject to NSP assessment	Required		
	Any constraint or physical limitations affecting voltage and frequency ride-through capability, including equipment protection functions (e.g., rectifier current limiting).	Subject to NSP assessment	Required		
	Automatic Transfer Switch operation for transfer of load between the grid and back-up generation	Subject to NSP assessment	Required		
Motors and variable-speed drives	Modelling of drive systems and electric motors, including relevant controls and protections ONLY where they are connected directly and not via a UPS system	If required by NSP	Required	RMS and EMT	- Detailed model documentation - RUG
Load ramping following disturbance	Load ramp rate settings (e.g., MW/minute, constant time, or constant ramp) at post-fault and under emergency operating conditions to mitigate risk of oscillating or pulsating loads.	Subject to NSP assessment	Required	RMS and EMT	Detailed model documentation

A.2 Design data information

Table 5 Design and data information

Information category	Information requirements	IBL < 30 MW	LIBL	Documentation requirements
Load components	Information of aggregate load components and their proportions to reflect disturbance sensitive behaviour: • IBL electronic components (e.g., power electronic equipment, UPS systems) • non-IBL loads (e.g., cooling, lighting, building services) • battery storage systems.	Subject to NSP assessment	Required	Document detailing % allocation of each load component.
Single line diagram	Single line diagram including connection point and general arrangement of site reticulation networks and load components	Subject to NSP assessment	Required	PSDS or a separate document
Reticulation system data	Site specific reticulation network data representing elements between the connection point and inverter terminals: • main connecting transformer(s) • MV lines and cables • MV/LV transformers – may be an aggregate model • shunt compensation – if applicable • back-up battery and/or generating systems.	Subject to NSP assessment	Required	- PSDS or equivalent - RUG
Auxiliary systems	Substantive auxiliary system design (e.g., HVAC system) and its impact on ride-through performance.	Subject to NSP assessment	Required	PSDS or equivalent
Control and protection settings	Control and protection settings that may cause disconnection, including multiple fault settings, ambient and thermal limits, and loss-of-communication conditions.	Subject to NSP assessment	Required	PSDS or equivalent
Back-up generation/storage	Details of any back-up generators or storage systems, including their technology, connection arrangement, and any period of network connection.	Subject to NSP assessment	Required	PSDS or equivalent
Hardware and firmware	Any hardware and firmware upgrades applicable or available to achieve higher operating range for voltage withstand and ride-through performance.	If required by NSP	Required	OEM technical note

A.3 Operational information

Table 6 Operational information

Information category	Information requirements	IBL < 30 MW	LIBL	Documentation requirements
Plant operation scenarios	Intended operating procedures, which affect the load at the connection point including start up and shut down.	If required by NSP	Required	Operating procedure document (may be simplified to cover only those aspects affecting the load at the connection point).
Operation control models	UPS type and key technical details of its operational modes (e.g., constant power, power factor control, constant current modes).	If required by NSP	Required	RUG or similar document
	Operational control schemes for active power, reactive power, and voltage regulation during normal and contingency conditions	If required by NSP	Required	RUG or similar document
Supervisory Control and Data Acquisition (SCADA)	SCADA monitoring signals (e.g., MW, MVAr, voltage) at the connection point, with specific information requirements to be determined by AEMO and NSP.	If required by NSP	Required	SCADA point listing
Contingency and redundancy management	Operating philosophy showing how the plant manages credible contingencies, including redundancy arrangements and how loss of critical equipment (e.g., transformers and key components) is handled to maintain reliable and compliant operation.	If required by NSP	Required	Operating philosophy or procedure document
Load profile	A representative time-series load profile should be provided for each major load group (e.g., IT load, cooling load). The load profile should represent any cyclic variations in the load under steady state voltage and frequency conditions at the connection point.	Required	Required	Spreadsheet format containing numerical data and associated graphs.
Operational contact	Contact details for a responsible person, including a phone number and email for a registered IBL.	If required by NSP	Required	According to registration documentation requirements or NSP connection agreement (for unregistered IBL).
Size of any separately switchable load components	Internal switching arrangement including any separately switchable load components and their sizes.	If required by NSP	Required	Single line diagram.

Appendix B. Guidance on distribution connected IBLs

This appendix outlines how AEMO proposes to treat distribution connected IBLs from an operational perspective, and what this means in terms of NSP decisions on whether there is a material cumulative impact.

AEMO is specifically seeking feedback on a proposed 100 MW distribution network bulk supply point (BSP) threshold for cumulative non-ride through IBLs, including the suitability of this value, how this should be calculated and by whom. Please refer to sections B.5 and B.6 for further context.

The consequences of too high a threshold include:

- a potentially large load disconnection in response to a credible contingency, with consequential power system security impacts; and
- a requirement for additional Frequency Control Ancillary Services (FCAS).

Too low a threshold could mean unnecessarily onerous ride through requirements for IBLs < 30 MVA.

B.1 Preferred outcomes for management of distribution connected IBLs

The following high-level outcomes guide the approach AEMO is taking to the management of distribution connected IBLs, including LIBLs:

- AEMO requires sufficient information to discharge its obligations to manage power system security. This information must explain how distribution connected IBLs are expected to perform during power system incidents, and particularly, voltage disturbances originating on the transmission networks. For AEMO, this information should allow us to model the bulk supply point (BSP) behaviour to support dynamic stability analysis in both off-line and potentially on-line assessments.
- Transmission Network Service Providers (TNSPs) are expected to require the same information, and possibly more detail, in order to determine the transfer capabilities of their networks (e.g., transmission limits).
- AEMO does not wish to be involved in the connection processes administered by DNSPs unless by exception, where an NSP may seek clarity on a potential system impact or their proposed approach to managing such an impact. AEMO must be satisfied that potential impacts are managed through, for example, application of one or more access standards in NER Schedule 5.3 (for IBL < 30 MVA), or other operational mechanisms like run-back schemes or special protection systems.
- The DNSP or TNSP may require SCADA from distribution connected IBLs. AEMO will require SCADA[30] from distribution connected IBLs if they are:
    - Registered under Chapter 2 of the NER, or

[30] On July 2026, AEMO submitted the Operational integration and visibility rule change proposal. This rule change includes consideration of information, including near real-time information, that LIBLs may be required to provide that would support efficient operation of markets and the power system. An outcome of this rule change process may include requirements for SCADA or equivalent data. At https://www.aemc.gov.au/rule-changes/operational-integration-and-visibility-large-inverter-based-loads.

- connected to a busbar that falls under AEMO oversight, such as where there are sub-transmission links between bulk-supply points or some other reason for AEMO to monitor a distribution busbar.

- AEMO notes there are rule change proposals[31,32] that may require all LIBLs (e.g., IBLs > 30 MVA) to register. In the interim, NSPs may require IBLs to make provision for SCADA facilities and for at least the following signals to be provided to AEMO[33]:
  - Active power of the IBL, measured at the connection point.
  - Reactive power of the IBL, measured at the connection point.
- Even if AEMO has SCADA signals for an IBL, there is no implication that AEMO would take on any roles in managing the distribution network or the local security condition, which remain a responsibility of the DNSP.
- AEMO does not directly consider the impact of each distribution connected IBL. The TNSP calculates the transmission limits on their network. This calculation may take into consideration some or all distribution connected IBLs. The TNSP advises AEMO of the transmission limits and AEMO develops corresponding constraint equations, which are used in the AEMO dispatch process to avoid exceeding the TNSP-advised limits.

B.2 Overview of how distribution connected IBLs are managed

Figure 2 illustrates the treatment of distribution connected IBLs, summarised as follows:

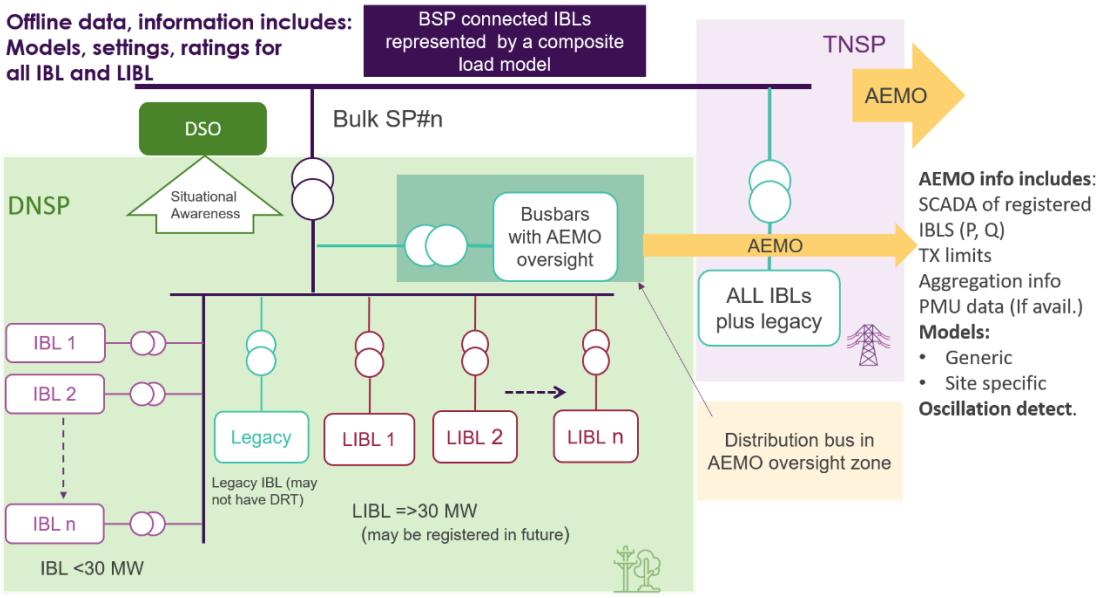
- For IBLs (<30 MW), the DNSP may require disturbance ride-through (DRT) capability where it considers it appropriate, having regard to the expected aggregate impact of all IBL connections on its network on the quality and security of network services to other Network Users. DRT requirements would be in accordance with the ride-through access standards in NER S5.3.12 and S5.3.13.
- All IBLs ≥ 30 MW (e.g., LIBLs) must comply with the Schedule 5.3 access standards.
- Registered IBLs, or IBLs connected to distribution busbars that are included in the AEMO oversight network, must provide operational information directly to AEMO using AEMO compatible standard protocols like SCADA. Note that there are rule change proposals in progress that may require all IBLs > 30 MVA to register (see Section B.1).
- There may be legacy IBLs connected. These may contribute to significant cumulative impacts but cannot be required to comply with NER Schedule 5.3 access standards. However, their performance must be defined (e.g., voltage and frequency protection trip levels) and they must be considered in any assessments of cumulative impacts.

[31] AEMC, Operational integration and visibility of large inverter-based loads. At https://www.aemc.gov.au/rule-changes/operational-integration-and-visibility-large-inverter-based-loads.

[32] AEMC, Data centre contracting obligation for firmed energy. At https://www.aemc.gov.au/rule-changes/data-centre-contracting-obligation-firmed-energy.

[33] The DNSP and the TNSP may require additional SCADA signals for their purposes of operating the distribution system and assessing transmission limits, respectively.

Figure 2 Overview of distribution connected IBLs in network fed from a bulk supply point[34]



B.3 Role of the Distribution System Operator (DSO)

DNSPs are registered participants and have a role in operating their networks. Most DNSPs are also registered for this purpose as 'Distribution System Operator' per NER 2.6(a)(2). In this document, DSO refers to the role of the DNSP in operating its distribution networks.

The DSO must:

- Maintain situational awareness of all equipment, including IBLs, connected to their distribution network. This is likely to include telemetry, such as SCADA, for real-time operation.
- Manage its network capabilities, taking into account the impacts of, among others, any connected IBL and LIBL.

IBLs are currently not required to register but there are rule changes in progress that may result in all IBLs > 30 MVA being required to register[35,36]. Some state legislation may also require IBLs to register with AEMO. Registration changes the way AEMO interacts with IBLs and allows AEMO to direct an IBL.

Details of the registration category for IBLs have not yet been finalised. The proposed rule changes requiring registration are currently under development by the AEMC and the appropriate registration category and requirements are under consideration as part of this process.

Only AEMO can direct or instruct registered IBLs. AEMO requires visibility (e.g., SCADA) for registered IBL as described in Section B.1 (e.g., active and reactive power), but the expectation is that the DSO will

[34] For the purposes of this document, the term "bulk supply point" (BSP) means a transmission connection point. All references to a bulk supply point or BSP are to be interpreted accordingly.

[35] AEMC, Operational integration and visibility of large inverter-based loads. At https://www.aemc.gov.au/rule-changes/operational-integration-and-visibility-large-inverter-based-loads.

[36] AEMC, Data centre contracting obligation for firmed energy. At: https://www.aemc.gov.au/rule-changes/data-centre-contracting-obligation-firmed-energy.

continue to have accountability for the two dot points above. DSOs do not have the power to direct or instruct. If a DNSP connected IBL requires specific operational limitations under some conditions (e.g., maintenance outages), these should be included as requirements in the connection agreement.

The DSO must provide modelling and performance information to the TNSP (as asset owner of the bulk supply point) and AEMO on how the connected IBLs will perform for power system disturbances, including ride-through capabilities for voltage disturbances and frequency disturbances. Models are required under NER Schedule 5.3[37]. For IBLs not subject to Schedule 5.3, the DSO may need to create aggregate models, generic models, site specific models or a combination of these models as indicated in Table 3 of this guideline. This modelling information will be used by the TNSP in calculating transmission limits and by AEMO for offline operational studies and planning studies, including for connection assessments.

The DSO is responsible for controlling or operating any portion of a distribution system (including being responsible for directing its operations during power system emergencies). This includes those busbars designated as having AEMO oversight[38].

B.4 Role of the DNSP in connecting IBLs

DNSPs currently manage connections to their network and include technical and performance requirements in their connection agreements. This should remain unchanged other than for any added requirements under NER Schedule 5.3, including that each IBL (<30 MW) should be considered for its potential contribution to a cumulative impact.

Under NER Schedule 5.3, a DNSP may require an IBL to comply with additional performance requirements where it considers this appropriate, having regard to the expected impact of the connection on its network.

The DNSP will therefore need to understand for each IBL (<30 MW) connection:

- Whether it is reasonable and appropriate to treat the IBL as a LIBL, having regard to its aggregate impact with existing and planned IBL connections that are electrically proximate, and the electrical configuration of those connections[39].
- The duration of credible transmission faults, that could affect the IBL and others in the vicinity of the transmission fault. This is to support the DNSP in negotiating appropriate access standards for voltage disturbance ride-through.

The next section proposes an approach that will assist DNSPs forming an opinion as to whether there is likely to be a significant cumulative impact.

B.5 Determining if there is a significant impact

A transmission credible contingency can produce a voltage disturbance that extends over hundreds of kilometres and could therefore affect multiple BSPs. For the same fault, the cumulative impact would be the sum of all the impacts across these affected BSPs.

[37] NER S5.3.1.

[38] AEMO oversight of a distribution busbar relates more to how the assets connected to this busbar are operated, rather than the management of security, which is managed by the DNSP.

[39] NER S5.3.1a(b)(2).

It is not practical for a DNSP to conduct system-wide analysis of the power system to determine whether their candidate IBL is causing a cumulative impact to exceed some threshold.

AEMO therefore proposes a threshold of 100 MW per BSP for cumulative non-ride through IBLs, against which the DNSP would assess the impacts of existing and planned IBL connections, including legacy IBLs. Summing the ratings of non-ride-through IBLs gives the expected size of the cumulative impact. If this exceeds 100 MW then all future IBLs must include ride-through capability or agree an appropriate approach with AEMO.

This proposed threshold would inform, but not replace, the DNSP's judgement under NER S5.3.1a(b)(2).

Rationale for the proposed threshold

The proposed value of 100 MW per BSP for cumulative non-ride through IBLs provides a practical screening threshold, based on engineering judgement rather than a calculated system-wide limit. This value seeks to balance power system security impacts with proportionate requirements for smaller IBL connections.

A BSP-level screening approach would allow DNSPs to identify when additional ride-through capability or other measures may be needed, without requiring detailed system-wide assessment of every smaller IBL connection or routine project-specific involvement by AEMO and the TNSP.

B.6 Application of the proposed threshold and how AEMO advisory matters are managed

In the process of determining materiality, the threshold of significance should be assessed by the TNSP[40] based on the level of non-ride-through IBL that can be safely tolerated. Non-ride-through IBL includes legacy IBL and IBL (<30 MW) that do not meet Schedule 5.3 ride-through access standards. The proposed 100 MW threshold should ideally apply uniformly across NEM.

The proposed threshold screening process is intended to support DNSPs' connection assessments but does not replace AEMO's role in AEMO advisory matters.

The process, including AEMO's advisory role, can be summarised as below:

- Assuming the proposed BSP threshold of 100 MW.
- Assuming the TNSP or AEMO has specified the longest clearing time expected for any credible transmission contingency and provided this information to the DNSP.
- The DNSP should sum the rating of all IBLs, including legacy IBLs, that cannot ride through the longest credible transmission contingency.
- If the sum exceeds 100 MW, the DNSP must require all future IBLs to have ride-through capability that meets or exceeds the longest clearing time specified by the TNSP or AEMO.

The DNSP must engage with AEMO to determine an appropriate outcome when the DNSP assesses the cumulative impact as exceeding the threshold, and the DNSP feels there are extenuating circumstances such that ride-through for a particular project is NOT required.

[40] The TNSP can assess how many BSP are affected by each credible contingency and thereby estimate the maximum size of the credible load contingency and therefore the requirement for FCAS.

Under this proposal, further project-specific engagement with AEMO would be by exception, rather than a routine additional step in every DNSP connection assessment. AEMO's formal role in relation to applicable AEMO advisory matters under the NER remains unchanged.

The objective is that AEMO can make assumptions on the maximum amount of load that could potentially be lost during a voltage disturbance due to non-ride-through IBLs. This is a conservative approach, but it is also likely, in some locations, to necessitate additional ancillary services (for frequency control) or some reduction in network transfer capabilities.