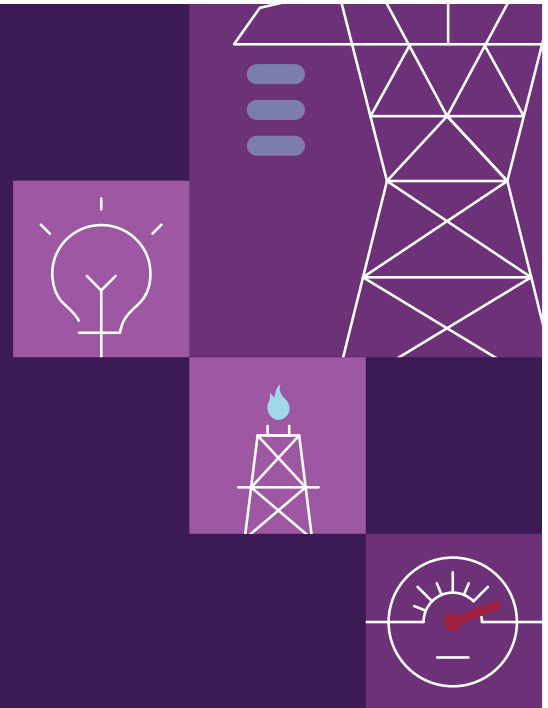


NER 5.3.9 Process Guideline

Alteration of a generating system or integrated resource system



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Current version release details

Version	Effective date	Summary of changes
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1. Introduction

1.1. Purpose and scope

This guideline outlines the process to be followed when proposing alterations to a generating system or integrated resource system (each referred to in this guideline as a ‘system’) that may impact its performance or impact the power system or other network users. The process for system alterations described in this guideline is initiated under clause 5.3.9 of the National Electricity Rules (NER), so the process is commonly referred to as the NER 5.3.9 process.

The NER 5.3.9 process is, in effect, a change management process which enables the Network Service Provider (NSP) and the Australian Energy Market Operator (AEMO) to:

- Maintain visibility of system alterations, as proposed and implemented.
- Assess the impact of a proposed system alteration on the power system.
- Where appropriate, re-negotiate performance standards affected by the proposed alteration.

The NER 5.3.9 process is also intended to provide appropriate levels of investment certainty for Proponents¹. It is not intended to discourage plant changes or upgrades which have an overall network benefit.

The NER 5.3.9 process may apply regardless of whether the proposed alteration’s impact on performance is expected to be positive or negative. This is so AEMO and NSPs can continue to maintain accurate power system models which are required to operate the power system and maintain power system security.

This guideline is intended for use by Proponents and their advisers who have at least a working familiarity with the connection requirements for generating systems or integrated resource systems. It provides guidance on:

- When the NER 5.3.9 process applies and when it does not.
- How the NSP and AEMO assess the impact of proposed alterations.
- Approach to re-negotiation of performance standards affected by the proposed alteration.
- Modelling and data requirements for proposed alterations, including legacy plant model requirements.

It also contains answers to common questions raised by Proponents.

1.2. Abbreviations and definitions

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

¹ The person who proposes to alter their system, including equipment, performance standards, protection or control settings. That person will be either the registered Generator or Integrated Resource Provider, or the Connection Applicant (where performance standards have been included in an executed connection agreement but registration has not yet occurred).

Term	Definition
AAS	Automatic Access Standard
AFL	Available fault level
Alteration assessment and negotiation	Assessment and negotiation of a NER 5.3.9(b) submission undertaken in accordance with NER 5.3.4A and NER 5.3.4B.
change form	<i>generating system or integrated resource system change form</i> used to notify the NSP and AEMO of a proposed system change under NER 5.3.9, or S5.2.2, or 4.14(p), or where the change mechanism is unknown.
ASU	Ancillary Service Unit
BESS	Battery energy storage system
'current' technical requirement	The Schedule 5.2 technical requirement applicable at the time of the alteration.
DC	Direct current
FCAS	Frequency Control Ancillary Services
Full Assessment	The assessment referred to in NER 5.3.4B (a2)(3)
GFM	Grid forming
GFL	Grid following
IRP	Integrated Resource Provider
Legacy plant	Systems for which performance standards were established under superseded modelling requirements and do not meet current Power System Modelling Guidelines (PSMG) and/or NER requirements
MAS	Minimum access standard
NAS	Negotiated access standard
NEO	National electricity objective
NER	National Electricity Rules
NER 5.3.9(a) criteria	Application criteria specified under NER 5.3.9(a)
'new' technical requirement	A technical requirement which has taken effect subsequent to the finalisation of performance standards
NSP	Network Service Provider
OEM	Original equipment manufacturer
Performance standard	Has the meaning given in the NER: A standard of performance that: (a) is established as a result of it being taken to be an applicable performance standard in accordance with clause 5.3.4A(i); or (b) is included in the register of performance standards established and maintained by AEMO under rule 4.14(n), as the case may be.
PFRR	Primary Frequency Response Requirements
PSMG	Power System Model Guidelines
Preliminary Assessment	The assessment referred to in NER 5.3.4B (a2)(1)
Proponent	The person who proposes to alter their system, including equipment, controls or settings. That person will be either the registered Generator or Integrated Resource Provider, or the Connection Applicant (where performance standards have been included in an executed connection agreement but registration has not yet occurred).
R2 data	Registered data after connection, data derived from on-system testing (see NER S5.5.2).
specified equipment list	Equipment specified in NER 5.3.9(d)
SSQ	System strength quantity

Term	Definition
Stability Assessment	The modelling referred to in NER 5.3.4B(a2)(4)
system	A generating system or integrated resource system, as the context requires

1.3. Related documents

Title	Location
Generating system or integrated resource system change form	https://aemo.com.au/-/media/files/electricity/nem/network_connections/transmission-and-distribution/GS-or-IRS-Change-Form
NER Change Mechanism Fact Sheet	https://aemo.com.au/-/media/files/electricity/nem/network_connections/transmission-and-distribution/NER-Change-Mechanism-Fact-Sheet
NER 5.3.9 Fact Sheet – Adding a BESS behind a connection point of an existing plant	Currently being developed
NER 5.3.9 Fact Sheet – Alterations to a proposed generating system or integrated resource system at the capability assessment stage	Currently being developed
NER 5.3.9 Fact Sheet – Firmware updates to a generating system or integrated resource system	Currently being developed
NER 5.3.9 Fact Sheet – Like-for-like replacements on a generating system or integrated resource system	Currently being developed

2. Application of NER 5.3.9

NER 5.3.9 applies when a Proponent is seeking to alter its system at any time after agreed performance standards are in place. This means that NER 5.3.9 can apply where the system is already operational, or prior to that if performance standards have already been included in an executed connection agreement².

Alterations affecting access standards which have been accepted by AEMO in a 5.3.4A letter³ but are not yet included in an executed connection agreement with the NSP will not be subject to NER 5.3.9 (see Figure 1). In practice, the application of engineering judgement, assessment and negotiation of a proposed alteration at this stage will usually be consistent with the NER 5.3.9 process described in this guideline⁴. However, the access standards for such an alteration would be reassessed as part of the application to connect process under NER 5.3.4A and would be formalised in a subsequent 5.3.4A letter (replacing the initial letter)⁵, rather than a NER 5.3.10 notice⁶.

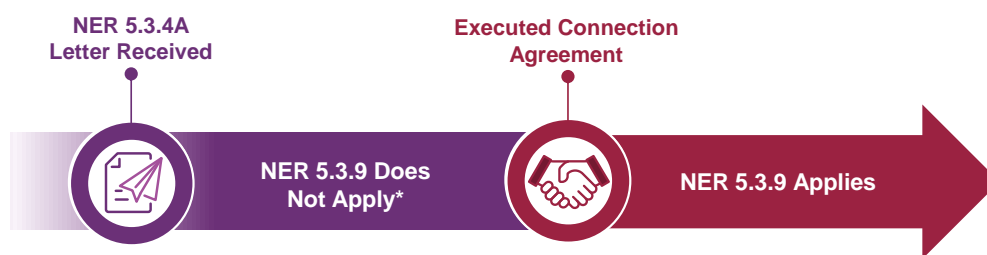
² NER 5.3.4A(i).

³ A letter issued by AEMO to the NSP formalising AEMO's agreement to access standards as a result of NER 5.3.4A negotiations.

⁴ The Proponent should check with their NSP and AEMO how their proposed alteration will be treated under transitional arrangements for any rule changes that occur subsequent to the initial 5.3.4A letter but prior to execution of the connection agreement.

⁵ A Proponent may propose an alternative access standard or elect to adopt the relevant automatic access standard under NER 5.3.4A(h)

⁶ A letter issued by AEMO to the NSP formalising AEMO's approval of a NER 5.3.9 alteration.



*Principles of NER 5.3.9 process will be used to assess the proposed alteration

Figure 1 Application of NER 5.3.9

2.1. NER 5.3.9 criteria

NER 5.3.9 may apply to a wide range of alterations that a Proponent may propose to make to a system, including alterations to any equipment, associated protection and control systems configuration or firmware. There are two ways in which NER 5.3.9 can be determined to apply:

- (a) **Proposed alteration of equipment identified in the ‘specified equipment list’:**
NER 5.3.9(d) specifies a list of equipment for which a proposed alteration is automatically deemed to affect the performance of a system relative to NER technical requirements.
- (b) **Meeting NER 5.3.9(a) criteria:** NER 5.3.9(a) contains a set of criteria to be assessed by the Proponent, the NSP and AEMO to determine whether NER 5.3.9 applies to an alteration. The NER 5.3.9 criteria require assessment of whether the alteration:
 - Will affect performance of the system against NER Schedule 5.2 technical requirements⁷.
 - Will have a general system strength impact⁸.
 - Will adversely impact network capability, power system security, quality or reliability of supply, inter-regional power transfer capability or the use of the network by another user.

If a proposed alteration meets any of the above criteria, NER 5.3.9 requirements will apply.

2.2. NER 5.3.9 notification exceptions

The Proponent is required to notify the NSP and AEMO of most proposed system alterations. However, some alterations will not require notification as they are not subject to NER 5.3.9 requirements or will not meet the NER 5.3.9 criteria. For example:

- alterations to systems that are exempt from registration and Schedule 5.2 technical requirements⁹
- mandatory Primary Frequency Response Requirements (PFRR)¹⁰ modifications

⁷ NER 5.3.9 may not always result in changes to the existing performance standards.

⁸ AEMO considers the wording in NER 5.3.9(a)(ii) to be in error (it refers to an ‘adverse’ system strength impact) and anticipates that it will be subject to an administrative rule change.

⁹ Some exempt generators may have performance standards and may be required by the conditions of exemption to follow a process similar to the NER 5.3.9 process to obtain agreement to changes to these performance standards.

¹⁰ See NER 5.3.9(a1). Refer to [AEMO Primary Frequency Response Requirements](#) for PFRR including notification of variations.

- like-for-like DC component alterations not impacting the performance of the system^{11,12}
- automated change of control mode previously accepted by the NSP and AEMO¹³.

These alterations do not need to be formally notified to the NSP or AEMO as NER 5.3.9 alterations, though Proponents should consider whether a proposed alteration is subject to other connection agreement conditions or NER requirements¹⁴.

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 5.3.9 process.

3. NER 5.3.9 process

Figure 2 sets out the high-level process that applies to proposed alterations to a system.

Specific stages of the NER 5.3.9 process are explained below. Should there be any outstanding questions, the NSP and AEMO can provide support at any stage during the process.

3.1. Notifying NSP / AEMO of proposed alteration

The Proponent will need to notify the NSP and AEMO of a proposed alteration, unless they have established that their proposed alteration is not subject to NER 5.3.9 requirements or does not meet the NER 5.3.9 criteria.

Proponents should engage early with both the NSP and AEMO to discuss the proposed alteration and its expected impact. This can be done by making an initial submission using the *generating system or integrated resource system change form*^{15,16} (change form) so that the NSP and AEMO may undertake scoping for the proposed alteration as outlined in Section 3.2. The scoping phase benefits the Proponent as it can provide clarity on the process and required information early, increasing the efficiency to complete the alteration process.

However, if the Proponent is confident that NER 5.3.9 applies and knows the likely scope of assessment, the Proponent may commence the process with a NER 5.3.9(b) submission¹⁷ as per Section 3.3. Proponents should use the completed change form to support their NER 5.3.9 (b) submission.

¹¹ For example, like-for-like replacement of degraded solar panels or battery cells does not impact performance S5.2 technical requirements.

¹² For further information on other types of like-for-like replacements please see [Like-for-like fact sheet] currently being developed.

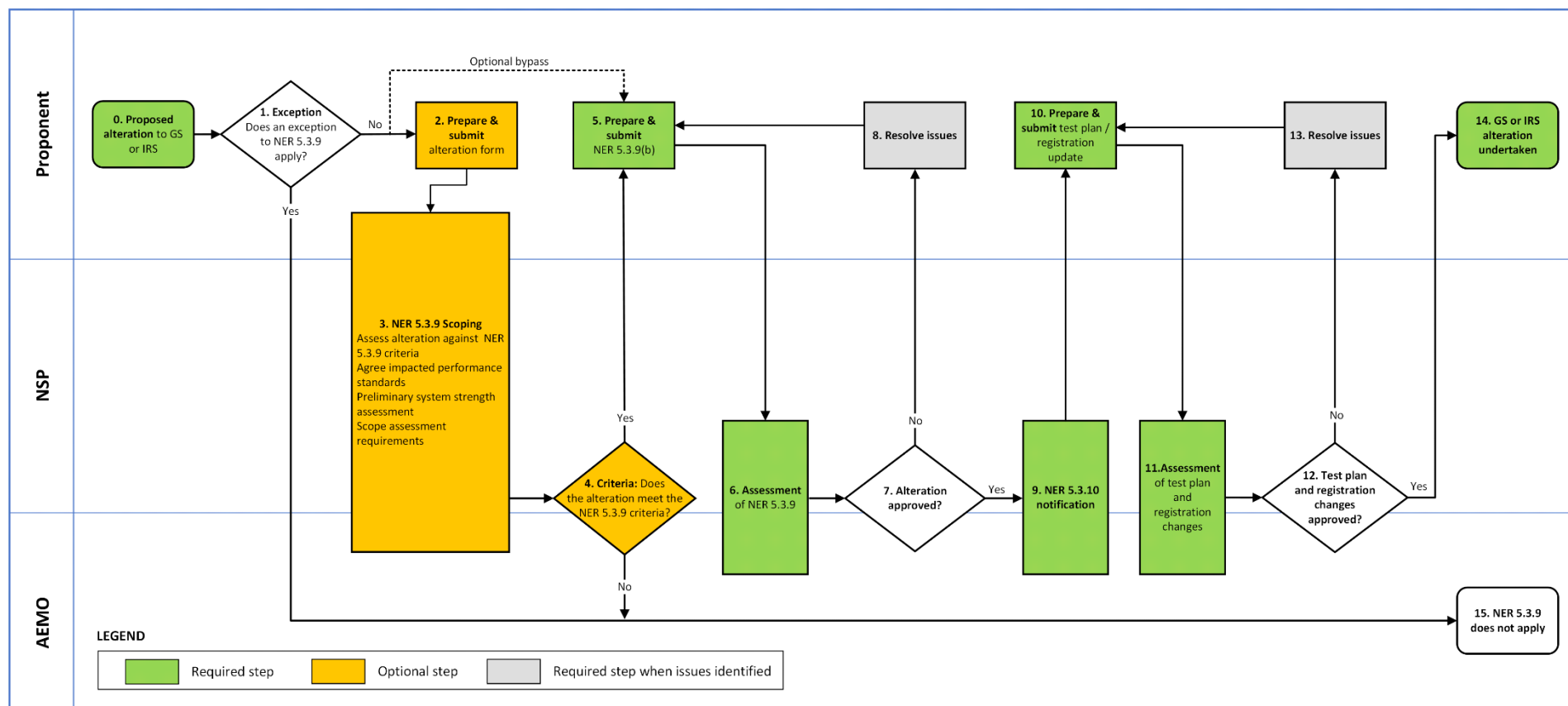
¹³ For example, change from grid connected mode to an islanded mode during a contingency. NER 5.3.9 does not apply to automated operations where they are related to the operation of the system which have already been agreed with the NSP and AEMO.

¹⁴ Such as the [AEMO PFRR Guideline](#) which provides further information on PFRR under NER 4.4.2A(a) or S5.5.3 which sets out the requirements for review, change and supply of data.

¹⁵ https://aemo.com.au/-/media/files/electricity/nem/network_connections/transmission-and-distribution/GS-or-IRS-Change-Form

¹⁶ The change form can be used for any proposed changes which may include changes under NER 5.3.9, NER S5.2.2, NER 4.14(p) or where the Proponent is unsure of the applicable process.

¹⁷ NER 5.3.9(b) sets out prescribed information to be submitted by the Proponent, where NER 5.3.9 applies.

Figure 2 NER 5.3.9 process¹⁸¹⁹

¹⁸ For alterations proposed after a 5.3.4A letter has been issued but before a connection agreement has been executed, an updated 5.3.4A letter will be issued at step 9 rather than a NER 5.3.10 notification.

¹⁹ For alterations that occur post execution of the connection agreement but prior to registration, steps 10 - 14 will be captured as part of the process of establishing the connection.

3.2. NER 5.3.9 scoping

To undertake initial scoping, the NSP and AEMO require information on the nature of the alteration and its potential impacts. The change form will guide Proponents to provide the information the NSP and AEMO will typically require.

For some alterations, particularly minor ones, not all fields will be relevant. Where alterations are more complex, further information may be requested. If unsure of necessary information, Proponents should liaise with the NSP.

It is recommended that the NER 5.3.9 scoping begin with a kick-off meeting attended by all three parties to agree the scope and timing of the alteration assessment.

As relevant, the NER 5.3.9 scoping may include:

- Confirmation of whether NER 5.3.9 applies (i.e. whether the NER 5.3.9 criteria are met)²⁰.
- Identification of any alternative NER change mechanisms (should NER 5.3.9 not apply)²¹.
- Identification of impacted performance standards.
- Agreement on scope (i.e. assessment and information requirements such as required simulation studies, model updates, etc...).
- Agreement on an activity plan, including responsibilities and timing.
- AEMO preliminary advice on general system strength or power system impacts²².
- NSP system strength Preliminary Assessment.

The NSP and AEMO will work with the Proponent to identify key activities, indicative timing and estimated assessment costs, although timing and costs may change if any new issues or impacted performance standards are identified during the assessment. The Proponent will be kept informed of any such changes through regular project meetings with the NSP and AEMO.

3.3. NER 5.3.9(b) submission

A proponent will need to formally commence assessment and negotiation if they have not elected to undertake initial scoping or the result of the initial scoping confirms the application of NER 5.3.9. To do this, the Proponent must submit prescribed data and information through a NER 5.3.9(b) submission.

Even if the Proponent has not elected to undertake initial scoping, it should provide the completed change form with the NER 5.3.9(b) submission. If the proponent has undertaken initial scoping, it should submit data and information in accordance with the requirements identified by the NSP and AEMO.

To ensure that the NER 5.3.9(b) submission contains the information necessary for assessment, the Proponent should also refer to:

²⁰ If it is determined that NER 5.3.9 does not apply, AEMO and the NSP will not provide a NER 5.3.10 notification.

²¹ https://aemo.com.au/-/media/files/electricity/nem/network_connections/transmission-and-distribution/NER-Change-Mechanism-Fact-Sheet

²² NER 5.3.9 criteria set out in NER 5.3.9(a)(1)(i) and (ii); and (a)(2) (i) and (ii).

- AEMO Connection Application Checklist²³
- any relevant NSP Application Checklist.

The Proponent may not be required to provide all items in the checklists, depending on the nature of the alteration. The Proponent may wish to liaise with the NSP and AEMO if clarification is required regarding the information necessary for assessment of the proposed alteration.

3.4. NER 5.3.9 assessment

The NSP and AEMO will assess the NER 5.3.9(b) submission made by the Proponent in accordance with the principles outlined in Section 4 and Section 5 of this guideline.

The NER 5.3.9 assessment includes:

- Review of submission and supporting documentation for completeness and simulation studies as per agreed scope (see Section 3.2).
- Negotiation of affected performance standards (see Section 5).
- Carrying out a Full Assessment or Stability Assessment (per NER 5.3.4B), if required based on the NSP's Preliminary Assessment outcome²⁴.
- AEMO advising the NSP on:
 - AEMO advisory matters relating to the assessment and negotiation of Negotiated Access Standard (NAS) under NER 5.3.4A.
 - The results of any Full Assessment or Stability Assessment conducted by the NSP.

The timing for assessing and negotiating performance associated with an alteration varies significantly depending on the type and complexity of that alteration. For example, replacement of a transformer with a transformer that has similar electrical characteristics may be able to be completed in as little as one week, whilst major alterations such as adding a Battery Energy Storage System (BESS) to an existing system may have timeframes comparable to an initial application to connect.

3.5. NER 5.3.10 notification

The rules require the Proponent to obtain confirmation from AEMO and the NSP that the NER 5.3.9 process has been properly completed. This is called a 'NER 5.3.10 notice'. The Proponent cannot make changes to registration or commission the altered system without a NER 5.3.10 notice²⁵.

3.6. Registration changes

Some alterations will result in a modification of the system's registration including²⁶:

- Change in number of production units.

²³ [AEMO | Connection Application Checklist](#)

²⁴ [AEMO | System Strength Impact Assessment Guidelines](#)

²⁵ NER 5.3.10(a).

²⁶ This is a non-exhaustive list of alterations requiring changes to registration.

- Change of participant's registration category (For example, change from a Generator to Integrated Resource Provider (IRP) due to addition of BESS behind a connection point).
- Change in classification of production units within a system (For example, change from non-scheduled to semi-scheduled generator when capacity is increased to above 30 MW).
- Classification of production units within a system as Ancillary Service Units (ASU) to participate in frequency control ancillary services (FCAS) markets.

An updated NER Schedule 3.1 Bid Validation Data Form²⁷ will need to be submitted where an alteration impacts bid validation data even if it does not require changes to registration.

If there is any uncertainty around registration requirements, Proponents should liaise with AEMO²⁸.

A Proponent will require a NER 5.3.10 notice to change registration following a NER 5.3.9 process. The relevant guidance and application forms to register as an IRP or a Generator in the NEM, including classification or amendments to ancillary service units, can be found on the AEMO website^{29,30}.

3.7. Commissioning

An alteration of a system cannot be commissioned without a NER 5.3.10 notice from AEMO and the NSP³¹. Once the alteration of the system is approved, the Proponent must submit a testing and commissioning program for implementation of the alteration to the NSP and AEMO for approval.

Commissioning and testing requirements for an alteration should be discussed during the initial scoping (where undertaken) and as the alteration assessment progresses, in consideration of performance impacts. Even if an alteration is not expected to have a performance impact, some testing may be required to confirm this.

The submission of the commissioning program by the Proponent will need to occur three months prior to commissioning for transmission connections, and one month prior to commissioning for distribution connections³². Depending on the alteration, the Proponent may also be required to provide updated R2 data and validated models to the NSP and AEMO within three months of the final commissioning tests being completed³³.

The extent of testing, including the number of required hold points (where applicable), will not be the same for all alterations and will depend on factors such as:

- Type and complexity of the alteration
- Performance impact of the alteration
- Plant technology

²⁷ NER Schedule 3.1 Bid Validation Data Form: [AEMO | NEM Schedule 3.1 Notification](#)

²⁸ Direct any queries related to registration to the AEMO Registration Team email: onboarding@AEMO.com.au.

²⁹ Register as an IRP: [AEMO | Register as an Integrated Resource Provider in the NEM](#)

³⁰ Register as a Generator: [AEMO | Register as a Generator in the NEM](#)

³¹ See NER 5.3.10(a). Other obligations also apply, for example under NER 5.8.

³² NER 5.8.4.

³³ NER S5.2.4(d)(1).

- Plant capacity
- Location within the power system.

To illustrate:

- Where a change is made to the minimum active power of an existing synchronous generating system, testing at the new minimum active power level may be required to verify the performance.
- For the addition of new production units behind the connection point, a process similar to commissioning of a new plant will be required to establish that the installed plant performs as expected and complies with its altered performance standards.

4. Performance assessment

Subject to the considerations outlined in the below sections, system alterations will be assessed against the technical requirements applicable at the time of the alteration (i.e. 'current' NER technical requirements) as outlined below.

4.1. Performance standards affected by alteration

Only those performance standards impacted by the alteration will be renegotiated. A Connection Applicant is not required to renegotiate performance standards not affected by the alteration.

The impact of the alteration against specific performance standards may be unclear when a Proponent undertakes its initial assessment. It is recommended that the Proponent consult with the original equipment manufacturer (OEM) and undertake benchmarking studies³⁴ to inform this assessment.

Where the Proponent considers that performance against a specific performance standard is not impacted, the NSP or AEMO may require the Proponent to demonstrate this. For those performance standards that the Proponent considers are not impacted, it would be beneficial to include the reasoning and evidence (such as the results of the benchmarking studies) to support their assessment.

The NSP and AEMO will apply engineering judgement in making assessments on potential impacts of an alteration. This judgement will be supported by an explanation of why the alteration is deemed to have a performance impact, and therefore rationale for its assessment requirements.

4.2. Performance standards of existing plant not impacted by addition of new plant

Where an alteration involves the addition of new plant to an existing system (For example, connecting a BESS behind an existing connection point), it is not expected that the performance of the existing plant will need to be re-negotiated under the NER 5.3.9 process.

³⁴ A benchmarking study compares existing and proposed altered performance by overlaying results to indicate impacts of that alteration.

However, performance of the new plant will need to be assessed with both existing and new plant online to confirm no adverse interaction between the two, and that the existing plant remains capable of meeting its existing performance standards. In cases where adverse interaction is observed, the Proponent may elect to modify the performance of the existing plant (For example, through re-tuning) to facilitate integration of the new plant, in which case new performance standards would be negotiated in accordance with the principles outlined in Section 5.

In circumstances where existing and new systems are separately controlled and dispatched, it may be appropriate to capture the performance of the existing and new plant separately. The performance standards for the two plants together become the registered performance standards for the system. Where agreed with AEMO and the NSP, performance of each plant may be measured at a point other than the connection point (For example, S5.2.5.5 reactive current contribution and voltage deviation). However, the NSP and AEMO must be satisfied that the overall performance at the connection point is satisfactory (i.e. capable of meeting the NER S5.2 technical requirements at the connection point when both systems are in service).

4.3. 'New' technical requirements

Some technical requirements may have been introduced into the NER subsequent to the existing performance standards having been finalised (a 'new' technical requirement).

In some circumstances assessment and negotiation of performance against a 'new' technical requirement may be required as part of the alteration assessment and for that performance to be recorded in new or updated performance standards.

Transitional rules typically provide direction on how any 'new' technical requirements apply in specified circumstances³⁵. These regulatory arrangements take precedence.

Where there are no relevant transitional rules, factors which may be considered in requiring assessment against a 'new' technical requirement include:

- Capacity of any new system relative to the capacity of the existing system.
- Materiality of the performance impact under consideration.
- Ability to assess and capture performance of the existing and new plants separately.

In circumstances where it has been agreed that performance against the 'new' technical requirement does not need to be assessed or negotiated, actual performance³⁶ of the system may be recorded as the performance standard (where determined through the alteration assessment). In these circumstances, the performance is not expected to meet the 'current' Minimum Access Standard (MAS).

For example, existing performance standards for some older systems do not include performance against NER S5.2.5.14 – Active power control. In these circumstances, the actual performance of the system has typically been recorded without expectation to meet the 'current' MAS for NER S5.2.5.14.

³⁵ See Chapter 11 of the NER.

³⁶ For example, based on modelling or other evidence such as OEM information.

4.4. Changed technical requirements

NER technical requirements can change from time to time as a result of rule changes and may become more or less onerous. Impacted performance will be assessed against the technical requirement applicable at the time of the alteration ('current' technical requirement) and negotiation will be as detailed in Section 5.

5. Negotiation of affected performance standards

This section describes the principles that will be applied when negotiating performance standards affected by a proposed alteration.

5.1. Negotiated Access Standard (NAS) boundaries

Where an alteration is subject to assessment under NER 5.3.9, the negotiation of altered performance will be undertaken in accordance with NER 5.3.4A. The boundaries of negotiation will fall between the MAS and AAS for that technical requirement in the current version of the NER, unless the existing performance standard is below the current MAS (i.e. where the MAS has since become more onerous following a rule change)³⁷. These boundaries are summarised in Figure 3 below. The MAS, AAS and considerations for NAS for each technical requirement are set out in NER S5.2.

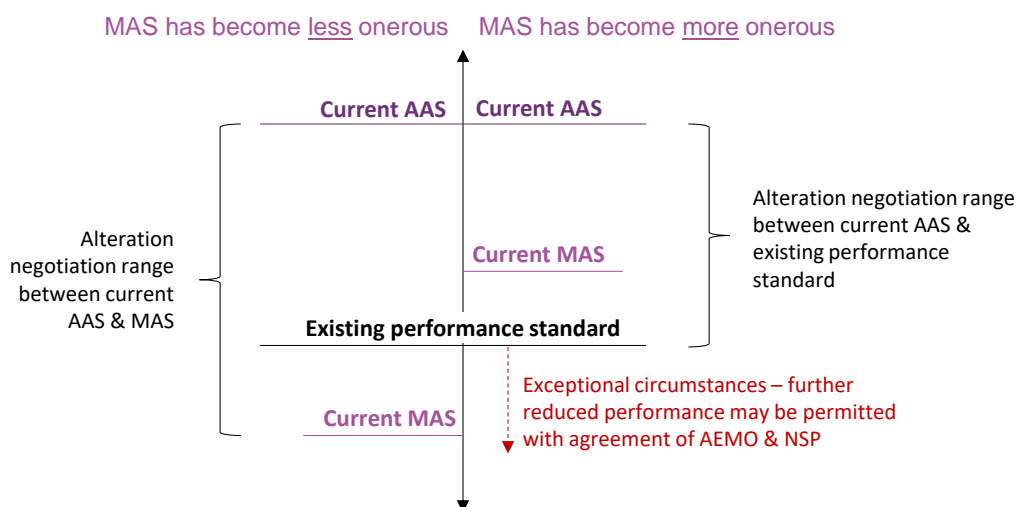


Figure 3 Negotiation bounds for an alteration

5.2. Automatic Access Standard (AAS) requirement

For each impacted performance standard, the Proponent must propose an altered standard that is as close as practicable to the AAS, having regard to:

- The need to protect the altered system from damage.
- Power system conditions at the location of the proposed alteration.

³⁷ NER 5.3.4A (b) (1A).

- Commercial and technical feasibility of achieving the AAS.

In assessing performance, the NSP's and AEMO's primary obligation is to ensure that altered performance will not adversely affect power system security and quality of supply. However, the NSP and AEMO should also have regard to the commercial and technical feasibility of complying with the AAS.

Benefits of a higher performance standard than the proposed performance standard should be weighed against considerations such as:

- Time and cost associated with delivering and/or validating higher performance.
- Capital expenditure associated with delivering higher performance.
- Materiality of the alteration impact to the power system.

Some examples of situations where a NAS may be appropriate are:

- The AAS for reactive power capability of a 100 MW system is 39.5 MVar. The system is able to achieve 35 MVar capacitive reactive power capability at maximum power with no filters/capacitor banks and 39.5 MVar capacitive below 90 MW. In this instance, the NSP and AEMO may determine that there isn't a need for capacitive reactive power at that location, and installing a capacitor bank to achieve AAS would not have a material impact on the power system. Therefore, a NAS is acceptable.
- Due to differences in manufactured impedances of the main power transformer, a system is found to have higher fault current contributions. In this instance, the NSP may determine that there is sufficient headroom on network fault current ratings, considering operating configuration changes to accommodate the additional fault current. Consequently, a higher maximum contribution may be agreed as a NAS.

5.3. Alterations that meet or exceed existing performance standards

As discussed in Section 4.1, only the performance standards affected by a proposed alteration will be assessed under NER 5.3.9. The Proponents are required to submit proposed performance standards for affected technical requirements when NER 5.3.9 applies, but the proposed alteration might not always result in changed performance standards.

A Proponent will undertake connection and tuning studies to determine that a proposed alteration will result in performance meeting or exceeding an existing performance standard. Based on this assessment the Proponent will need to either:

- Propose to retain the existing performance standard.
- Propose a new performance standard if performance will be exceeded.

The NSP and AEMO will assess each affected performance standards and negotiate the altered performance of the system with the Proponent under NER 5.3.4A, by taking into consideration matters outlined in Sections 5.1 and 5.2.

For a minor performance change due to an alteration which will continue to meet or exceed the existing performance standard, a Proponent's proposal to retain the existing performance

standard would usually be acceptable as it would be considered consistent with promoting efficient investment outcomes in the NEM.

Where a significant improvement to performance is a consequence of the alteration or is the purpose of the alteration, this should be reflected in an updated performance standard. Performance standards are a key input into AEMO's understanding of the power system's technical operating envelope. Therefore, it is important that the actual plant capability is reflected in the performance standards. For example, if a developer decides to increase the size of a solar farm by adding more inverters and solar panels, the additional active and reactive power capability would be captured in the NER S5.2.5.1 performance standard.

5.4. Alterations that result in reduced performance compared to existing performance standards

Generally, alterations should not result in reduced performance compared to their existing performance standards. However, in some circumstances NSPs and AEMO may permit reduced performance and agree to negotiate a lower performance standard. The NSP and AEMO will consider whether the reduced performance:

- Will materially impact the power system.
- Is necessary to maintain system stability, For example, due to interactions with other systems.
- Otherwise results in a net benefit, considering matters such as price, quality, safety, reliability, security of supply of electricity and greenhouse gas emissions reductions.

Examples of alterations for which a lower performance standard may be accepted include:

- S5.2.5.5 in conversion of grid following (GFL) to grid forming (GFM) inverters: GFM inverter reactive current response may not settle to a steady value over the duration of a fault which may result in slower settling times of reactive current injection compared to GFL inverters.
- S5.2.5.13 in alterations to asynchronous systems: Considering locational conditions, slower responses for settling and rise times for asynchronous system alterations that increase system capacity may be appropriate to achieve stable performance under relatively weak grid conditions.

In some instances, an existing performance standard will be below the current MAS in the NER (i.e. where a technical requirement has become more onerous as a result of a rule change). In this circumstance, the floor for negotiation is the existing performance standard for the plant³⁸. However, in exceptional circumstances, AEMO and the NSP may agree to relax performance below even the existing performance standard. In making this decision, the NSP and AEMO may give consideration to:

- Why the existing performance standard is no longer achievable.
- Whether there would be any adverse power system impacts (For example, reduced reliability) if the alteration was not approved.
- What the MAS was at the time the Connection Agreement was executed.

³⁸ NER 5.3.4A(b)(1A).

An example of where an alteration may result in reduced performance below the current MAS may be:

- Where it is required to replace a component of an ageing synchronous plant that is necessary for reliability purposes (for example, an automatic voltage regulator), and the owner is unable to source a compatible replacement that can meet the existing performance standards, which are already below the current MAS.

6. Model and data requirements

6.1. Updating system models

Some alterations will require updates to models, typically where the alteration impacts the information and functionality in existing models. For example, updates to firmware that alter dynamic performance of plant will need to be captured in an updated model. On the other hand, a firmware update that only fixes a software bug which does not have an impact on the functionality of the existing model may not require model updates.

Where a Proponent is required to provide models and information to the NSP and AEMO³⁹, these must comply with AEMO's Power System Model Guidelines (PSMG)⁴⁰. The PSMG includes requirements regarding specificity, accuracy and completeness of modelling as well as setting out appropriate tools and formats.

Proponents should also seek advice from the OEM and consider whether updates to model versions for the existing plant are required to reflect the alteration.

6.2. Legacy plant modelling requirements

Performance standards for some (older) systems were established under superseded modelling requirements and may not meet the current PSMG requirements (such older systems are referred to as 'legacy plant' in this guideline). Means of validating legacy plant performance must be provided where:

- Legacy plant alterations impact performance of that plant.
- The proposed alteration to connect any new plant may interact with the legacy plant or materially impact power system stability or security.

To the extent reasonably practicable, the method of validation will need to comply with the PSMG. In determining requirements, the NSP and AEMO may have regard to the costs and benefits of aligning with the PSMG in relation to matters such as price, quality, safety, reliability and security of supply of electricity; and greenhouse gas emissions reductions⁴¹.

The PSMG provides model development options that may enable assessment of alterations to legacy plant where site specific models or OEM support is not available. For example:

- Vendor-specific model for similar type of equipment.

³⁹ NER 5.3.9(b)(2) and 5.3.9(b)(2A).

⁴⁰ [AEMO | Power Systems Model Guidelines](#)

⁴¹ The National Electricity Objective (<https://www.aemc.gov.au/regulation/neo>).

- Model parameters configured using available legacy plant information.
- Performance established in a control hardware-in-loop environment.
- Models of similar equipment, adapted through similar parameter reconfiguration.
- Generic models.

Prior to undertaking significant model development, Proponents should discuss potential options with the NSP and AEMO to agree the most appropriate method.

7. Frequently asked questions

7.1. How long will it take to complete the NER 5.3.9 process and how much will it cost?

The duration and cost to complete the NER 5.3.9 process for a proposed alteration depends on the nature and the complexity of the alteration. For example, replacement of a transformer with a transformer that has similar electrical characteristics may be able to be completed in as little as one week, whilst major alterations such as adding a BESS to an existing system may have timeframes comparable to an initial application to connect.

The NSP and AEMO will work with the Proponent to identify key activities, indicative timing and assessment costs during the NER 5.3.9 scoping phase, although timing and costs may change if any new issues or impacted performance standards are identified during the assessment. The Proponent will be kept informed of any such changes through regular project meetings with the NSP and AEMO.

7.2. Is it necessary to notify the NSP and AEMO of all proposed system alterations?

The Proponent will need to notify the NSP and AEMO of a proposed alteration, unless they have established that their proposed alteration is not subject to NER 5.3.9 requirements or does not meet the NER 5.3.9 criteria⁴². While the Proponent should form a view on this, they may not be aware of broader power system impacts. Therefore, Proponents should engage early with both the NSP and AEMO to discuss the proposed alteration and its expected impact. This engagement can be initiated by submitting a change form. The NSP and AEMO may ultimately decide that the alteration does not meet the NER 5.3.9 criteria, in which case the Proponent will not be required to make a NER 5.3.9(b) submission.

7.3. Does NER 5.3.9 apply to firmware changes?

NER 5.3.9 will apply to systems with existing performance standards, if the proposed firmware change impacts the performance relative to the NER 5.3.9 criteria outlined in Section 2.1 of this guideline. The NER 5.3.9 assessment will be commensurate with the impact of the firmware change on the system and may not always result in altered performance standards.

⁴² See Section 7.4 for notification requirements for setting changes.

NER 5.3.9 will not apply to firmware changes that do not meet the NER 5.3.9 criteria. However, Proponents should notify the NSP and AEMO of the proposed firmware change to enable the NSP and AEMO to make their own assessments, as firmware changes can affect the structure or underlying functionality of controller systems which may impact performance. Where it is determined that the NER 5.3.9 criteria are not met, the NSP and AEMO will typically require that the Proponent agree and execute a test plan to confirm that the firmware update has not impacted performance, once the update is commissioned.

Refer to AEMO NER 5.3.9 fact sheet on firmware updates to a generating system or integrated resource system for further information.⁴³

7.4. Does NER 5.3.9 apply to setting changes?

NER 5.3.9 will apply to systems with existing performance standards if the setting change impacts the performance relative to the NER 5.3.9 criteria as outlined in Section 2.1 of this guideline. If the Proponent has established that the proposed change is not subject to NER 5.3.9 requirements (i.e. setting changes are proposed to comply with the existing performance standards), they are still required to notify the NSP and AEMO of the proposed change under clause S5.2.2 'Application of Settings'. The change form can be used for this purpose. Settings changes can only be applied if they have been approved in writing by the NSP and AEMO to ensure a robust change management process.

7.5. Does NER 5.3.9 apply to customer connection alterations?

NER 5.3.9 only applies to generating systems and integrated resource systems. It will not apply to customer connection alterations (including for large load connections), noting that NER 5.3.12 may apply in this case.

7.6. How will changes in assessment methodology be considered when assessing a proposed system alteration?

NSP and AEMO engineers will generally follow assessment methodologies as outlined in the AEMO Access Standard Assessment Guide⁴⁴. However, assessment methodologies will vary over time as industry and power system requirements evolve, potentially resulting in different performance requirements. In circumstances where methodologies have changed since the finalisation of existing performance standards, engineering judgment will be applied in deciding whether a different methodology is required to assess performance. Factors for consideration include:

- Whether the difference in performance is significant.
- How it is captured in the performance standards.
- Whether the previous assessment methodology is appropriate.
- What performance can be achieved by existing/unaltered plant.

⁴³ [Link to the firmware fact sheet] currently being developed.

⁴⁴ [AEMO | Access Standard Assessment Guide](#)

Where a previous assessment methodology is not considered to be appropriate, an explanation will be provided to the Proponent.

7.7. Which version of the NER will a proposed system alteration be assessed against?

Performance standards impacted by the proposed alteration will be assessed against the technical requirements applicable at the time of the alteration (i.e. current version of the NER). From time to time new or changed technical requirements may have been introduced to the NER subsequent to the existing performance standards having been finalised. Assessment and negotiation against new and changed technical requirements is outlined in Section 4 and Section 5 of this guideline. Proponents should contact their NSP and AEMO if they require additional guidance on technical requirements for their proposed alterations.

7.8. How are system strength impacts assessed for proposed system alterations?

If in AEMO's reasonable opinion the proposed NER 5.3.9 alteration will have a general system strength impact, NER 5.3.4B will apply⁴⁵. If NER 5.3.4B applies, the Proponent may request the NSP to undertake a Preliminary Assessment prior to making a NER 5.3.9(b) submission during NER 5.3.9 scoping (see Section 3.2).

The assessment of general system strength impact should be relative to the network (including the existing system being altered) prior to the proposed alteration. Therefore, the Preliminary Assessment and Full Assessment, including calculation of system strength quantity and reduction in available fault level, will only assess the system strength impact of the alteration.

Further information on assessment of system strength can be found in the AEMO System Strength Impact Assessment Guidelines⁴⁶ and System Strength Framework Frequently Asked Questions⁴⁷.

7.9. How will power system changes be considered when assessing a proposed system alteration?

Power system conditions may have changed since performance standards were finalised. When contemplating an alteration, Proponents should contact their NSP to request the latest network information to ensure that the alteration is designed in consideration of current network data and conditions.

⁴⁵ NER 5.3.9(c1).

⁴⁶ [AEMO | System Strength Impact Assessment Guidelines](#)

⁴⁷ [AEMO | System Strength Framework Frequently Asked Questions](#)