



SSIAG Amendment – Calculation of System Strength Quantity

Draft Report – Expedited consultation
for the National Electricity Market

Published: 22 April 2024

aemo.com.au

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

Australian Energy Market Operator Ltd ABN 94 072 010 327

© 2024 Australian Energy Market Operator Limited. The material in this publication may be used in accordance with the [copyright permissions on AEMO's website](#).

Explanatory statement and consultation notice

The publication of this draft report commences AEMO's expedited consultation on proposed amendments to the System Strength Impact Assessment Guidelines (**SSIAG**) (the **proposal**) under the National Electricity Rules (**NER**).

This consultation is undertaken as required by NER 4.6.6 and 11.163.2, following the procedure in NER 8.9.3. AEMO considers that the expedited rules consultation procedure is appropriate because the proposal is non-material for the reasons set out in section 1 of this draft report.

The proposed amendments to the SSIAG are being made to give effect to the Australian Energy Market Commission (**AEMC**) final rule on Calculation of System Strength Quantity (**SSQ Final Rule**)¹. The SSQ Final Rule requires AEMO to amend the SSIAG to include a methodology for calculation of the system strength quantity for a connection point². The methodology must be made in accordance with principles specified in the SSQ Final Rule³. The amendments are also required to provide guidance on the inputs and assumptions that may be used by a Network Service Provider when calculating an indicative system strength quantity in accordance with NER 5.3.4B(a2)(2A)⁴.

AEMO's draft proposal is to amend the SSIAG in the form published with this draft report⁵, with a proposed effective date of 1 July 2024.

In addition to the amendments required to give effect to the SSQ Final Rule, the proposed amendments to the SSIAG also include a number of minor and administrative changes, including:

- The introduction of terminology and concepts that are consequential on amendments to the NER made by the Integrating Energy Storage Systems (IESS) Rule⁶, for which full implementation will occur on 3 June 2024
- Clarification of the way in which the existing concept of the stability coefficient is defined and described in the Guideline
- Clarification of the number of decimals to be used in calculating the Withstand SCR
- Other minor corrections and clarifications to the text of the Guideline.

¹ See <https://www.aemc.gov.au/rule-changes/calculation-system-strength-quantity>.

² See NER 11.163.2

³ See NER 4.6.6(b1)(3)

⁴ See NER 4.6.6(b1)(4)

⁵ See https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/SSIAG/Draft-System-Strength-Impact-Assessment-Guidelines.

⁶ See <https://www.aemc.gov.au/rule-changes/integrating-energy-storage-systems-nem>.

Consultation notice

If any person considers that AEMO should follow the standard (rather than expedited) consultative procedure for this proposal, they can submit a request for AEMO to do so (a **procedure change request**) within 10 business days after publication of this draft report. Any procedure change request must be sent to contact.connections@aemo.com.au by 5:00pm (AEST) on 7 May 2024. In accordance with NER 8.9.3(b), a request must include reasons why the person considers the proposal is not a 'Non-material Proposal' as defined in NER 8.9.1 – that is, why it would have a significant effect on the National Electricity Market (**NEM**) or on the activities of a relevant group of registered participants.

AEMO invites written submissions from interested persons on this draft report and the draft proposal to contact.connections@aemo.com.au by 5:00 pm (AEST) on 21 May 2024.

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

Before making a submission (including a procedure change request), please read and take note of AEMO's consultation submission guidelines, which can be found at <https://aemo.com.au/consultations>. Subject to those guidelines, submissions will be published on AEMO's website.

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

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

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

Contents

Explanatory statement and consultation notice	3
1. Stakeholder consultation process	6
2. Background	8
2.1. Context for this consultation	8
2.2. NER requirements	8
2.3. The national electricity objective	9
3. Proposal discussion	10
3.1. Description of proposal	10
3.2. How the proposal meets the objectives	12
4. Draft determination	13
4.1. Draft determination	13
4.2. Effective date	13

1. Stakeholder consultation process

As required by National Electricity Rules (**NER**) 4.6.6 and 11.163.2, AEMO is consulting on proposed amendments to the System Strength Impact Assessment Guidelines (**SSIAG**) in accordance with the expedited rules consultation procedure in NER 8.9.3. The proposed amendments (the **proposal**) are being made to give effect to the Australian Energy Market Commission (**AEMC**) final rule on Calculation of System Strength Quantity (**SSQ Final Rule**)⁷.

In addition to the amendments required to give effect to the SSQ Final Rule, the proposed amendments to the SSIAG also include a number of minor and administrative changes, including:

- The introduction of terminology and concepts that are consequential on amendments to the NER made by the IESS Rule⁸, for which full implementation will occur on 3 June 2024
- Clarification of the way in which the existing concept of the stability coefficient is used in the Guideline
- Clarification of the number of decimals to be used in calculating the Withstand SCR
- Other minor corrections and clarifications to the text of the Guideline.

Note that this document uses terms defined in the NER, which are intended to have the same meanings.

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

Table 1 Consultation process and timeline

Consultation steps	Dates
Calculating System Strength Quantities in the NEM guidance paper published*	11 May 2023
AEMO Rule change proposal	9 November 2023
AEMC Draft determination consultation	30 November 2023 – 18 January 2024
AEMC Final determination	29 February 2024
Draft report published	22 April 2024
Procedure change request deadline	7 May 2024
Submissions due on draft report	21 May 2024
Final report published	Expected 30 June 2024

* See https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/ssrmiag/amendment/guidance---calculating-system-strength-quantities-in-the-nem.pdf.

⁷ See <https://www.aemc.gov.au/rule-changes/calculation-system-strength-quantity>.

⁸ See <https://www.aemc.gov.au/rule-changes/integrating-energy-storage-systems-nem>.

AEMO considers that the expedited rules consultation procedure is appropriate for the proposal for the following reasons:

- The proposed amendments to the SSIAG are unlikely to have a significant impact on the NEM or the activities of the Registered Participants to which the proposed amendments will apply as they address an issue that may otherwise prevent the intended outcomes of the system strength framework being achieved.
- The proposed amendments are in accordance with requirements specified in the SSQ Final Rule, and give effect to the Final Rule in a manner that is consistent with principles prescribed in the Final Rule. These have already been the subject of extensive stakeholder consultation through the AEMC's rule change process and AEMO's previous consultations on the SSIAG⁹.
- The additional proposed amendments to the SSIAG are minor or administrative in nature in that they make corrections or provide additional clarity and certainty to the SSIAG, but do not alter its substantive effect.

AEMO notes that the AEMC agreed with AEMO's intention to use the expedited rules consultation procedure in its Determination on the SSQ Final Rule and set a date of 30 June 2024 as the date by which amendments to the SSIAG were required to be made on that basis¹⁰.

At any time before the final report is published, and based on information received through submissions to this draft report, any procedure change requests under NER 8.9.3(b) or otherwise, AEMO may decide that the proposal can no longer be considered non-material. If so, AEMO will switch to the standard consultation procedure by publishing a notice under NER 8.9.3(f).

AEMO's consultation webpage for the proposal is at <https://aemo.com.au/consultations/current-and-closed-consultations/system-strength-impact-assessment-guidelines-amendment-consultation>, which will contain all published papers and reports, written submissions, and other consultation documents or reference material (other than material identified as confidential).

⁹ See <https://aemo.com.au/consultations/current-and-closed-consultations/ssrmiag>.

¹⁰ See <https://www.aemc.gov.au/rule-changes/calculation-system-strength-quantity>, p22.

2. Background

2.1. Context for this consultation

The SSQ Final Rule amends clause 4.6.6 of the NER, which specifies the required content of the SSIAG. Schedule 1 of the SSQ Final Rule^{11,12} sets out the amendments, which come into effect on 1 July 2024 and include a requirement for the SSIAG to:

- specify a methodology for calculation of the system strength quantity for a connection point; and
- provide guidance on the inputs and assumptions that may be used by a Network Service Provider when calculating an indicative system strength quantity in accordance with clause 5.3.4B(a2)(2A) of the NER.

The transitional provisions contained in Schedule 2 of the SSQ Final Rule require AEMO to update and publish the SSIAG to take into account the amendments made by the SSQ Final Rule by 30 June 2024. The transitional provisions also require that the amendments to the SSIAG must come into effect on 1 July 2024¹³.

2.2. NER requirements

The key change implemented by the SSQ Final Rule is the substitution of a principles-based methodology for calculation of the SSQ in place of the prescriptive formula previously included in clause 6A.23.5(j) of the NER. The principles to be applied by AEMO in specifying the methodology will be set out in clause 4.6.6(b1)(3) of the NER (as amended by Schedule 1 of the SSQ Final Rule) from 1 July 2024, which provides that the methodology must:

- (i) *include the use of:*
 - (A) *the short circuit ratio for the connection point; and*
 - (B) *the rated active power, the rated power transfer capability or the maximum demand (as applicable) for the connection point,*
each as agreed in accordance with clause S5.2.5.15, clause S5.3.11 or clause S5.3a.7 (as applicable) and as recorded in the relevant performance standards for the plant connected at the connection point; and
- (ii) *reflect the adverse system strength impact of a new connection or alteration to a connected plant as well as any additional amount by which it reduces the available fault level at the connection point for the new connection or connected plant,*

¹¹ See AEMC final amending rule: <https://www.aemc.gov.au/sites/default/files/2024-02/National%20Electricity%20Amendment%20%28Calculation%20of%20system%20strength%20quantity%29%20Rule%202024%20No.%202%20%286%29.pdf>

¹² See AEMC final rule markup reflecting indicative changes from the amending rule: <https://www.aemc.gov.au/sites/default/files/2024-02/ERC0375%20Calc%20of%20SSQ%20-%20final%20rule%20-%20rule%20markup.pdf>

¹³ NER 11.163.2

so as to produce a result that is an approximation of the level of impact that would be required to be remedied or avoided by a system strength remediation scheme for that connection point, as assessed by AEMO having regard to the need to avoid a full system strength impact assessment.

2.3. The national electricity objective

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

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

to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- (a) price, quality, safety, reliability and security of supply of electricity; and*
- (b) the reliability, safety and security of the national electricity system; and*
- (c) the achievement of targets set by a participating jurisdiction—*
 - (i) for reducing Australia’s greenhouse gas emissions; or*
 - (ii) that are likely to contribute to reducing Australia’s greenhouse gas emissions.*

3. Proposal discussion

3.1. Description of proposal

3.1.1. SSQ methodology

The proposed amendments to the SSIAG include re-naming section 6 to System Strength Charge and creation of a new sub-section for SSQ. The original section on System Strength Locational Factor (**SSLF**) is now a sub-section of section 6. Consistent with the SSQ Final Rule, the updated SSIAG presents the methodologies of system strength impact assessments and calculation of SSLF and SSQ separately to distinguish their different purposes.

The following has been included in the amended SSIAG in relation to the SSQ to give effect to the SSQ Final Rule:

- Inclusion of purpose, timing and circumstances in which an SSQ calculation is not required, for clarity and completeness
- Distinguishing the difference between an indicative and final SSQ
- The methodology for undertaking the SSQ calculation following the principles in the NER, which:
 - Includes the use of parameters set out in the NER
 - Considers the outcomes that should be achieved in relation to the SSQ component
 - Provides guidance on inputs and assumptions that may be considered when calculating an indicative SSQ.

In the proposed SSQ calculation methodology, AEMO has incorporated a stability coefficient, to appropriately recognise system limitations, in addition to the prescriptive parameters in the NER (the short circuit ratio and the rated active power, the rated power transfer capability or the maximum demand (as applicable)). This is the same stability coefficient that is used in the reduction in available fault level (**AFL**) calculation. This in turn produces an outcome that is broadly equivalent to the assessment of the general system strength impact used for self-remediation.

3.1.2. Minor and administrative amendments

The SSIAG mark-up includes minor and administrative amendments that AEMO identified in the course of updating the SSIAG, as set out below.

Integrating energy storage systems concepts and terminology

On 2 December 2021, the AEMC made its final determination on the IESS Rule, to integrate storage and hybrid systems into the NEM¹⁴. The full implementation of the rule will occur on 3 June 2024.

¹⁴ See <https://www.aemc.gov.au/rule-changes/integrating-energy-storage-systems-nem>.

Key new concepts relevant for the SSIAG include:

- A new participant category: **Integrated Resource Provider (IRP)**
- A new unit classification: **bidirectional unit (BDU)**
- A new collective term for generating units and bidirectional units: **production unit (PU)**
- A new system type: **integrated resource system (IRS)**
- A new collective term for distribution connected generating unit or distribution connected bidirectional unit replacing embedded generating unit: **distribution connected unit.**

The SSIAG has been amended to reflect these concepts and terminology where relevant.

Stability coefficient – SSIAG section 3.4.3

The proposed amendments to the SSIAG include a new sub-section under section 3 (concepts) that centrally defines and describes the stability coefficient. The stability coefficient is an existing concept used in the reduction in AFL calculation and is a component of the SSQ calculation methodology proposed in the SSIAG. There is no material change to the definition or description of the stability coefficient, the new sub-section only serves to centralise the concept and avoid repetition.

Withstand SCR calculation result – SSIAG section 7.3.2

AEMO has received requests from stakeholders to clarify the number of decimals that should be considered for the Withstand SCR calculation result, similar to the guidance provided for the SSLF calculation result (SSIAG section 6.1.4(c)(viii)). The proposed amendments to the SSIAG include guidance by specifying that the result should be expressed to a minimum of 2 decimal places and not more than 3.

3.1.3. Other minor corrections

The proposed amendments to the SSIAG include a number of other minor corrections. These are:

- Section 2.1.3 – inserted appropriate NER reference in point (a)
- Section 2.5.2 – addition of the words ‘is required’ in the second sentence in point (a)
- Section 2.5.3 – removed underline from point (a) and corrected the reference to ‘Connecting NSP’ in point (c)(i)
- Section 3.2 – corrected capitalisation of heading
- Section 3.4 – re-worded first sentence to clarify that the AFL used for calculating SSLF is dealt with separately in the SSLF sub-section
- Section 3.4.2 – corrected heading and removed outdated assumption from footnote
- Section 4.2.4 – corrected sentence in point (c)(iii)
- Section 7.2.1 – corrected italicisation.

3.2. How the proposal meets the objectives

When considering application of the NEO to the making of the SSQ Final Rule, the AEMC focused on three key considerations:

- Safety, security and reliability – the final rule promotes efficient investment in and provision of system strength services by providing two broadly equivalent options for connection applicants to choose from when mitigating their system strength impacts
- Innovation and flexibility – by adopting a principles-based approach to calculating the SSQ, the final rule is designed to accommodate changes in knowledge, technology and policy as the power system evolves
- Principles of good regulatory practice – the final rule will interact constructively with other security reforms underway.

The first of these is most relevant to the proposed amendments to the SSIAG, in that the methodology for calculation of the SSQ in the amended SSIAG will influence the extent to which connection applicants are presented with two broadly equivalent options when mitigating their system strength impacts. Presenting connection applicants with broadly equivalent options ensures they are able to make-like for-like comparisons between alternative options, thereby supporting efficient decision making and efficient investment in the provision of system strength services.

The SSQ methodology proposed in the amendments to the SSIAG is designed to produce a result that is an approximation of the level of impact that would be required to be remedied or avoided by a system strength remediation scheme for the relevant connection point. This approach ensures broad equivalence between the options of self-remediation by connection applicants and an election to pay an SSQ, and is consistent with the principle set out in NER 4.6.6(b1)(3) (reproduced above in section 2.2).

4. Draft determination

4.1. Draft determination

AEMO has prepared a draft of amendments to the SSIAG reflecting the proposal, as published with this draft report in mark-up format from the current version. AEMO's draft determination is to make the amendments in that form.

4.2. Effective date

AEMO's proposed effective date for the determination is 1 July 2024. As noted in section 2.1 above, the transitional provisions contained in the SSQ Final Rule require that the amendments to the SSIAG take effect from that date.